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SOPHIA

Philosophical approach to learning as a cognitive process

Enfoque filosófico del aprendizaje como proceso cognitivo

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Editorial

We present the number 36 of the journal *Sophia: Collection of Philosophy of Education*. The fundamental axis of reflection revolves around the philosophical approach to learning as a cognitive process, and explores different theories and concepts related to learning from different perspectives, including a post-digital vision. This volume contains key elements typical of a philosophy of learning that provides tools and categories that allow understanding the nature of knowledge, learning models, the executive functions of learning, psycho-emotional competencies, psychoeducational elements, the way learning is acquired and how it is applied in everyday life.

By making a conceptual approach to the philosophy of learning, it can be shown that it involves a set of beliefs and principles that guide the way of understanding and approaching the learning process, and in turn, learning is understood as a basic cognitive process for the development of the human being and for the functioning of the mind. Knowledge, skills and attitudes are acquired through learning, which contribute to understanding the world and interacting with others.

The title of this volume already constitutes a philosophical question. It forms a categorical *corpus* that invites to rethink the meaning of learning, its process and its purpose. However, it is essential to consider some perspectives that historically have been key to understanding learning, which, among other aspects, has had different variants and has been considered as:

- An active process whereby students build their own knowledge by interacting with the environment and self-reflection on their experiences, as stated by constructivism.
- Significant, when students can relate new information to knowledge previously acquired and applied to real situations. It considers the deep understanding and need to implement knowledge transfer.
- Collaborative, as it promotes interaction and collaboration among students. It is based on the idea that learning is improved through the exchange of ideas, discussion and joint problem solving.

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- Autonomous, as it considers the ability of students to take the initiative in their learning process. It involves self-regulation, planning and making informed decisions about how and what to learn.
- Project-based, as it involves the accomplishment of tasks or practical projects that require the application of knowledge and skills in a real context. A learning that moves intrinsic motivation and skill development internship.
- Lifelong learning since the philosophy of learning recognizes that it is not limited to the school environment but is a lifelong process in which informal learning is valued along with personal and integral development and the acquisition of skills to adapt to the circumstances and reality in which the subjects find themselves.

Continuing with the reflection on the topic proposed in this volume, learning as a cognitive process is important because it allows to acquire information and knowledge on different topics, from basic concepts to specialized knowledge in specific areas, aspects that allow an approach to the world and contribute to timely and informed decision-making.

It is necessary to keep in mind that cognitive skills such as critical thinking, problem solving, decision making and creativity are developed through learning; impressionable skills that allow to face the challenges of life and achieve success in different areas, such as work, studies, and interpersonal relations. Learning also stimulates memory and attention by considering information, processing, and storing it in long-term memory.

In addition, learning exposes us to different ideas, perspectives, and cultures, allowing us to broaden our worldview and develop an open and tolerant mindset in a globalized and diverse context.

There are several philosophical approaches to learning as a cognitive process, about how learning takes place and how knowledge acquisition processes can be improved in humans. From this point of view, the philosophical foundations of the approaches are found in different edges. One of them, such as the idealism, establishes that knowledge is in the mind and that learning is a process of discovery and development of innate ideas; this philosophical current establishes that learning involves the search for truth and the understanding of universal principles. Another, like empiricism, states that knowledge is obtained through sensory experience and observation; according to this philosophical current, learning is based on data collection, experimentation, and focuses on the acquisition of practical skills.

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A third perspective such as constructivism affirms that learning is an active process in which individuals build their own knowledge by interacting with their environment; according to this trend, learning occurs through problem solving, reflection and the construction of meanings. A fourth perspective is existentialism, which states that knowledge depends on individual experience and freedom of choice; it asserts that learning involves the exploration of authenticity and the search for meaning in life; existential learning concentrates its attention on personal development and self-reflection.

In the attempt to understand the essential characters that determine the understanding of cognitive learning, it is linked to emotions; in this sense, positive psychology establishes that "emotional balance [...] increases learning, [...] and depressive states or anger lead to difficult learning. This is the basis of the Yerkes-Dobson Law (1908)" (Quilambaqui and Aguilar, 2011, p. 52). Indeed, the link between learning and emotions is important in education. Emotions can have a significant impact on the learning process, to the extent that they can influence students' motivation, attention, memory, and decision-making, which are fundamental aspects of the learning process.

Some scholars show that positive emotions, such as joy or interest, contribute to the improvement of attention and the retention of information, which facilitates the learning process. On the contrary, negative emotions, such as fear or anxiety, tend to hinder learning, can distract, hinder concentration, negatively affect memory and can even generate negative attitudes towards learning, which can decrease motivation and academic performance of students.

Philosophical approach to learning as a cognitive process Educators need to be aware of the influence of emotions on learning and adopt strategies that enable the strengthening of positive emotions in the classroom.

Volume 36 of the collection is structured in two sections that group the ten articles best evaluated by the specialists selected to participate in the international review process. Out of the approved manuscripts, the first five are related to the central theme and the other five documents, equally important, are located under the name "Miscellaneous".

First section

The section linked to the central theme seeks to answer questions such as: what do we refer to when we talk about emotion in the education sciences?, what components and mechanisms define the emotional

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architecture of educational processes?, what are the characteristic features in the transition from traditional learning approaches to contemporary learning approaches?, what is the epistemological dynamic experienced by learning models?, does digitalization today increase the socioeconomic gap between students with access to digital tools and those who do not have it?, *is it possible* to have a counter-digitalization in the contemporary context?, contributions of executive functions in the learning of university students?, which activities are recommended to develop executive functions in students?, what are the main difficulties in behaviors aimed at goals in young university students?, what is the significant articulation between academic performance, lack of acceptance and emotional clarity?

These questions seek to be answered in the presentation of the content of each of the documents. A brief synthesis is presented:

The reflective tour starts with the article "The Emotional Architecture of Education from Science, Philosophy and Art", presented by Clara Romero Pérez, from the University of Seville, Spain. The author proposes to offer a framework of integrative analysis on what she calls "emotional architecture of education" and its implications for designing educational actions inherent to the human processes. The researcher analyzes the components and emotional mechanisms involved in educational processes and anticipates that the emotional architecture of education has a multidimensional character insofar as it relates to organic, psychic and sociocultural realities. Finally, it establishes the need to bet on an affective and inclusive education.

The path of cognitive construction is found in the article "Learning models in the transition to complexity as a challenge to simplicity", written by Jefferson Alexander Moreno Guaicha (University of Experimental Technology Yachay of Ecuador; University of Research and Innovation of Mexico), Alexis Alberto Mena Zamora (Educational Unit Santa Juana of Arco La Salle of Ecuador) and Levis Ignacio Zerpa Morloy (University of Experimental Technology Yachay; University Pontificia Bolivariana de Medellín). The authors intend to systematically examine the evolution of learning models, highlighting the paradigmatic changes that have aroused in the transition from traditional learning approaches to innovative and transdisciplinary proposals.

Likewise, the article "Post-digital pedagogy as a synthesis of rhizomatic learning and the post-digital era", by Diego Medina López-Rey, from the University of Valencia, Spain. The author refers to two central axes: rhizomatic learning and the post-digital era. Rhizomatic learning bases its principles on the construction of knowledge from the contribu-

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tions of the students in real time. The post-digital era is understood as "the juncture in which digital technology is an imposed social need". The researcher analyzes the possibility of a counterdigitalization using digital technology as an emancipatory tool and, consequently, discusses the possibility of establishing a postdigital pedagogy.

In the trajectory of knowledge is the manuscript "Executive Functions in the Learning of University Students", written by Darwin Joaqui Robles, from the Minuto de Dios University Corporation (Colombia) and Dorys Noemy Ortiz Granja, from the Pontificia Universidad Católica (Ecuador). The writers raise the need to understand the role of executive functions in learning, in such virtue, identify the characteristics, describe their components and analyze the relationship with learning as such. According to the authors, the article presents a neuropsychological approach in dialogue with the philosophy of Heidegger, Hume and Locke.

Philosophical approach to learning as a cognitive process the article "Psychoeducational proposal on emotional competencies in university students", by Cristina Michelle Rojas Cadena, Arianna Melissa Ruiz Silva and Elena Narcisa Díaz Mosquera, from Pontificia Universidad Católica del Ecuador, closes this itinerary on the central theme. The authors analyze the link between emotional competencies and academic achievements in higher education, addressing the characteristics of emotional regulation competence, which affects the academic performance of young university students, in order to design a psychoeducational proposal aimed at strengthening the emotional self-management of the mentioned group.

Second section

This section aims to answer questions such as: what is the characterization of emotions in today's society marked by the characteristics of the fourth industrial revolution?, what are the implications of emotional experiences in contemporary discussions about the human nature in contexts of innovation?,

What is the significant value of applied ethics in teaching? What are the contributions of discursive ethics in the educational context of the professions? Is the subject an autonomous being in political deliberation? are the thoughts, postures and forms of the politic organization the ones that determine the subject?, what are the contributions of higher education for the integral formation of the human being?, what are the contributions of

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critical thinking for its execution in the curriculum and in the classroom?, what is the incidence of critical thinking on academic performance?

For dynamizing the different horizons of comprehension that derive from the questions described, an extract of the content of each of the manuscripts that comprise the one described is shown:

Thus, in this intellectual deliberation path we start with the article "The role of emotions in the society of performance", written by Iván Alfonso Pinedo Cantillo, from the National Open and Distant University of Bogotá. The researcher presents an interesting analysis on the philosophical thought of Byung-Chul Han and its impact on the current socio-political and economic reality, in which the transformation of biopolitics into psychoplitics constitutes one of the most significant elements of modern society. The author reflects on the "role played by emotions in the society of performance, fatigue and infocracy turning to the 'hamster wheel' metaphor as an evocative image of [...] current dynamics".

The path of philosophical thought continues with "The value of applied ethics in engineering studies in a horizon of reliable artificial intelligence", elaborated by Antonio Luis Terrones Rodríguez, from the University of Valencia and Institute of Philosophy-CSIC (Es-Spain) and Mariana Rocha Bernardi, from the University of Caxias do Sul (Brazil). The researchers carry out an analysis of studies on the need to establish bases for ethical governance of artificial intelligence. Hence, ethics applied in engineering studies is a commitment to professional strengthening, ethical governance and responsible research and innovation.

Likewise, "Psychopolitics and big data as new forms and tools for political organization," written by Elkin Eduardo Niño Morales, Oscar Javier Cabeza Herrera and Campo Elías Flórez Pabón, from the University of Pamplona (Colombia). The authors analyze the relationship between *mass media* and politics from Chomsky and Han. To fulfill their objective, the researchers use the database with the algorithm: "Neoliberalism, psychopolitics, big data, mass media and democracy" and from this perspective they study 13 books and 20 articles. They identify new forms and tools of political organization, establish the existing relationship between politics and the media and among other interesting aspects consider that the "emotionalization" of political communication diminishes individual autonomy.

As part of the discussion follows the manuscript "Higher education and integral development in Mexico", by José Antonio Villalobos López, from the National Polytechnic Institute (Mexico). The author explains the correlation between the higher education student universe and economic growth and human development, argues that education

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contributes to achieve "economic growth and substantial improvement in stages of integral development".

The volume closes with the article "Pedagogical Practice of Critical Thinking from the Cultural Psychology", written by María Gisela Escobar Domínguez, from the Metropolitan University of Caracas (Venezuela). The author makes an approach of critical thinking as a fundamental competence in educational approaches, raises the need to understand the subject from the categorical interaction of "its epistemology, theorization and praxis" and states that there is incongruity between curricula and classroom practice; also, analyzes the implications of critical thinking on academic performance.

Philosophical approach to learning as a cognitive process Learning as a cognitive process entails the need to acquire knowledge, to develop comprehension skills and mental skills to process information, solve problems, make decisions and develop critical thinking skills.

The content presented on this issue carries approaches and perspectives that invite to continue rethinking and propose new aspects of reflection.

Floralba del Rocío Aguilar Gordón
Editor-in-Chief

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Articles / *Artículos*

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The emotional architecture of the education through science, philosophy and art

La arquitectura emocional de la educación desde la ciencia, la filosofía y el arte

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Abstract

The aim of this paper is to offer an integrative framework of the emotional architecture of education and its implications for the design of pertinent educational interventions in the processes of human development. Specifically, the emotional components and mechanisms involved in educational processes that have proven to be effective are examined. To this end, an analytical approach based on a documentary review of scientific and humanistic studies has been applied. The questions that have guided this study have been: What do we mean when we talk about emotion in Educational Sciences? What components and mechanisms define the emotional architecture of educational processes? It is concluded that the emotional architecture of education has a multidimensional character as it concerns organic, psychic, and socio-cultural realities. Furthermore, the essential components for educating and learning have their most important instruments in emotions: these include desire and enthusiasm. The most relevant emotional mechanisms are involvement—of teacher and learner—resonance as well as emotional proximity. The pedagogical implications are support for affective education that integrates the learning of well-being and suffering, and the use of experiential, participatory, and artistic methodologies—especially, performing arts—and support structures for education professionals and students.

Keywords

Emotions, social and emotional learning, teacher effectiveness, education, educational model, educational theory.

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Resumen

El propósito general de este estudio es ofrecer un marco de análisis integrador sobre la arquitectura emocional de la educación y sus implicaciones para el diseño de acciones educativas pertinentes en los procesos de formación humana. De modo específico, se analizan los componentes y mecanismos emocionales implicados en los procesos educativos que han probado su efectividad. A tal fin, se ha aplicado un enfoque analítico basado en una revisión documental a partir de estudios científicos y humanísticos. Las preguntas que han guiado este estudio han sido: ¿a qué nos referimos cuando hablamos de emoción en las ciencias de la educación?, ¿qué componentes y mecanismos definen la arquitectura emocional de los procesos educativos? Se infiere que la arquitectura emocional de la educación posee un carácter pluridimensional, pues concierne a realidades orgánicas, psíquicas y socioculturales; asimismo, que los componentes esenciales para educar y aprender tienen en las emociones sus instrumentos más destacados, entre ellos, deseo y entusiasmo. Como mecanismos emocionales más relevantes se encuentran la implicación —del enseñante y el aprendiz— la resonancia y la proximidad emocional. Las implicaciones pedagógicas son apostar por una educación afectiva que integre el aprendizaje del bienestar y del dolor, y la apuesta de metodologías experienciales, participativas y artísticas —especialmente dramáticas o escénicas— y dispositivos de acompañamiento para los profesionales de la educación y los estudiantes.

Palabras clave

Afectividad, aprendizaje socioemocional, eficacia docente, educación, modelo educacional, teoría de la educación.

Introduction

Child and adolescent well-being, school welfare, resilience, emotional intelligence, social and emotional learning, emotional competence, are terms that are reflected in the agenda and in the political discourse in education, in the editorial collections in the psycho-pedagogical field, as well as in the curricular programs. These concepts contain meanings mainly derived from scientific theories from the health sciences, giving them a specific link: the *emotional* as *mental state* associated with mental health. All these terms are stated by previous theories generated within specific research communities with different objectives, cultures and dynamics than those produced within educational research communities.

The problem with theoretical conceptualizations is that they allow us to see the tree, but they prevent us from seeing the forest and appreciating the landscape. In the educational field, we appropriate concepts applied in other contexts -in this case, concepts that come mainly from the clinical or therapeutic field that account for specific realities (*i. e.* mental health). We employ concepts (*i. e.* child and/or adolescent well-being) that we transfer directly to a reality on which intervention is needed due to the precise problems demanded by each historical time (read in our socio-educational time: mental health problems for children and adoles-

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cents, violence and harassment, racism, xenophobia and other exclusionary attitudes and behaviors).

Approaching the study of any phenomenon of reality is an arduous process that requires interdisciplinarity and distance from the phenomenon studied. There is no clear reality nor do we have a unified theory, at least those that deal with the socio-human world, whose explanatory power or cognitive depth makes it unique and exclusive, and which requires a single theorization or conceptualization. There is no theory from anywhere. As Niklas Luhmann (1996) argued, the understanding of reality is explained by networks of observers that make a unified observation impossible.

This theoretical limitation (Zemelman, 2021) has practical implications. A limitation that affects especially the social sciences and, with it, the education sciences. In the specific case of the latter, in relation to the emotional dimension in educational scenarios, processes and practices, the greatest limitation has to do with the diversity of existing pedagogical theories and approaches, and the hegemony of some approaches against others (*i. e*. the wellbeing or therapeutic approach in education, dominant today in education). Even though, I insist, this theoretical diversity allows us to see the trees, it limits us to appreciate the thickness of the forest and the shades of the landscape. Therefore, the initial purpose of this theoretical study is to offer a framework of inclusive analysis -although not exhaustive- that explores new epistemic opportunities around a reality little explored in the theory of education: the emotional framework or architecture of education and its implications for the design of relevant educational actions in the processes of human formation.

For conducting this study, we do not start from a closed discourse on the theoretical level, i.e., we do not follow a score *per se*. On the contrary, it has decided to incorporate knowledge derived from different sources -scientific, philosophical and artistic- in an attempt to expand the epistemic possibilities on the object of study. This contribution is, therefore, responsible for the epistemic contributions of Bunge's systemic cosmology (2000a, 2000b) and complexity epistemology (Morin, 2001a; 2001b). From the first, it is nourished by the notion of *conceptual systemicity* (2000a) and the need to build bridges between theories and their productions (read: theorizations). Second, it is inspired by the commitment to *relevant knowledge* that can integrate partial and local knowledge (Morin, 2001b) and recognizes the *permeability of knowledge* (Arce-Rojas, 2020), as well as methodological and epistemological pluralism. Then, taking into account these initial cosmological and epistemic premises as the main thread, it starts with a series of questions with the objective of

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distancing ourselves from it and thinking about new possibilities of theorizing and keys to action. Thus, two questions have motivated the elaboration of this study: what do we mean when we talk about emotion in the education sciences? And what components and mechanisms define the emotional architecture of educational processes?

To answer the questions that guide the general purpose of this essay, an analytical approach based on a documentary review from scientific, humanistic and artistic studies has been used.

I consider that the topic to be analyzed is important due to the increasing fragmentation of knowledge about the emotional dimension in educational processes, with a notorious weight of psychology and, more recently, neuroscience, which would explain the phenomenon described by Ocampo-Alvarado (2019, pp. 143-149) on the "colonization psi" and the "advent of the neuro" in pedagogical studies. Education - and its product: learning - is a phenomenon that goes beyond neuropsychological processes, and whose nature is not only causal, probabilistic, but also symbolic, social, relational and expressive. Hence the attempt to unravel the theories produced by academic specialization and suggest a conceptual system on the emotional in education that accounts for its basic components and mechanisms. I believe that none of this can be achieved without resorting to different knowledge (scientific, humanistic and artistic).

This study is structured in three sections. First, emotion is examined as an analytical category in the education sciences. Then, the basic elements and affective mechanisms that underlie all educational processes are inferred. Finally, the pedagogical implications that I consider relevant in this process.

Emotion as an Analytical Category in Education Sciences

Each scientific field delimits its object from specific ontological and epistemic assumptions. The multidimensional nature of emotion, inherent to every human process such as education, requires a conceptual clarification, as a preliminary step to hypothesize about the emotional structure of education.

Affectivity, emotions and feelings in a semantic key

The terms: affections, emotion, feelings, although they participate in the same analytical category (affectivity), have different meanings. From the field of health—psychology and psychiatry especially—the construct

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"affectivity" refers to the emotional system of the subject (moods, feelings, emotions, affections, humor, mood, temperance, etc.) (Castilla del Pino, 2000). In the educational field, affectivity is, first of all, an element of pedagogical action. Thus, affective education focused on the development of the socio-affective capacities or competences of schoolchildren is discussed. Secondly, affectivity, especially positive affectivity, turns out to be a crucial element so that the learning of school children can start and continue in time, by virtue of the emotional meaning attributed to the object, actors and contexts where such learning takes place. Third, affectivity, when positive (adaptive), activates relational processes "both with people, animals and things, as well as with itself" (p. 20). These relational processes are important not only for achieving the functions of socialization and formation of subjectivity, but also as a basic condition for any educational process to emerge. As Núñez Cubero (2016) points out, one of the great challenges of the teaching profession today is to "make viable the mutual acceptance of communication" between teachers and students (p. 20). Every educational process—i.e., communicative—is imbued with affectivity, even if it is presented as a technical, neutral, and objective action. There is no communication or, what is the same, no educational relationship without managing the environment or affective atmosphere in which such communication takes place. Nor without the body (faces, glances, gestures, silences, etc.) through which affections are expressed. So important is the content of what is said, as the style of communication that is adopted. Hence the importance of the affective environment or climate and the body itself in education and, by extension, in all the professions where one works from the communication -educational, therapeutic or otherwise- that serve as a support to the communication of what is transmitted.

The human emotional system—affectivity—comprises as basic elements: emotions, affections, and feelings. Different theories of emotion offer different conceptualizations about the nature of emotions and the functions they play in human life. Each one of them offers conceptual keys and relevant practices for the educational task. A standard definition of the concept of "emotion", from the point of view of psychology, is that provided by Chóliz Montañes (2005), who defines emotion as "an affective experience to a certain extent pleasant or unpleasant, that assumes a characteristic phenomenological quality and that compromises three response systems: cognitive-subjective, behavioral-expressive and physiological-adaptive" (p. 4).

There is no unified theory of emotions, but a theoretical plurality that reveals the multidimensional nature of the analyzed phenome-

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non. The scientific theories of emotion oscillate between the continuum nature-culture conferring a greater weight to the innate or the learned depending on the content they attribute to the emotions. Thus, evolutionary theories support the adaptive nature of emotions and conceive them as a system aimed at ensuring the survival and well-being of the subject (Frijda, 1986; Izard, 2001). They would come to represent "warning signs" present in the human animal species and, with it, emotions imply an automatic response to the environment. In this way, the feelings are but expressions of the homeostatic demands of the body (Damasio, 2021). On the contrary, cognitive theories emphasize the evaluative role of emotions in which reason is integrated into emotion. Emotions would be states of mind that allow the situation to be assessed and made intelligible. To be excited, would suppose, "to form a normative judgment of one's own situation" (Rodríguez González, 1999, p. 114) and in this complex mental process converge: evaluation and interpretation of the situation, beliefs, values and singular desires of each subject. For socio-cultural theories, emotions and feelings are cultural products: result of the modes of affiliation of the subjects to a social community of belonging. They are inscribed in a specific affective culture and are part of a social game (Le Breton, 2004), forming socially regulated valorative expressions (Sirimarco and Spivak L'Hoste, 2019).

Affectivity, emotions and feelings as objects of study in the education sciences

The preliminary analysis of the *emotional architecture of education* needs to focus on how the education sciences have conceptually delimited the concepts of emotion, affectivity and feelings and how they have been approached from educational research. Analytically, there is no unanimity in the definition of any of these concepts (Martin and Reigeluth, 2000), although there is consensus in scientific and professional educational communities on the importance of the formation of the affective domain from early ages. After all, throughout development, the human adventure—and with it, the educational one—consists of a more fractal than linear process (Ciompi, 2007), in which the transactions with the environment become less neurobiological and much more affective—valuative—and cultural (Cyrulnik, 2007).

Basically, the following lines of research can be distinguished in relation to affective education and the role of the emotional dimension in teaching and learning processes.

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Affective education and development of socio-personal competences

Affective education is aimed at the personal and social development of students and is conceived as a deliberate and systematic process of educational actions aimed at the development of individuality and sociability in the school. In a broad sense, it includes both education of emotional skills—education of emotional competence—and attitudes and affective dispositions toward learning and moral development or character education. Due to the importance of this dimension in the teaching profession, during the last third of the 20th century -especially during the 1970s and 1980s- an important line of work in education sciences aimed at developing taxonomies for the affective domain (Krathwohl *et al.*, 1964; Martin and Briggs, 1986) was developed so that teachers could draft affective objectives and define learning outcomes expected for each educational stage. In the 21st century, Martin and Reigeluth (2000) proposed a new conceptual model of emotional mastery, sufficiently clarifying and useful for teachers in their daily work with the students. The model included six dimensions - emotional development, moral development, social development, spiritual development, aesthetic development and motivation development - and three components: knowledge, skills or abilities, and attitudes, which confer a more updated and closer view to the current vision of affective education, from the competency-based learning approach. The OCDE (2016) defines affective learning objectives in terms of social and emotional skills, and defines them as:

> Individual abilities that can (a) manifest themselves in consistent patterns of thoughts, feelings and behaviors, (b) develop through formal and informal learning experiences, and (c) be important drivers of socioeconomic outcomes over a person's lifetime (p. 35).

The OCDE conceptual framework includes:

- Achievement of skills (perseverance, self-control and passion for goals).
- Skills to work with other people (sociability, respect, solicitude).
- Emotional management skills (self-esteem, optimism, confidence).

Likewise, the Council of the European Union (2018) considers personal and social competence as one of the key competences for lifelong learning and defines it as:

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> Ability to reflect on oneself, [...] engage with others constructively, maintain resilience, [...] cope with uncertainty and complexity [...] contribute to one's own physical and emotional well-being, maintain physical and mental health, and be able to lead a healthy and future-oriented life, express empathy and manage conflicts in an inclusive and supportive context (Council 2018/84 189/01, 22 May 2018, p. 10).

From these conceptual frameworks, the education sciences have been developing psychopedagogical research that have been translated into: a) meta-analytical studies that offer evidence on the effectiveness of educational interventions in the development of the socio-emotional competences of children and adolescents (Corcoran *et al.*, 2018; Durlak *et al.*, 2011; Goldberg *et al.,* 2019; Murano *et al.*, 2020; Quílez-Robres *et al.*, 2023; Taylor *et al.,* 2017) and b) integrative conceptual frameworks for social and emotional competence in academic contexts. An example of these is DOMASEC (Schoon, 2021), which includes interpersonal competencies (oriented towards the execution of tasks and adaptation to the environment) and intrapersonal competencies (orientations towards oneself).

Affective neuroscience applied to teaching-learning processes

Based on the advances of affective neuroscience, education sciences have diversified their scientific agenda on the emotional dimension in education, focusing their interest on the implications of affective neuroscience in the educational practice. For this purpose, the emotional experiences of students are taken as a unit of analysis. Most of these emotional experiences are inferred from the analysis of the feelings that arouse in them their usual transactions in the academic context. Goetz *et al.* (2006) and Pekrun *et al.* (2002, 2017) have demonstrated the effects of positive and negative emotions on intrinsic and extrinsic motivation in academic contexts. Positive emotions (enjoyment, hope, pride, etc.) originate from: a) the expectations and perceived causality of the control of activities by the student, and b) the subjective value attributed to activities and results. Li *et al.* (2020) demonstrate the influence of positive emotions on motivational, attentional processes, memory and information processing.

Pleasant emotions such as curiosity, interest, enthusiasm, joy and social connection have been shown to activate exploratory behavior so important in learning processes, while acting as true remedies or antidotes to displeasurable emotions, lightening or neutralizing them (Greenberg and Paivio, 2000). Likewise, love and joy favor the bonds in inter-

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personal relationships so important in the teaching work. Neuroscientific studies have also shown that the brains of children and adolescents who experience persistent adversity reinforce neural circuits that promote aggressive and anxious tendencies, at the expense of circuits for cognition, reasoning, and memory. Stress limits neuronal plasticity and growth in adolescence. Hence the importance of educating from childhood in coping strategies and adaptive lifestyles as an organism. As Bueno (2021) emphasizes, learning from pleasurable emotions (joy, surprise, love) tends to be set more efficiently than those sifted from displeasurable emotional experiences (fear, anger, sadness).

In short, new advances in affective neuroscience reveal that brain development and learning depend directly on the quality of the socio-emotional experience lived (Immordino-Yang *et al.*, 2019). Research shows that brain development and brain network configuration require friendly social interactions that provide early opportunities for support and care, as well as pleasurable socio-emotional experiences with clear implications for socio-emotional functioning, cognition, motivation, and learning.

The sociocultural and political nature of emotions

Culture conditions and bases people's emotional experience, as cultural and poststructuralist approaches in the social and human sciences sustain. Culture, *roughly speaking*, unifies our emotional experience that is then set in each subject from their own evaluations in situational transactions. David Le Breton (2012), from an anthropological reading of emotions, states that:

> Feelings and emotions are not transferable substances from one individual or group to another, and they are not just physiological processes. They are relationships, and therefore they are the product of a social and cultural construction, and they are expressed in a set of signs that man always has the possibility to display, even if he does not feel them. Emotion is at the same time interpretation, expression, meaning, relationship, regulation of an exchange; it is modified according to the audience, the context, it is differentiated in its intensity, and even in its manifestations, according to the uniqueness of each person (p. 69).

Emotions also have their origin in the ideological and institutional devices and in the social structure, on which the order that regulates human relations within the community lies (Averill, 1980). As Hochschild (2003) showed, there are close links between social structure, ideology, rules of expression of feelings and emotional management. Primary or

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basic emotions (disgust, shame, love, sadness, or fear) play a very important evaluative role in social ordination, although some enjoy greater social recognition than others (*i. e.* love versus disgust or disgust).

At the same time, from social constructionism and poststructuralist philosophies, emotions are conceived as discursive and disciplinary practices. From the critical sociological analysis, Cabanas e Illouz (2023) analyze the new coercive strategies and emotional hierarchies that, along with a new concept of citizenship, emerge in the "age of happiness". The authors denounce the tyranny of *happiness*. A new affective culture that erodes and deflects displeasurable emotions such as anger and resentment, and enhances pleasant emotions. An individualistic affective culture divorced from the feeling of community, social injustice —also planetary—, feelings of indignation towards inequality and/or diversity that, however, can act as driving forces of remarkable sociocultural transformations.

In the framework of theoretical and philosophical studies of education, it would be useful to deepen the agendas of educational policies and their concretions in the actions of teachers and students. There are good reasons for this, following the development of arguments offered by the authors, as to rethink the discourses from which affective education -emotional education- of children and adolescents in schools is being worked, as rightly stated by Boler (1999). Given that emotions satisfy certain social functions and preserve order and social cohesion and that emotions are also subject to convention and social regulations, it would be useful to inquire about the valuative contents that are developed in emotional education programs and the model of human being and citizen deduced from them. Each culture exalts or punishes, encourages or dismisses the plurality of emotions, as well as the expression and self-regulation of some emotions in front of others. For example, our culture urges us to avoid pain and suffering and to extol happiness as a supreme good. I do not intend on these pages to claim suffering as an educational principle or to deny the importance of preserving and promoting the well-being of children and adolescents. But suffering, when it becomes pain, as Agnes Heller (1985) rightly argues, allows:

> To involve ourselves in the cause of humanity [...]. The suffering of humanity must be transformed into pain. In the case of those who suffer themselves, as in the case of those who know others suffer. Help yourself... help others! (p. 315).

Educators who work in contexts of social vulnerability or those who try to raise awareness about the atrocities of humanity (such as the

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Holocaust, world wars, poverty or hunger), i.e. those who habitually work for social justice, use experiences of malaise to work from education feelings of injustice, abandonment, oppression or stigma with positive results in school children (Zembylas, 2016). In this line, Boler (1999) maintained the idea of incorporating a *pedagogy of discomfort*, conceived as an educational practice that, based on critical self-reflection on values and socially constructed beliefs, allows reworking new perceptions -free of stereotypes or social stigmas- about the other-different-to-me.

In the end, both pedagogical proposals -those oriented to well-being or those focused on discomfort- represent complementary ways to work the affective dimension in an educational key, either as promoters of social change (pedagogies of discomfort) or as "a way of structuring emotion and affection in a certain social and political context" (Zembylas, 2019, p. 27) (pedagogies oriented to well-being).

In this line of thinking, it should be noted that the 2030 Agenda, in particular that related to goal 4.7 of Sustainable Development Goal 4, which addresses the social, moral and humanistic objectives of education, incorporates as an educational goal the promotion of human rights, gender equality, the promotion of a culture of peace and non-violence, global citizenship and the appreciation of cultural diversity.

I argue, in the above line of argument, that an affective education focused on the socio-emotional competences of schoolchildren is not enough, even if it is clearly relevant today, but also an education of affectivity that beyond individuality and emotional well-being, embraces humanity as a guiding principle (Heller, 1985).

The emotional architecture of education

As for Bunge (2000a), the analysis of any structure begins by generating hypotheses about the basic components or elements of the system (read: structure) and about the specific mechanisms that explain its operation. This section hypothesizes the *emotional composition of education*—its basic structure or collection of components—as well as the specific affective mechanisms underlying educational processes.

Desire and enthusiasm as affective components in educational processes

Formal, non-formal or informal educational processes are nourished by emotional components as supports of action. With them, priority goals

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are established, and the initial conditions are created for the implementation of the influential action called education.

In a way, every educational process starts from the *desire to educate* —i.e. to instruct, accompany, stimulate, guide, recommend, etc.— by the *desire to learn*—intrinsically motivated—or by the *desire to let oneself be educated* —extrinsically motivated. An educational process can hardly be initiated, let alone sustained, by *aversion* as an emotional component. However, it may happen that some of these initial desires are not given initially by some of the subjects imbricated in this process. For example, when the desire to educate is low or practically non-existent among the teachers—by saturation, reluctance or disdain, as occurs among those teachers who suffer from the syndrome of professional attrition—or when the desire to learn by the student is mediated by displeasurable emotions such as rejection, loathing or reluctance. Out of the range of emotions that humans can experience, desire is one of the emotional components that underpins any educational process, both from the perspective of the teacher and the student. Also, there is the enthusiasm, whose mediating effects have been confirmed as a protective element and promoter of the well-being of teachers (greater job or life satisfaction and lower levels of emotional exhaustion) and for its positive effects on academic performance because it functions as a factor promoting pleasant emotions (enjoyment, satisfaction) (Bardach *et al.*, 2022).

Involvement, resonance and proximity as affective mechanisms in educational processes

According to Bunge (2000b), a mechanism is defined as what "makes the system what it is" (p. 56). Emotional mechanisms are defined as a combination of affective processes (moods, emotions and feelings) with which the desiderative—affective—connection of the subject with the environment is expressed. Taking this conceptualization into consideration, we will then define the main emotional mechanisms that make any educational process work.

The involvement

The basic form of bonding is acceptance and rejection (Castilla del Pino, 2000). Agnes Heller (1985) defined feelings as "being involved in something" (p. 17). And this implication is "the inherent constructive factor of acting, thinking, etc. [...] through action or reaction" (p. 18). The implication, according to Heller, "is not a concomitant phenomenon" (p. 18),

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but involves the subject with an event—real or imagined—an object—determined or indetermined—or with other beings—human or animal. It is the way in which the subject experiences reality and which underlies the act, think, know and feel human. It is, following the author, inherent to action and thought and not an auxiliary element or mere "accompaniment" (p. 23). Furthermore, "it may affect part or all of the personality, may be momentary or continuous, intensive or extensive, deep or superficial, stable or expanding, oriented towards the past, present or future" (p. 22).

The feeling or implication is what gives meaning to the action and is the mechanism in which the subject is committed in the world. Even when indifference is experienced, the lower threshold of involvement—a feeling that cannot be fully attained, in Heller's words—the subject is compromised, if only subtly.

In educational processes, as in all human processes, the affective implication or emotional relationship that "works" (i.e. feelings, in Heller's words) is the active and positive, versus the reactive and aversive. This is demonstrated by research that has explored the school involvement of students (Gutiérrez *et al.*, 2017; Rodríguez-Fernández *et al.*, 2018), the involvement of families in school life (Smith *et al.*, 2020), teacher-student relations and their impact on school learning, and the involvement of teachers in accompanying their students (Hofkens and Pianta, 2022; Kaplan, 2021).

The resonance

Resonance is a term usually used in the acoustic field. According to the Dictionary of the Royal Academy of Language, it means "making sound by repercussion." Underlying the semantic network of this concept are synonyms such as scope, echo, incidence or projection, which ultimately refer to emotionality and the sensory world, i.e., to the sensory properties of our relationship with the world.

The philosopher Harmuth Rosa (2020) argues that the "quality of the appropriation of the world" (p. 20) - the way we relate to it, experience it and take a position before it - depends on the "quality of the relationship with the world" (p. 20). The concept of resonance is also present in theatrical theory. Augusto Boal (2004) refers to resonance as one of the deepest levels that actors-participants can reach in the expression and emotional experience. This occurs when the scene deeply affects the actors-participants. Boris Cyrulnik (2007) postulates that resonance stands as a mechanism that allows union:

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> The history of one and the biology of the other. [Thus,] an anatomical or temperament trait, a gesture or a phrase, resonates differently according to the meaning they acquire in one spirit and not in another, in one culture and not in another (p. 29).

Borrowed from physics as a synonym for "vibration," the Royal Academy of Language (RAE) defines the term "resonate" as "sound-making by repercussion." In short, resonance, as a mechanism that activates the educational process, refers to *move, question and make vibrate*. In short, as Rosa (2020) points out, resonance is "a specific way of being related to the world, in which this world or a segment of it feels responsive" (p. 220). From the educational point of view, the author opts for a school as a space of resonance (vibration) and criticizes the current model whose affective logic is organized around alienation (mutism). The mechanisms of alienation, according to Rosa (2020), work favoring emotional dynamics activated by frustration, displeasure and, in extreme cases, aversion and threat (fear). The teacher "feels the students as a threat: he does not reach them; he perceives them as disinterested, and the learning material as imposed" (p. 314). On the contrary, resonance mechanisms allow the educational experience to *vibrate* and allow teachers and students to speak with their own voice, transforming each other. In a school conceived as a space of resonance:

> The teacher reaches out to his students and transmits enthusiasm; but he also lets himself be moved. The student is captivated by the subject: he feels subjugated or absorbed and, at the same time, is open. The material (*curriculum*) appears to both sides as a field of significant possibilities and challenges (p. 316).

Although it might seem that the model of school as a resonance space proposed by Rosa could harbor certain ideas of *happiness* in the sense proposed by Cabanas and Illouz (2023), resonate (vibrate) is not opposed to dissonance, but to alienation (mutism). In a resonant (vibrant) school, teachers and students speak with their own voice "each in its frequency" with different and leading voices (Rosa, 2022).

The proximity

The philosophy of Lévinas (2014) allowed to nourish the ontology of educational reality from the principle of proximity, understood as the "origin of any question of itself" from the other (p. 80). Educational pro-

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cesses require this ontological principle to be recognized as such and also require it for these to develop.

A third affective mechanism that is set in motion in the educational processes "that work" is that related to the communicative or expressive function. The "main pitfalls of interpersonal relationships—and, with it, of the educational relationship—are presented at the level of communication" (Núñez Cubero, 2016, p. 19). The communicative style used by teachers and their willingness to empathize or, on the contrary, be little or nothing sensitive to the needs of students, are variables that have a significant impact — be it positive or negative — on the dynamics of education. Being able to provide an optimal degree of emotional proximity to students is one of the emotional skills that are trained in teacher-directed training for emotional development. Núñez Cubero (2016) is committed to a *pedagogy of proximity* supported by eloquence —understood as the art of knowing how to express oneself—, emotional expression and dramatic expression. The eloquence emerges between the message — what is expressed — the voice — how the message is expressed — and those who listen — those who are present. It uses not only words (verbal), but also silences, gestures, gaze, body posture (non-verbal). "The expression of feeling is one of the main sources of information we have from someone else. The eyes are the mirror of the soul" (Heller, 1985). Hence the importance for teachers of using dramatic language and learning to read the non-verbal signs (gestures) in their students.

On the other hand, the proximity to which it is alluded is not so much physical, but emotional, and materializes in the accompaniment to students (Joaqui Robles and Ortiz Granja, 2019) But for this, following Núñez Cubero (2016), the affective texture of the educational relationship must be fueled by "the feeling (sentic dimension) of the presence of the other and the feeling that without the others I cannot be" (p. 56).

Conclusions

The main objective of this study was to analyze the emotional architecture of education from its components and mechanisms involved. To this end, an analytical approach has been chosen based on the conceptual system based on a documentary review based on scientific and humanistic studies. Since the words "emotional" and "education" have plural meanings, it has been chosen to describe their semantics from science, philosophy and art, instead of opting for a specific philosophical or scientific theory or

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approach. This was intended to win "telemicroscopy" (Boal, 2004, p. 45) to expand the analytical possibilities of the object of study, i.e., to be able to "see the forest" and not lose sight of the whole. For that reason, it was determined to take as a unit of analysis the "architecture"—as a synonym of "structure"—instead of selecting *a priori* some element or process.

The first conclusion drawn is that the emotional architecture of education has a multidimensional character as it concerns organic, psychic and sociocultural realities. Both emotion and education are realities in which the organism (brain), psychism (mind) and culture (society) are present, forming a unit. As an *organism*, emotions play an adaptive role in their transactions with the environment and always have a body correspondence. As a *psyche*, emotions influence thinking and memory, motivation and communication (Greenberg and Paivio, 2000). Finally, as a *sociocultural* reality, emotions are the result of socialization and, with it, learning, and in them the beliefs and values of each society and social group are condensed.

Education, as an influential action, oriented to individuality, sociability and socialization of people, takes as an element of "work", first of all, a "body" (*soma*) that will develop as a psyche through learning. Neuroscientific studies have demonstrated, for example, the critical role of parenting styles in the development of brain systems linked to affiliation and attachment. They have also shown that adverse experiences and toxic stress during the first years of life modify brain structure in early childhood, with a negative impact at the psychophysical and neurocognitive levels (Förster and López, 2022). It has also demonstrated the importance of knowing our emotions, which includes knowing how to read the body sensations, as a first step to manage them properly (Van der Kolk, 2015).

> The price of ignoring and distorting body messages is being unable to detect what is really dangerous or harmful to us and, just as bad, what is safe or empowering. Self-regulation depends on maintaining a cordial relationship with our body (p. 109).

Likewise, education develops subjectivities (*psyche*). Hence the important role that affective education takes - much broader, in my opinion, than emotional education - in pedagogical work.

Ultimately, it shapes social and socialized subjects. Sociability in education is also the subject of the educational task. Learning to live together in a diverse world requires an affective education, which sets up new emotional sociabilities that are more friendly, altruistic and plurichromatic from the affective point of view. In addition to an emotional

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education oriented towards well-being, it would also be important to integrate pain as an educational element, for example: the pedagogy of discomfort of Zembylas (2006, 2016).

The second conclusion of this study is that this exercise of influence action, which we call education, has its most outstanding instruments in emotions. Specifically, in those generated from enthusiasm, both for those who teach and for those who learn. This is confirmed in different scientific studies (Keller *et al*., 2018; OECD, 2020; Valentín *et al*., 2022). Enthusiasm and desire to teach are closely related and appear as a necessary, but not sufficient, reason to start and develop in the teaching profession (Sánchez-Lissen, 2009). When the starting conditions when teaching are the aversion to learning on the part of the student, the most experienced education professionals put in place different mechanisms conducted in this study.

One of them is the implication, a consequence of the teacher's enthusiasm. The effectiveness of this mechanism to work apathy in students (discouragement, despondency, despondency, laziness, apathy or indifference) has been proven. Enthusiasm, from the emotional point of view, has a greater reach than other adaptive emotions (*i. e*. joy, satisfaction, desire or liking), since it involves the personality of the agent who exhibits it (be it the educator). It was pointed out that, in education, the working implication is the active and positive, versus the reactive and aversive.

From these results, relevant pedagogical implications for teaching and socio-educational support are inferred. If involvement is an inherent quality of action (Heller, 1985) and has been proven to be effective when supported by a motivating and vibrant emotional substrate (school as a resonance space) (Rosa, 2020), the most effective teaching and learning methodologies are those that rely on experiential and participation, which are always accompanied by introspection, self-reflection and collective reflection. Among them are artistic-expressive methodologies (*i. e*. suffering should not be suffered or sought intentionally in school, but make it known). Theater as a pedagogical tool for "effective" emotional education has been based on the works of Gavilanes Yanes and Astudillo Cobos (2016), Navarro Solano (2006), Núñez Cubero and Navarro Solano (2009), among others. From the perspective of philosophy, Heller (1985) and Nussbaum (2010) argue the same point. As Heller (1985) rightly points out, "the arts, and first of all their verbal forms, are capable of evoking in us all the emotions we know [...] whether or not we have lived or experienced in our lives the emotions and sentimental dispositions illustrated by the artists" (p. 161). We also see it in the participatory methodologies applied in learning for life (Novella and Sabariego, 2023).

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Another mechanism present in effective educational processes is resonance (Rosa, 2020, 2022). Alienating educational practices—in the affective sense of the term—anesthetize, so to speak, learning experiences. There is a correlation between school as a resonant space (Rosa, 2020, 2022) and the "teacher of sense" (Le Breton, 2000). The implications that resonance has for practice are diverse, but succinctly, the most relevant would be its impact on the agency capacity of schoolchildren. To conceive school as a space of resonance would imply practicing a *vibrant education* — active, sensitive, affective, motivating, and transformative— that promotes a disposition to resonance among those who wish to learn or among those who are left to educate. This means, in the words of Rosa (2020), "facing the world—the strange, the new and the other—with an intrinsic interest and with high expectations of self-efficacy" (p. 321).

Again—especially for those educational situations where the alienated (non-resonant) student resists being educated/taught—there is a third affective mechanism that is often applied by educators with remarkable success. It is about proximity (emotional). A mechanism that often breaks down communication barriers by building trust and dispelling fears - a source of barriers and blocks in learning. In practice, it means exercising active listening (López-Martín *et al.*, 2022; Boada and Melendro, 2017) and having in educational institutions -within and/or outside the school framework- adequate devices of educational accompaniment, both for professionals working in it (Schmitt-Richard, 2022) and for school children. This is the case, for example, of second-chance schools (Romero-Rodríguez *et al.*, 2023).

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Learning models in the transition towards complexity as a challenge to simplicity

Modelos de aprendizaje en la transición hacia la complejidad como un desafío a la simplicidad

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Abstract

This research is motivated by the need to unravel the progression of learning models, which have been adapting to meet the demands of society in its constant dynamics of fluctuation and transformation. The aim of this work is to systematically examine the evolution of learning models, highlighting the paradigmatic changes that have favored the transition from traditional learning approaches to more innovative and transdisciplinary proposals. To achieve this, a bibliographic analysis is carried out, supported by the hermeneutic method for the contextual interpretation of literature and discourses, in order to unravel the complexities inherent in the evolution of learning models. The results highlight the limiting influence of the simplicity paradigm in traditional educational formation and the need for a shift towards dialogicity and disciplinary collaboration and integration to advance towards complexity. It concludes by arguing in favor of adopting the complexity paradigm, advocating for a transdisciplinary epistemology and an interstructuring approach to learning, which allow for integral human development. Recognizing human complexity in teaching and learning demands a radical transformation of education towards more holistic and transformative practices, essential for building an equitable and just society.

Keywords

Learning, complexity, dialogicity, epistemology, paradigm, transdisciplinarity.

Resumen

Esta investigación se emprende motivada por la necesidad de desentrañar la progresión de los modelos de aprendizaje, los cuales se han ido adaptando para responder a las demandas de la sociedad en su dinámica constante de fluctuación y transformaciones. El objetivo de este trabajo es examinar de forma sistemática la evolución de los modelos de aprendizaje, destacando los cambios paradigmáticos que han favorecido la transición de enfoques de aprendizaje tradicionales hacia propuestas más innovadoras y transdisciplinarias. Para lograrlo, se lleva a cabo un análisis bibliográfico apoyado en el método hermenéutico para la interpretación contextual de la literatura y los discursos, a fin de desentrañar las complejidades inherentes en la evolución de los modelos de aprendizaje. Los resultados resaltan la influencia limitante del paradigma de la simplicidad en la formación educativa tradicional y la necesidad de un giro hacia la dialogicidad y la colaboración e integración disciplinaria para avanzar hacia la complejidad. Se concluye argumentando a favor de la adopción del paradigma de la complejidad, abogando por una epistemología transdisciplinaria y un enfoque de aprendizaje interestructurante, que permitan el desarrollo humano integral. El reconocimiento de la complejidad humana en la enseñanza y el aprendizaje exige una transformación radical de la educación hacia prácticas más holísticas y transformadoras, esenciales para construir una sociedad equitativa y justa.

Palabras clave

Aprendizaje, complejidad, dialogicidad, epistemología, paradigma, transdisciplinariedad.

Introduction

In an era characterized by global interconnectedness and the rapid evolution of knowledge, education systems face the challenge of preparing individuals for a world of constant change and increasing complexity. This situation has led to a critical reassessment of existing pedagogical methodologies, highlighting the urgency of adopting more flexible approaches. In this environment, the transition from conventional educa-

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tional methods - often based on simplistic principles - to more complex learning models has become a pressing need, marking a turning point for contemporary educational philosophy.

The main challenge identified in this paper is the persistent adherence to traditional methods of teaching and learning, which are often insufficient to address the needs of a rapidly evolving world. This article defends the idea that embracing complexity in education transcends mere profit and becomes a necessity for the holistic development of both students and educational models. The importance of this topic is intensified in a context where adaptability and innovation are key to achieve educational success.

In the current educational context, marked by significant changes following the pandemic, the rapid digitization of education (IACHR, 2021) and the incorporation of advanced technologies such as artificial intelligence (Kim, 2022), there is an urgent need to evolve learning models. This transformation goes beyond a mere response to circumstantial challenges, rather it reflects a substantial change in the way we interact with knowledge and in the very conception of teaching. In this age of global interconnectedness and constant evolution, adapting education systems to prepare individuals for a changing world of increasing complexity is critical.

The aim of this article is to examine how the transition to complex and interstructuring learning models challenge and reconfigure traditional conceptions of simplicity in education, highlighting the importance of these transformations in contemporary educational practices and emphasizing the need for adaptation and flexibility to effectively address the new demands of educational reality.

The methodology used integrates the bibliographic analysis, focused on a critical review of relevant academic literature, including theoretical studies and reviews in the field of pedagogy and philosophy of education. At the same time, hermeneutics is used for the contextual interpretation of texts and discourses, in order to unravel the inherent complexities in the evolution of learning models.

This document is structured in three key sections. The first section, entitled "The dynamics of paradigms in educational configuration", analyzes how simplicity, dialogue and complexity have shaped the educational environment, highlighting its influence on the formulation and evolution of teaching and learning methods. The second section, "Epistemological Approaches that Support Learning Models", examines the transition in disciplinary integration from more traditional approaches

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to transdisciplinarity, demonstrating the trajectory towards more inclusive and holistic teaching models. Finally, the third section delves into the "Learning models: heterostructuring, self-structuring and interstructuring", focusing on how their evolution challenges traditional notions of simplicity in education and guides pedagogical practices, adapting it to new needs and educational dynamics.

The dynamics of paradigms in educational configuration

At the beginning of the discussion in this section, it is essential to specify the meaning of "paradigm", a polysemy word in the academic field. From the Greek *παρά* (next to) and δειγμα (model, example), considered as examples to follow and serve as references in specific interpretative contexts (Ferrater, 1994). Over time, the concept has undergone a semantic evolution, extending its scope to include both theoretical and methodological frameworks, and, in the educational context, to designate the sets of practices, beliefs and methodologies that shape and define their educational models.

Paradigms, framed in epistemic and ontological contexts, are defined as conceptual structures that individuals use to interpret and understand reality, as Audi (2004) explains. The tendency to adopt common frames of reference stems from the social nature of the human being. Through linguistic interaction and communication, people not only assign meanings and generate meaning in their environment, but also contribute to the configuration of systems and structures of increasing complexity.

These systems are intertwined with the social fabric, exerting a significant influence on human interactions and on the multiple aspects that make up society. Acting as collective referents, paradigms not only model the individual perception of reality, but also play a crucial role in the configuration of human societies, adapting to their changing dynamics, as González (2005) points out. In education, their influence is particularly notable, as they contribute to the form and development of pedagogical practices.

In classical Greece, philosophers like Plato used the term "to designate an instrument of mediation between reality and its ideation" (p. 18), since in its dualist model this idea is present when referring to an "intelligible world", which becomes the ideal and perfect reference on how reality should be interpreted, and a "sensible world", material and imperfect, experienced by earthly man. With Plato's "Allegory of the Cave" (1998), the incidence of paradigms in the interpretation of reality and the orientation

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of the human being's actions is revealed, as they are expressed in an epistemological dualism between *episteme* (knowledge) and its separation from the simple *doxa* (opinion), as well as in ontological dualism with the already mentioned world of ideas and its separation from the sensible world.

Within this framework, several thinkers have postulated their theories on how to constitute the horizons of interpretation, some focused on the construction of knowledge and truth from the correspondence between the sensitive element and its referentiality in consciousness, such as Aristotle (2003) and hilemorphism or Locke (2020) and Hume (2020) with the concept of impressions provided from material experience. Others, focused from the idealistic and rationalist tradition, interpret reality in reference to the logical development of consciousness as: Descartes (2012) and methodical doubt, the principle of sufficient reason in Leibniz (2022) or Hegel's idealism (2017), which describes it with the dialectic as the motor of social and cultural transformation.

Regardless of the position taken, various thinkers agree that the origin of all knowledge is in a specific referential framework, which facilitates the understanding of the world in different ways. These frameworks are fundamental for theoretical development and their evolution represents an advance in the model that does not necessarily imply a greater truth, but a better adaptation to the dynamics and discourses of the time and society. In this context, González (2005) highlights Thomas Kuhn as a key figure in the scientific field for his development of the concept of paradigms, defining them as complex systems that include "beliefs, principles, values and premises, which are essential to shape the perception of reality of a specific scientific community" (p. 32).

In his review of *The Structure of Scientific Revolutions*, Masterman (1970) addresses how certain theoretical frameworks affect all aspects of human knowledge. It highlights the different ways in which "paradigm" is defined, making a definition of this term essential from one of its greatest exponents, Thomas Kuhn (1922-1996). In the concept proposed by Kuhn (2000), two types of scientific progress can be distinguished: the "normal" and the "revolutionary". Normal science, also called paradigm-based science, represents that time interval during which a scientific discipline undergoes evolution, supported by community acceptance of a relevant scientific work (Kuhn, 2000). Emblematic examples of this science include the Newton´s *Principia* (1972), which lay the foundations of Newton-Euler mechanics, and the work of Carnot (1963) in classical thermodynamics, which establishes the framework of the thermodynamics of calorie.

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The adoption of a paradigm in a period of normal science constitutes the premise or basis of scientific work, even defines the field of study, so that abandoning it "is to stop practicing the science that defines it" (Kuhn, 2019, p. 75). These ideas that Kuhn contributes in his conception of scientific development in periods of normal science, are later generalized in different directions, one of those directions is its extension to the educational field and the social field in general.

In contrast, revolutionary science occurs when dominant theories are rejected and replaced by others (Kuhn, 2000). A "scientific revolution" is the result of a "paradigm shift," which usually occurs when the scientific community identifies a set of "anomalies" in the prevailing theories, i.e., a set of phenomena that frames of reference should explain in a convincing way, but do not, or a set of failures that can take various forms including excessive complexity, paradoxes, ambiguities, or unresolved difficulties.

An anomaly, says Kuhn (2019), arises "recognizing that nature has somehow violated the expectations induced by the paradigm that governs normal science" (p. 103). This concept is illustrated by the transition from the anomaly-filled phlogiston theory to the oxygen combustion theory, proposed by Lavoisier around 1777. This change meant a scientific revolution in the understanding of combustion. Similarly, the discovery of X-rays defied the expectations rooted in the scientific community, despite not directly contravening the dominant theory of the time, evidencing the dynamism and contingency of scientific theories (Kuhn, 2019). Another example is the transition from Ptolemaic to Copernican astronomy (Copernicus, 1965), which shows how revolutionary developments can radically transform our understanding of the world.

As a theoretical framework in science dictates the focus and scope of study, a conceptual model in the social sphere exerts a comparable influence on the social fabric and community interactions (González, 2005). However, for a paradigm to consolidate as the essential archetype in a society, it must be shared and internalized either voluntarily or involuntarily by the whole community. From this adoption, various social, cultural, scientific and educational dynamics will be oriented.

In the context of the adoption and transmission of reference frameworks, the role of education is fundamental to the formation of the social fabric. It acts as a means of imparting the necessary concepts and tools to understand the complex matrix of meanings, values and perceptions inherent in a culture. It also plays a crucial role in strengthening collective identity and in the holistic development of society, paving the way for effective adaptation to future challenges and changes. Then, the

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determining paradigms in the evolution of education and learning models will be examined.

Paradigm of Simplicity

In the field of education, the influence of paradigms is essential to define the modes, design and construction of pedagogical approaches and methods. An example is simplicity, prevalent in the traditional educational model that, characterized by its preference for clear and sequential educational processes, deeply marks conventional pedagogical practices (Aguayo *et al*., 2021). With its roots in positivism, the simplicity framework acts as a guide for both the structuring of disciplinary knowledge and the heterostructuring approach to learning.

Since positivism underlies this approach, its exploration is essential to understand its influence on the formation and evolution of educational models. The term "positivism" originated in the nineteenth century with Henri de Saint-Simon, but it started being used with Augusto Comte and his works *Course of positive philosophy* of 1830 and *Discourse on the positive spirit* of 1844. Comte uses it to refer to the way of analyzing physical facts in the field of science, alluding to empiricist studies and the conceptions of philosophers such as Bacon, Hume, Locke and Condillac, for whom all knowledge is understood as a product of the sensitive experience (Dos Santos, 2017).

Positivism will place special emphasis on all knowledge that comes from experience, and that is observable, manipulable and corroborable through the use of methodologies linked to the exact sciences, in order to dismantle mythical thought, given in theology or metaphysics, to reformulate it from human rationality that aspires to maximum objectivity (Marquisio, 2017).

As a philosophical trend, positivism aims to establish the determinant parameters of scientific knowledge, under a unified methodological criterion that includes and guides all disciplines and branches of knowledge (Guamán *et al*., 2020; Hizmeri, 2011). For Comte and Sanguineti (1987), the disciplines will be questioned by the scientific-positivist character, as long as they clarify an object of study (gnoseological question) and a concrete way to address it (methodological question). From this conception, says Malinowski (2007), any attempt to base the knowledge methodologically must be based on:

> The analytical principle described by Descartes in the Discourse of the Method, and summarized two centuries earlier by the English scholastic

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> philosopher William of Ockham by the principle of parsimony, or of "Knife of Ockham" in the explanation and construction of theories: between two explanations, the best is the most simplified or the smallest (p. 30).

The epistemological foundation of positivism proposes a separation between the relationship of the subject with the object, a "dualism and objectivism, where the researcher and the study objective are totally independent" (Ramos, 2015, p. 11), seeking to control this interaction in order to provide generalizations that objectify and simplify scientific knowledge. In addition to this, it is important to emphasize that positivism is based on the principle of simplicity, which, in line with the scientific vision, promotes decomposition or reduction processes of the extensive and complex issues to its more individual components to better understand them. In the words of Morin (1998), simplicity is understood as:

> A paradigm that brings order to the universe, and pursues disorder. Order comes down to a law, to a principle. Simplicity looks at the one and sees the multiple, but cannot see that the One can, at the same time, be Multiple. The principle of simplicity either separates what is bound (disjunction), or unifies what is diverse (reduction) (p. 55).

In this order of ideas, simplicity adopts a practical and accessible approach to knowledge, partially relying on the traditional notion of "analysis" as "decomposition", as exposed by Beaney (2014). This paradigm is also based on the application of principles of reasoning that do not necessarily require the development of deep or abstract ideas. According *to* Aguayo *et al.* (2021), it promotes a method of thinking and problem solving that favors simplification and reduction. In education, this approach not only accelerates results, but also facilitates students' learning of basic concepts, as a concise principle is easier to understand than a complex analysis.

> Teaching and learning based on concepts originated from a mechanical paradigm have dominated the Western educational tradition since the first industrial revolution. This type of educational tradition is characterized, among other things, by its reductionist and linear mentality, which has led to an isolated and disconnected generation of knowledge (p. 368).

The decomposition of information and complex topics into their unique components (an essential feature of the traditional conception of analysis) has its own limitations, especially in the scientific and academic field, due to its propensity — in many cases — towards disciplinary isolation and — ultimately — the fragmentation of knowledge (Aguilar *et al.*, 2019). The separation and/or reduction of knowledge in plots prevents

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students from understanding the interconnection between different disciplines and their applications (Balietti *et al.*, 2015). This, in turn, can lead to a loss of holistic understanding of knowledge and reduce their understanding to fundamental and pragmatic principles.

Dialogic Paradigm

This paradigm has emerged, essentially, as a movement of exchange of ideas "between various conscious subjects, flowing between, within and through [sciences]" (Hernández and Quintana, 2018, p. 26), which enables the transmission of beliefs and knowledge, facilitating the search for truth and the construction of knowledge in a participatory, collaborative and democratic dynamic. The main point of this approach is that frames of reference, through which we interpret reality, are collaborative constructions that evolve with social discourse (Leistyna, 2001). This dialogic process has led to the development of epistemological approaches such as multi-, and interdisciplinary, which, adapting to the changing needs and dynamics of knowledge and society, give way to the educational model of self-structuring learning.

Dialogicity manifests itself as a teaching method in the education of classical Greece, particularly in the philosophies of Socrates and Plato. Both philosophers used dialogue as an essential means for the search for knowledge or truth, identifying in its dynamics the "false beliefs and knowledge to eradicate them and undertake a search for truth" (Molina, 2021, p. 39). Socrates called this dialogical method "maieutical" (giving birth), since, through the confrontation that emerged through the interaction of questions and answers in the dialogue, it was possible to reveal the truth.

For his part, Plato used in his famous *Dialogs* the dialogical resource for the construction of philosophical categories such as "kindness, temperance, courage, love, wisdom, his vision on politics, wars, economics, religion, etc." (Hernández and Quintana, 2018, p. 28), useful for social education as the construction of self-knowledge in his apprentices.

The paradigm of dialogicity also has its roots in the *Topics* of Aristotle, which constitute a key contribution in this approach to argumentation and reasoning. An interesting later confluence occurs with the emergence of interrogative logic (Zerpa, 2011), the strategic analysis by mathematical game theory in the 40's, the constructivist approach in philosophy of mathematics and the pragmatic approach in semantics (associated with Wittgenstein). Such a confluence gives rise to "*dialogical logic*" (Clerbout And McConaughey, 2022).

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The importance of dialogue has evolved throughout history, deepening in essential aspects related to the generation of knowledge, science, social structuring and education. It has matured this approach to incorporate its structures and principles in the theoretical developments of influential thinkers such as Martin Buber (1973), in the nineteenth century, who conceptualized human existence as intrinsically dialogic and relational:

> It is neither the individual as such nor the collectivity as such. Both of these things, considered in themselves, are no more than formidable abstractions. The individual is a fact of existence insofar as he enters into living relationships with other individuals; collectivity is a fact of existence insofar as it is built with living units of relationship (p. 146).

The relationship units identified by Buber (1973) are inscribed within the dialogic, which implies an understanding of the self and the other as interconnected and mutually dependent entities, both in the process of knowledge and in the process of existence. The relevance of dialogue with other individuals lies in their potential to promote personal growth and understanding of the world. This approach, as Vázquez points out (2013), is outlined as "the only human possibility of access to Being" (p. 144), underlining its crucial role in understanding and human development.

In this way, it emphasizes how dialogic dynamics promote an effective understanding of the interaction between people and their process of knowledge construction. In the ontological realm of language, dialogue is defined as "the space where human interactions converge" (Sánchez, 1984, p. 133). An area where participants communicate and influence each other in order to build and understand themselves.

In the vision of this paradigm, the contribution of Lévinas (2002) on dialogue as an experience through otherness appears. It is in the dialogic experience that the other is understood, moving from the interiority of the being to the outward, since "in the relationship with the face in the fraternity in which another appears in turn as a solidarity of all others, constitutes the social order, in reference to all dialogue with the third" (p. 287), which means that individualities meet to transcend individuality. Lévinas suggests that through dialogue one can conceive a universal ethics, understanding that "the universality of reason arises from the overcoming of the subjectivity enclosed in itself, something that is evidently achieved through the relations of otherness" (Acosta, 2016, p. 276) produced through dialogical dynamics.

Through dialog, one can understand the other, going from the interior to the exterior of the being. In this process, solidarity between indi-

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viduals is manifested, giving rise to a social order based on the relationship with others and their transcendence.

Following this reasoning, dialogicity offers an interpretation of the world based on interpersonal relations, an idea that Lévinas (2002) expands by integrating a universal ethics and rationality that transcend simple communicative interaction. In this vision, rationality extends beyond the subjectivity of the individual, enriching itself in the dialogic process with others (Crowell, 2012). The paradigm of dialogue has been established as a meeting space, facilitating the recognition and integration of diverse points of view that arise from individual thought. This approach promotes an understanding of knowledge and a way of interacting with the world that prioritizes diversity, as opposed to homogeneity and simplicity.

Regarding the characteristics of the dynamics of dialogicity to transcend homogeneity, it is relevant to turn to the thought of Hans-Georg Gadamer (1900-2002), for whom dialogicity generates in the encounter between subjects and the world, which he called "fusion of horizons". Gadamer (1993) argues that this fusion is an essential dialogical experience in which participants expand their understanding of the world and of themselves through a mutual exchange of conceptions. In his words, "in this form of dialogue the other becomes understandable in his opinions from the moment his position and horizon have been recognized" (p. 189). This process makes it possible to overcome homogeneity, as it facilitates the incorporation of different points of view and fosters a deeper and enriching understanding of the subject.

Considering this perspective, it can be inferred that the structure of dialogicity is established by combining horizons that emerge from the dialogic dynamics. These dynamics are not static or inflexible, on the contrary, they constitute an active reality that transforms and evolves as the dialogue develops, since "it may happen that the horizon does not move, but this depends on whether the person is willing to walk; while a person walks, his horizon will change" (Demon 2013, p. 53). In this way, the subject approaches new worlds and unknown horizons in which dialogue acts as an integrating agent, merging the different generated horizons.

When approaching this paradigm in the field of the philosophy of education and its practical applications, it is relevant to mention Paulo Freire (1921-1997), who emphasizes the dialogic action centered on the question as a liberating instrument and catalyst of changes in human education. The dialogic action caused by the question will be an instrument of liberation from the traditionalist education, which seeks to reproduce

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knowledge without questioning or validating it. The question, in this context, generates this meeting of peers, in which:

> The subject ceases to be a mere object, since it is no longer an empty vessel to be filled, but, as a subject, is going to be subjected to challenge in order to achieve a critical knowledge of his situation as an active subject of praxis and a transformer of social reality (Velasco and González, 2008, p. 464).

Dialogue for Freire (2005) humanizes the subject, since, in the dialogue, there is "an encounter that sympathizes the reflection and action of its subjects channeled towards the world that must be transformed and humanized" (p. 108) in the search for the other, not as an imposition or conquest of an idea over another, but as paths that open in the pronunciation of the world as acts of freedom.

De Zubiría (2010), highlights the importance of dialogic dynamics in the formation of the human being as an essential condition for its integral development. These dynamics not only contribute to the humanization of the individual by enabling him to understand the world around him, but also aim to "ensure higher levels of thought, affection and action" (p. 216). By fostering a critical mindset, emotional development, and the ability to act with responsibility and awareness, dialogic dynamics enable human beings to cope and adapt to a context characterized by diversity and complexity.

Dialogy not only enriches understanding of knowledge and promotes the exchange of ideas, but also fosters more human and collaborative learning. By embracing dialogue, education becomes a dynamic space where multiple perspectives are valued and a deeper understanding of the world and ourselves is cultivated. In this environment, teaching and learning transcend the mere transmission of information, becoming an interactive and enriching process that prepares individuals to participate actively in an increasingly diverse society.

Paradigm of Complexity

Complexity has emerged as an alternative to the inherent limitations of traditional and simplified approaches that prevail in the scientific and educational field. When talking about complexity, it refers to a network of interconnected and multidimensional processes that demand a holistic and contextualized approach to adequately address the challenges of reality (Capra and Luisi, 2014). This approach is opposed to reductionism

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and linear thinking that characterize paradigms based on simplicity and single-dimensionality.

Edgar Morin (2003) is a fundamental figure in the development and promotion of complexity in the philosophical field. According to this author, complex thought "is a thought that does not separate, that does not dissociate, that does not fragment, that does not simplify, but integrates, relates, contextualizes and, above all, that does not lose sight of globality" (p. 30). This involves developing skills to recognize and address the uncertainty, ambiguity and interconnectedness present in the real world, and for this, he suggests seven essential knowledge that must be taught in 21st century education (Morin, 1999), including the ability to contextualize, question, relate and connect different knowledge.

Complexity drives an interpretive approach that encourages the generation of integrative and relational knowledge. These enable individuals to address the phenomena of reality in its entirety, maintaining a constant process of conceptual review and enrichment, driven by the environment and transformations of the changing world. As Moreno Guaicha (2023) points out, "it does not pose a schematic and rigid model with irrefutable knowledge, since it understands that knowledge is built at the same time as the subject does" (p. 158). Reflecting this flexibility and adaptability, the paradigm of complexity establishes a learning framework that dynamically evolves with growth and individual experiences.

Another outstanding theorist to understand complexity theory is Basarab Nicolescu (2010), a prestigious Romanian theoretical physicist and philosopher, who has played a fundamental role in the promotion and development of the transdisciplinary approach in order to transcend disciplinary boundaries and foster the creation of integrated and holistic knowledge. In line with Morin, Nicolescu (2002) characterizes complex thought as "a thought that is not satisfied with partial knowledge or with limited vision, but strives to integrate the totality of reality, overcome dichotomies and glimpse the deep unity underlying apparent diversity" (p. 10).

Nicolescu (2002) introduces the term "transdisciplinarity" as a methodology designed to transcend disciplinary boundaries and address the complexity of contemporary challenges from a complex perspective. This approach conceives reality as an intricate network of interrelated levels and dimensions that interact and influence each other, which requires a deep appreciation of the interconnections between the different areas of knowledge. The goal is to highlight the unity implicit in apparent diversity, understanding the complementary dynamics of opposites.

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In addition, the specialist in interdisciplinary studies Julie Thompson Klein (2004) has carried out extensive studies on the integration of knowledge and interdisciplinary teaching, expanding the discussion in relation to the "systematic use of multiple methods from various disciplines [in order to] generate different and alternative perspectives" (p. 34). According to Klein (2008), an effective solution goes beyond the mere combination of its individual components, implying the need for a change of approach that addresses in a more holistic and coherent way the different parties involved in the process. Complex thinking involves:

> A paradigm shift that challenges traditional conceptions of knowledge and reality, and requires an openness to new ways of thinking and addressing problems. This paradigm shift involves a transformation not only in knowledge, but also in the way it is produced and shared (p. 12).

In this framework, Klein (2008) defends the need to implement educational programs that promote collaboration between different disciplines, uniting different theories and methodologies, and promoting the integration of knowledge. This approach emphasizes the importance of developing critical-reflective thinking skills and of stimulating creativity and innovation to successfully address the complex challenges of contemporary society. In line with this idea, Chesley *et al*. (2018) highlight the importance of:

> Apply essential skills and concepts from the humanities and STEM fields to realistic global problems in an effort to provide students with a grounded, context-based experience that practices empathetic, human-centered design and critical thinking (p. 3).

In this way, it seeks to prepare students to address effectively and coherently the intricate challenges presented by the contemporary world.

By understanding the paradigm of complexity, we obtain a clearer view of its influence on the transdisciplinary education model, recognizing that it addresses in a coherent and comprehensive way the diverse and constantly evolving nature of the human being (Morin, 1998). The implementation of this approach in the educational field is presented as an adequate response to the multidimensional challenges of today's society. However, it entails a review of pedagogical practices, curricular structures and learning evaluation, emphasizing the promotion of collaborative environments, the adoption of adaptive teaching strategies and the incorporation of content from various disciplines.

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With this understanding of complexity and its relevance in the current educational context, this segment of the analysis is concluded. Then, the epistemological models of learning will be addressed, deepening their influence on the evolution and adaptation of pedagogical practices, as well as their role in the promotion of learning models.

Epistemological approaches that support learning models

This section focuses on heterostructuring, self-structuring and interstructuring learning models. We will analyze how different epistemological approaches -from the monodisciplinary level to more integrative ones such as multi- and interdisciplinarity- contribute to the conformation of these models, since they reflect the varied ways of understanding and structuring knowledge, demonstrating how the transition to more complex and holistic approaches constitutes a challenge for traditional simplistic conceptions.

Monodisciplinary epistemological approach

In the disciplinary or monodisciplinary approach, a single scientific discipline offers its unique set of methods, theories and conceptual frameworks to address specific fields of knowledge. This methodology, by focusing on detailed specialization, promotes a rigorous and methodical understanding, reflecting its influence on both pedagogical paradigms and the construction of knowledge (Quintanilla, 2013). Through this approach, focused and specialized learning is facilitated, although with the implication that it can limit the openness towards a more inclusive vision of knowledge.

According to Moreno (2014), a practical example of this type of disciplinary organization is found in universities, whose distribution is "by areas and departments, and their quality control systems are internal, i.e., by peer review and based on the publication system in specialized journals" (p. 7). In addition, it can be useful in situations where a specific problem must be solved through specialized knowledge and the application of specific techniques of a single discipline, as observed in the diagnoses of medical disciplines, calculations of statistics, analysis of components of chemistry, among others.

It should be noted that although the monodisciplinary approach has certain advantages, it also has some limitations (Figure 1):

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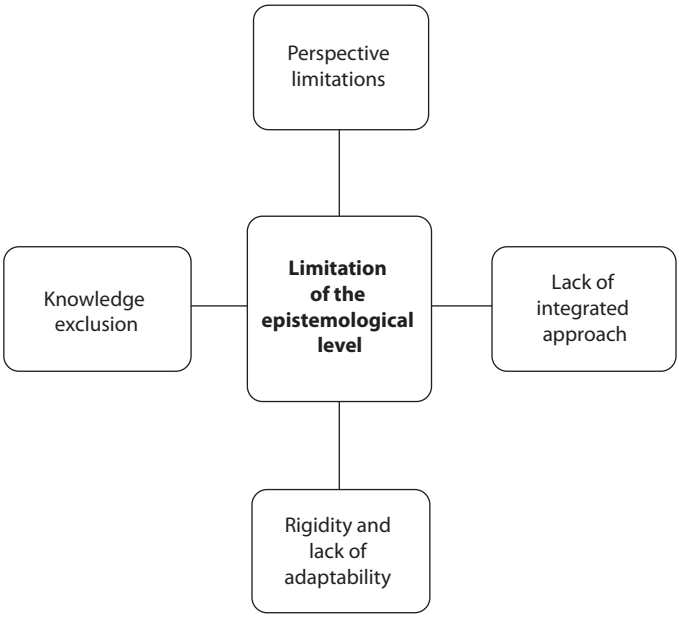
Figure 1
Limitations of the Disciplinary Epistemological Level



Source: own elaborated based on Beaney (2014).

First, "perspective limitation" hinders a full understanding of complex subjects, as it is confined to a single disciplinary field, restricting the possibility of reaching new understandings (Beaney, 2014). Second, the "lack of an integrated approach" limits the exploration of topics that require a holistic view or collaboration across disciplines (Moreno, 2014). Third, "knowledge exclusion" omits other forms of knowledge or skills that are not strictly aligned with a specific discipline, which can result in a partial view of knowledge. Finally, the "rigidity and lack of adaptability" of this approach prevents the incorporation of new methods, changes or innovative ideas. This last aspect translates into a tendency to strictly adhere to the processes, methods and approaches of a particular discipline, even when these may be obsolete or inadequate to address current or emerging problems (Quintanilla, 2013). Rigid adherence to a single disciplinary framework can therefore significantly limit the scope and relevance of the knowledge generated.

On these limitations, Morin points out (1998), the monodisciplinary practices oriented towards a "blind intelligence", which "destroys the sets and the totality, isolates all its objects from their environments"

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(p. 17). The monodisciplinary epistemological level entails several restrictions on holistic understanding, as it excludes certain types of knowledge and skills, and is rigid and intransigent in addressing complexity and emerging dynamics that require a more integrated and adaptive approach.

Epistemological approaches to integration: multi- and interdisciplinarity

As previously mentioned, dialogicity challenges the tendency to homogenize knowledge and fragmentation of knowledge, by promoting the integration of diverse epistemic approaches that allow reaching the levels of multi-and interdisciplinarity (Moreno Guaicha, 2023). This entails transcending simplicity and the epistemological model of discipline, giving way to an alternative view of rationality. According to Candioti (2009), it implies embracing epistemic reality in its complexity and interconnectedness, recognizing the importance of communicative and discursive dimensions for the construction and transmission of knowledge.

Pérez Wicht (2013) points out that dialogic reconsideration significantly expands the possibilities of knowledge exploration, transcending the limits of a single isolated science. Instead, diverse epistemic approaches are adopted that promote the integration of diverse disciplines. This interdisciplinary approach requires a communicative and intersubjective dialogue that can overcome the barriers of its own specialization and dialogue with other fields of knowledge in the search for truth (Aguilar *et al*., 2023). In fact, as mentioned above, the fusion of formal reasoning into symbolic logic, strategic analysis in game theory and argumentation in natural language, illustrates the disciplinary integration. In areas such as logic-based artificial intelligence, Zerpa (2000) identifies a similar integration of disciplines, demonstrating the versatility and depth of this approach.

The opening towards integration leads to the construction of bridges between fields of knowledge that, in a more traditional approach, could remain separate and isolated (Morin, 1999). More innovative and holistic solutions can be generated through collaboration and dialogue across disciplines to meet the challenges of today's world. By recognizing the importance of communication and discourse in the construction of knowledge, it fosters a greater understanding and appreciation of the diversity of approaches to enrich and strengthen scientific and academic progress.

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In order to identify the specific characteristics of each level of disciplinary integration, authors such as Quintanilla (2013), Fuentes and Collado (2019) and Moreno Guaicha (2023) have conducted detailed analyzes of the main models of interdisciplinary collaboration. These include multi-, inter- and transdisciplinarity. In relation to the disciplinary model -characteristic of traditional education and positivist scientism- it is not included in the levels of integration due to its fragmentary configuration. This exclusion is due to their resistance to the collaborative construction of knowledge and their focus on hyper-specialization and fragmentation of knowledge in areas that do not maintain a connection with each other.

In relation to multidisciplinarity, Paoli Bolio (2019) and Moreno Guaicha (2023) argue that this approach promotes collaboration between different disciplines that address a common theme, although participants remain within the methodological and epistemic boundaries of their respective disciplines. At the educational level, this model presents limitations due to the need to have experts from each discipline and the ability of individuals to assimilate and integrate new knowledge.

Regarding multidisciplinarity, Fuentes Canosa and Collado Ruano (2019) state that this approach promotes convergence between two or more disciplines, establishing networks of collaboration and complementarity, although without achieving complete integration. Multidisciplinarity preserves the methods and procedures specific to the disciplines involved.

On the other hand, interdisciplinarity, which is one of the highest levels of collaboration, differs from multidisciplinarity by pursuing deeper integration, reaching agreements on common theoretical and methodological aspects among the disciplines involved (Perez Wicht, 2013). This approach requires a greater degree of conceptual integration, moving and developing in the shared borders of the participating disciplines.

As an epistemological approach, interdisciplinarity defends an innovative and holistic view of the generation and understanding of knowledge, rejecting the idea that knowledge is confined to the boundaries of individual disciplines; instead, it postulates the need for disciplinary integration to address complex problems (Repko, 2008; Klein, 1990). From this perspective, knowledge is considered as a dynamic and constantly evolving entity, fueled by synergy between different disciplines. Interdisciplinarity provides a theoretical framework for analyzing disciplinary collaboration, facilitating the construction of knowledge that transcends disciplinary boundaries and traditional paradigms, promoting a more inclusive and diverse academic practice, capable of effectively addressing complex and multifaceted challenges of contemporaneity.

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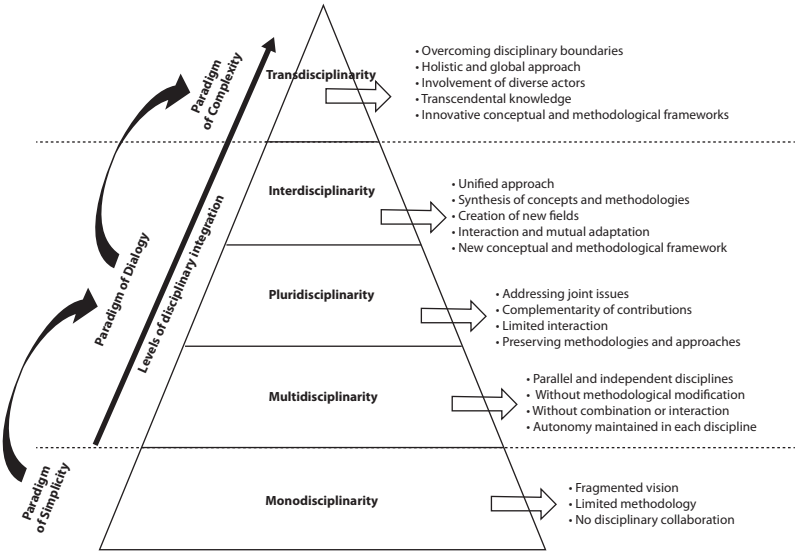
Figure 2
Levels of Disciplinary Integration and Paradigm Overcoming



Source: own production from Aquino *et al.*, (2016) and Fuentes and Collado (2019).

Undoubtedly, both dialogue and the various levels of multidisciplinary and interdisciplinary integration offer valuable interpretations useful to address complex challenges and build knowledge holistically. By recognizing the importance of communication, discourse, and interdisciplinary interaction, a more inclusive and enriching vision is promoted in the search for truth. Therefore, it is essential that educators, researchers and professionals use these approaches, and collaborate in the construction of a deeper, more holistic and contextualized knowledge, able to effectively address the challenges of today's world.

Transdisciplinary epistemological approach

The imperative of challenging traditional paradigms is an inherent reality of scientific and social progress, which, incidentally, postulates academia and education in general as actors in this process of improvement. To do this, a first step is to recognize that certain topics exceed the capacity of a monodisciplinary approach, and to make way for collaboration in the construction of knowledge, which promotes disciplinary integration and embraces innovative proposals such as transdisciplinarity. In this way, as-

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pects that might otherwise remain hidden or inaccessible from separate disciplines can be revealed.

The transdisciplinary proposal emerges as an epistemological innovation that seeks to transcend the conventional boundaries of science and, simultaneously, reveal new knowledge that intertwine transversally in the various fields of knowledge. By promoting an understanding based on reciprocal interdependence and the systemic structuring of knowledge, the understanding of complex phenomena is enriched, allowing a rigorous and integrative epistemological approach.

Transdisciplinarity promotes collaboration and synergy between different disciplines and areas of knowledge, overcoming disciplinary limitations and integrating emerging conceptions of multiple academic, cultural, social, economic and political contexts, among others (Aguilar *et al.*, 2023). This comprehensive and cooperative approach enriches understanding of complexity, while promoting the development of more comprehensive and effective solutions in a rapidly changing world.

There is a close relationship between transdisciplinarity and complexity (Morin, 1999; Nicolescu, 2010), since both approaches advocate an integrative and contextualized view of knowledge. Transdisciplinarity provides an epistemological basis for tackling complex problems from a broader and holistic perspective, while complexity provides a theoretical and philosophical framework for the transdisciplinary approach, highlighting the importance of recognizing and addressing interconnectedness, uncertainty, emergence and self-organization in reality (Morin, 2008; Cilliers, 1998; Capra and Luisi, 2014).

Morin (2019) argues that transdisciplinarity should be kept responsive to the dialogue of knowledge and complex thought, in order to achieve relational and integrative knowledge that enable individuals to understand reality in its entirety. Following this line of thinking, Moreno Guaicha (2023) and Aguilar *et al.* (2019) emphasize that the epistemology of complexity must be dialogic, establishing bridges between scientific knowledge and unconventional knowledge, such as those of ancestral, transcendental, emotional or cultural nature.

Faced with the challenges and complexity of contemporary society, the transdisciplinary epistemological approach stands as a solution to address the fragmentation and lack of integration of knowledge (Nicolescu, 2002; Gibbons *et al.*, 1994; Klein, 2010). Under this idea, the generation of knowledge is transformed into a process enriched by its complexity, since it integrates models such as constructivist, cognitivist and conceptual, and is based on a dialogue dynamic between being, knowing and acting.

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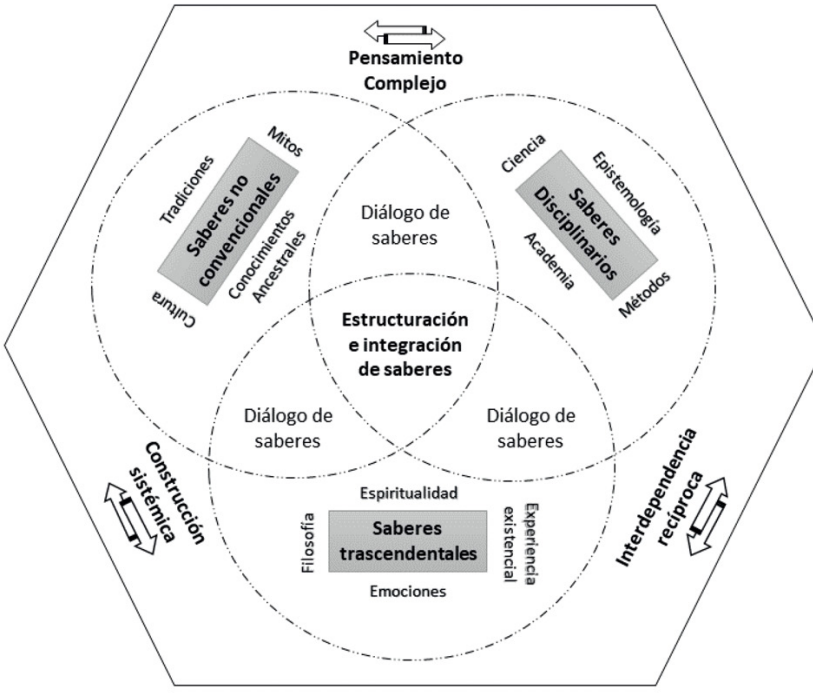
In this way, the approach leads to meaningful, memorable and practical learning for everyday life.

Figure 3
Transdisciplinary Dialogical Integration Scheme



Source: own production from Morin (2019), Aguilar *et al*. (2019), Pérez Wicht (2013) and Moreno Guaicha (2023).

Referring to the constructivist model proposed by Piaget and Vygotsky, it emphasizes the figure of the individual as an active protagonist in his own "construction of knowledge, based on schemes, whether innate or acquired, that guide learning" (Casañas, 2011, p. 224). In the constructivist vision, both the advance of knowledge and the understanding of educational phenomena emerge from the structures inherent to the individual, considering essential aspects such as the skills of the subject, the context around him and the levels of maturity achieved in his development process.

Under this premise, the argument of Garrido and Alvarado (2007), who contemplate constructivist epistemology as an element "dissident against paradigms that quantify reality" (p. 487), stands out. Such under-

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standing invites to examine the dialogic interactions between individuals and how they interpret their circumstances to build their knowledge. On the other hand, Casañas (2011) argues that the dialogic dynamics of constructivism grants individuals nonlinear dynamic processes, which allow addressing social complexity from the singularity of each actor within the educational process. Knowledge of the real world is therefore built through social and representational interactionism processes, which is intertwined with the dialogical dynamics that conceive knowledge as a continuous, progressive and constantly evolving phenomenon (Berger and Luckman, 2003).

Regarding the incorporation of the cognitivist model, it emerges as an essential epistemic pillar to examine how knowledge is generated and how the learning process of the individual develops. Placing particular emphasis on "changes in the structural content and organization of the mind" (Mila and Martínez, 1991, p. 149) and giving primary importance to cognitive structures. This implies a revaluation of the mind as a dynamic and adaptable entity, able to reconfigure itself in response to the cognitive challenges that emerge in the path of learning.

According to Bruner (1991), cognitivist epistemology seeks to "vindicate the study of the mind in the human sciences after a long period dominated by rigorous objectivism" (p. 22). This approach does not limit learning only to process information or to resolve conflicts, but rather aims to make the individual understand the world and himself, through a constant rediscovery of new meanings and meanings in collaboration with others and in different cultural contexts (Vázquez Gómez and Bárcena Orbe, 2011). In this framework, cognitive epistemology, by integrating dialogicity into its interactions, "allows to manifest the dialectical character that the conscious subject gives to his perceptions" (Meza, 2015, p. 5). This attribute enables the individual to interpret and model reality in a process that embraces the complexity of the context, moving away from reductionism or simplicity.

Following the line of reflection inherent to cognitive pedagogy, the inclusion of the model of conceptual pedagogy is contemplated, whose approach assumes a significant importance in the field of training. Here, dialogue stands as a primary element in the relationships between the student, the knowledge and the educator, and which focuses its efforts on ensuring that students "acquire the fundamental concepts and conceptual networks of the sciences and the arts. It is necessary to equip them with concepts, which are the foundations of the entire academic structure of sciences" (De Zubiría, 2010, p. 227).

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The same author emphasizes that dialogue "is an essential condition to ensure effective mediation by the teacher, intentionally, mediated and transcendent facilitating the integral development of the student" (p. 196). This approach allows us to avoid the tendency to focus the training process purely on learning, redirecting it towards a meaningful interaction with the environment, the community and the appreciation of the social repercussions derived from such interactions. For this purpose, De Zubiría (2010) says that conceptual epistemology must be developed in three dimensions of competencies that favor and promote the integral development of the human being: cognitive or analytical competencies, socio-affective competencies and praxeological or evaluative competencies.

> The first dimension is linked to thought, the second to affection, sociability and feelings; and the last, to praxis and action, depending on the subject who feels, acts and thinks [...]. In everyday language, we would say that the human being thinks, loves and acts; and that it is the duty of the school to teach us to think better, harp better and act better (p. 197).

The evolution of these dimensions, through dialogic interactions, aspires that the knowledge acquired in learning is not merely implanted in the minds, as if it were a deposit. Instead, it seeks that knowledge interacts and coexists with the values and emotions of each individual. The aim is to ensure that training is contextualized according to the conditions of its development, both individually and socially.

In summary, the confluence of constructivist, cognitive and conceptual approaches makes it possible to face complexity using dialogic interactions in an integrative approach that combines the structuring of mental operations with the social interaction provided by language. According to Guerrero and Henao (2019), this leads the individual to "manage, represent and reproduce new information, causing a modification in cognitive structures" (p. 23). In this way, the transition from the thought of simplicity to the complex thought is facilitated.

Undoubtedly, dialogue is consolidated as the key foundation in the development of complex structures, giving rise to an "interdependence [which is presented as] a principle by virtue of which elements and events are closely integrated and organized in an interrelated process" (De Zubiría, 2010, p. 198), which is structured and developed both individually and socially, allowing a deeper and more holistic understanding of the phenomena of study.

In summary, the transition from the precision of monodisciplinarity to the collaborative and holistic wealth of transdisciplinarity illus-

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trates a fundamental change in learning models. This progress, essential in an era defined by its complexity and intertwining, highlights the need to overcome disciplinary barriers and to value epistemological diversity. Thus, the relevance of adapting to an educational and scientific environment in constant transformation, where epistemological integration and flexibility are presented not only as options, but as essential requirements for development and advancement in multiple spheres of society.

Moving forward in this discussion, the following section will delve into heterogeneous-, self- and interstructuring learning models, exploring how these modalities reflect and feed on epistemological evolution, offering practical approaches to address educational challenges.

Learning models: hetero-, auto- and interstructuring

This section expands the understanding of how epistemological paradigms and approaches materialize in specific learning models and pedagogical practices. Here we explore how heterogeneous, self- and interstructuring learning models reflect different ways of interaction between the educator and the educator, the structure of information and the process of knowledge construction. Through this, the impact of each model on the deepening and enrichment of learning is examined, evidencing its relevance and applicability in different educational contexts.

Heterostructuring Learning Model

The educational model that is in line with the framework of simplicity is traditional and heterostructuring, which, in the words of Zubiría (2010), is typical of an education in which the role of the teacher is "privileged and is considered the central axis in all educational process" (p. 16), being the student a passive entity in the learning process. Traditionally, this student was perceived as an *a-lumine*, an individual "without self-light" or "off", an empty vessel or *tabula rasa*, ready to be filled with knowledge. In this conception, the teacher was considered the absolute holder of an unquestionable and immutable knowledge.

According to García and Fabila (2011), the heterostructuring learning model refers to repetition and memory, "incited by extrinsic motivators, which seeks to equate learning with behavior" (p. 4). Disciplinary tactics, such as the use of external incentives (rewards or punishments) to stimulate students, are common in this model, whose main purpose is to encourage the adoption of specific behaviors, shaping the way students

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interact with information. Additionally, this learning model emphasizes the use of analytical reasoning in the process of knowledge acquisition. Although this approach seeks to uncomplicate the learning process, it also harbors inherent limitations; as Besteiro (1994) argues, these reasonings "are purely explanatory and, in relation to content, do not provide anything additional" (p. 135).

Heterostructuring learning, despite facilitating an initial understanding of the content, may prove insufficient in terms of depth and richness of knowledge (Fischetti, 2019). This model, focused on the memorization and organization of information, does not guarantee a significant enrichment of learning. Therefore, it can limit the ability of students to critically analyze information, relate concepts and generate well-grounded conclusions.

The convenience of using receptive methods becomes the basis of the learning model, making the master class its default methodological strategy. In line with its methodological proposal, "it presupposes that teaching, authoritarianism and instruction must be used to ensure the assimilation of the cultural heritage in the classroom" (De Zubiría, 2010, p. 16). This guarantees that learning goes beyond simple conceptual content, promoting and reinforcing rules and structures of the prevailing system. What is being pursued is an equation between learning and student behavior, in such a way that the objectives established by the imposed pedagogical model are achieved.

García and Fabila (2011) also emphasize that heterostructuring teaching models emphasize the teaching process and the transmission of information and standards, using techniques such as repetition and copying to strengthen knowledge. Regarding the roles played by educational agents, it is highlighted that students become passive and receptive agents, a matter that has already been highly criticized, as it restricts creativity, critical thinking and student participation in the construction of knowledge. Likewise, the role of the teacher is criticized in this model, since its pedagogical approach places the teacher at the center of the educational process, as the mere transmitter of knowledge and holder of the truth (De Zubiría, 2010), excluding the needs and skills of the student.

In short, it can be argued that this model lacks flexibility to adjust to the specific demands of each student, which ends up hindering their ability to learn effectively. A teacher-centered approach based on repetition is not the most appropriate for the current educational landscape. This is why teaching models are adapted to the characteristics and needs of students, only in this way can significant and memorable learning be achieved.

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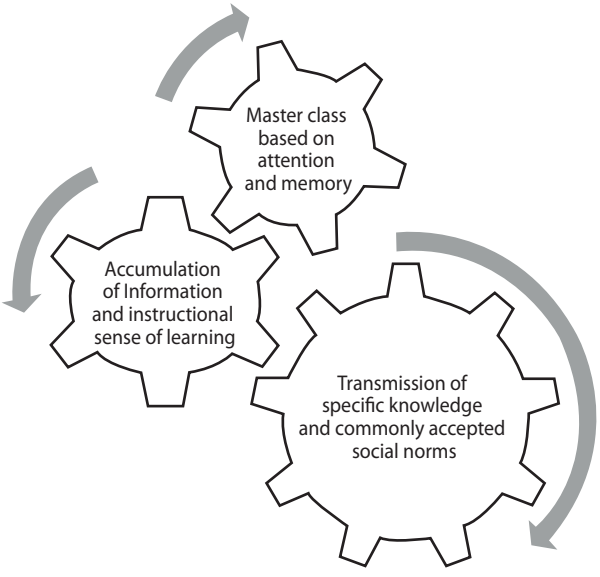
Figure 4
Characteristics of the Heterostructuring Learning Model



Source: own elaboration from García and Fabila (2011).

Self-Structuring Learning Model

The self-structuring model emerges as an innovative pedagogical proposal, in line with the principles of the paradigm of dialogue and disciplinary integration approaches. Its essential purpose is to transcend the limitations of simplicity, disciplinarity and heterostructuring learning, giving students an active and autonomous role in the acquisition and construction of knowledge from experience and its centers of interest (Dewey, 1938; Montessori, 2003).

In accordance with this idea, Gómez (2013) argues that the self-structuring pedagogical approach is based on the idea that learning is an active, individualized and self-organized process, in which the objective of education is to move from an "intellectual teaching guided from the outside to a project where the student becomes the active element of a set of processes in which he has to ensure the direction" (p. 9).

This idea is supported by Biesta (2015), who argues that self-structuring education should focus on creating spaces for students to "explore, experiment and build knowledge autonomously and collaboratively"

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(p. 45). Therefore, the importance of fostering flexible and dynamic learning environments is emphasized, since they allow students to develop skills and competences to face real challenges and problems in their specific contexts.

Regarding the process that guides the educational action between teacher and student, it is worth mentioning the didactic transposition (Mejía *et al.*, 2021), which stands as one of the main elements in the self-structuring theories, because the educational process focuses on the student, taking into account its particularities, nuances and meanings, which places the student in the very core of such transposition. As a result, the teacher has the responsibility to adapt his pedagogical approach to the individual profile of the student, seeking to optimize the assimilation of knowledge.

In the context of the self-structuring approach, it is essential to emphasize that the student becomes the main agent of his own learning process, assuming a self-regulation role. This model encourages students to organize their learning autonomously, guided by their specific interests, needs and contexts. In fact, the spirit that characterizes dialogic pedagogy, according to Moreno Guaicha *et al.* (2022), permeates the essence of self-structuring learning, recovering the key slogan of the Enlightenment: "Thinking for itself", the *sapere aude*, which seeks to question all kinds of institutions that hinder the development of human potential. This bond with the Enlightenment underlines the emphasis of the self-structuring approach on the empowerment of the individual and the use of reason as a learning tool.

Self-structured learning is enriched by integrating and leveraging a variety of recognized pedagogical frameworks. These include active pedagogy, constructivism, cognitive pedagogy, student-centered approach and dialogic pedagogy. These approaches, which have been strengthened and shaped by the contribution of notable educational psychologists and pedagogues such as Montessori (1870-1952), Lev Vygotsky (1896-1934), Jean Piaget (1896-1980), David Ausubel (1918-2008), Carl Rogers (1902-1987) and De Zubiría (1951-), expand and extend the reach to the depth and the possibilities offered by self-structuring learning, in a holistic pedagogical framework that promotes the growth and individual development of students.

In the development of self-structuring learning, De Zubiría (2010) says that it is important to deepen the dialogic activity to give students opportunities in decision-making, goal-setting and critical reflection about their own learning process, promoting responsibility and commitment in their personal and academic development. In doing so, it promotes

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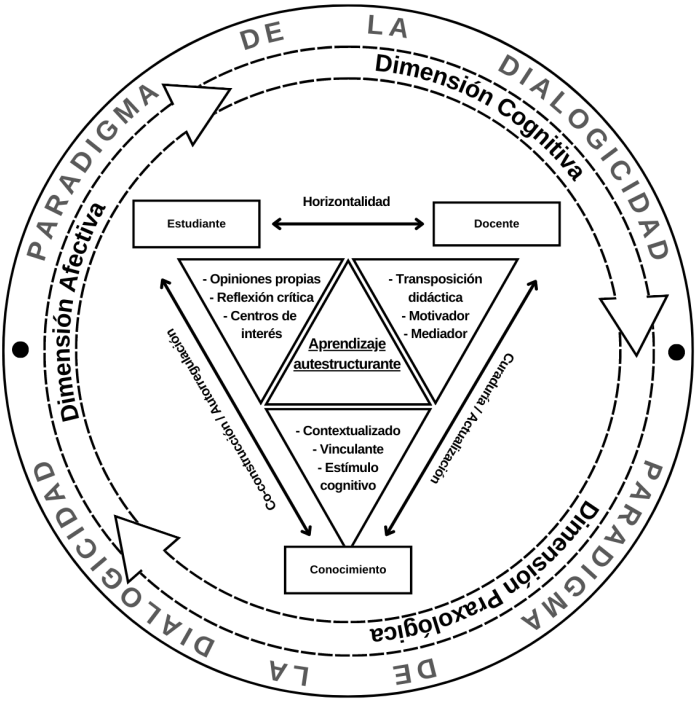
students' ability to listen to and value their peers' views, contributing to an environment of respect, inclusion and diversity in education.

Dialogic pedagogy not only promotes responsibility and commitment in academic development, but also promotes their integral formation, as critical and reflective individuals, able to face the challenges of a world in constant change. This approach "emphasizes the construction of structures through the practical, affective and cognitive dimensions, based on the cognitive modifiability theory of Reuven Feuerstein, who considers that intelligence is dynamic, relativistic, optimistic and contextual" (Contreras *et al.*, 2019, p. 174) and highlights the role of culture as an intermediary, which enables the plasticity and malleability of knowledge, as well as its progress.

Figure 5
Key Relationships and Functions
in the Self-Structuring Learning Model



Source: own elaboration from De Zubiría (2010) and De Zubiría and De Zubiría (2019).

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In this direction, it is appropriate to highlight the close relationship between self-structuring learning and the development of reasoning within the structuring of synthetic judgments for self-discovery and induction learning, processes in line with Kant's vision (1977). Here the truth is not merely contained in the concept of the subject, as it happens in the analytical judgments used in the reasonings of the heterostructuring model, but extends beyond, providing new information and propitiating the active participation of the subject in the process of knowing:

> There are two possibilities in synthetic judgments: they can be *a priori* if they arise from pure understanding and pure reason and therefore their truth is necessary, or they can be *a posteriori* and their value is determined by appealing to other types of instances such as experience. For this reason, the truth of a synthetic judgment *a posteriori* will be contingent on depending on factors that may or may not be the case (Castro, 2015, p. 8).

In the educational field, students do not limit themselves to assimilating pre-existing knowledge, they also actively contribute to its construction through their own exploration and analysis, based on their personal experiences. According to De Zubiría (2010), this approach, which promotes a deeper and more meaningful learning, faithfully reflects the spirit inherent in dialogic pedagogy.

The conception of the student as an active subject and participant in his learning resonates in different disciplines and establishes a link with dialogic logic, which -being a subdiscipline of symbolic logic rooted in game theory and mathematical constructivism (Clerbout and McConaughey, 2022)- provides an adequate conceptual framework to deepen the understanding of the dynamics of self-structuring learning, strengthening the guiding thread of this discourse.

Regarding the interaction between the model of self-structuring learning and the paradigm of dialogicity, it is clear that both approaches promote collaboration, communication and intersubjective understanding in different areas of knowledge (Contreras *et al*., 2019). On the one hand, dialogicity favors the development of relational and discursive skills in students, who become active agents of their own learning process, assuming the responsibility of building their knowledge through dialogue and reflection. On the other hand, the levels of multidisciplinary and interdisciplinary integration provide an epistemological framework that allows students to explore and connect knowledge from different disciplines. This approach encourages the construction of an integral and

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contextualized knowledge, which is adapted to the needs and interests of each student.

Ultimately, the self-structuring learning model emerges as an integral pedagogical methodology, effectively fusing dialogicity with an epistemological approach that prioritizes the integration of diverse disciplines, including multi- and interdisciplinary aspects. This approach promotes not only autonomy and self-reflection, but also the collaborative construction of knowledge (Hernández and Quintana, 2018). Here, students are encouraged to actively participate in the search for truth, through dialogue and collaboration across disciplines, and by valuing epistemic diversity in educational settings.

Interstructuring Learning Model

The interstructuring learning model is based on the conceptual pedagogy proposed by Miguel de Zubiría (2006), whose approach aims to promote an integral development of the student, covering affective, cognitive and praxological aspects. Villegas (2017) mentions that this model is built on "three interrelated factors: thinking (cognitive); emotional or socio-affective (feelings, sociability), and praxis (action)" (p. 3). Learning is conceived as a dynamic and versatile process, where students have the opportunity to structure and restructure their knowledge in a continuous way, promoting critical thinking skills, creativity and adaptability to different contexts and situations.

Interstructuring learning is distinguished by the importance it has to dialogue in education. De Zubiría (2010) stresses that "a dialogic and interstructuring model must prevail that, in addition to accepting the active role of the student in learning, recognizes the essential role of mediators in this process; a model that provides a dialectical synthesis" (p. 15). This approach involves close communication and collaboration between students, teachers and other educational and social actors, promoting the exchange of knowledge, innovation and the enrichment of knowledge through reciprocity, which culminates in a more comprehensive and effective learning (Aguirre and Godoy, 2020).

Interstructuring learning has a significant affinity with complexity and the transdisciplinary epistemological approach—as already stated—promoting awareness of the intricate network of connections that make up reality and urging to address challenges from a systemic and transdisciplinary approach (Morin, 2008; Nicolescu, 2002). In this way, the development of a wide and penetrating understanding of the phenomena

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that students face is fostered, equipping them to make informed decisions and act responsibly and ethically in a world of increasing complexity and interconnectedness.

Contrasting with the hetero- and self-structuring models, interstructuring learning emerges as a more holistic educational approach, designed to meet the challenges of the 21st century (Aguirre and Godoy, 2020). Heterostructuring learning, marked by its fragmented and simplified nature, differs from self-structuring, which emphasizes disciplinary integration and the construction of significant knowledge. However, interstructuring learning transcends these approaches, since it focuses on the integral development of the human being and is not limited only to academic learning, encompassing "cognitive, valuative and practical contents, which obliges the school to define purposes and contents that guarantee higher levels of intra and interpersonal intelligence" (De Zubiría, 2006, p. 7).

Consequently, learning transcends the classroom and the school context, incorporating a construction of knowledge that occurs actively and interrelated, both within and outside the educational areas. According to Benítez (2019), this knowledge is built:

> Outside the school, but it is reconstructed in an active and interstructured way from the pedagogical dialogue between the student, the knowledge and the teacher. Taking into account the development of human dimensions, such as thought; affection, sociability and feelings; praxis and action, according to a subject who feels, acts and thinks (p. 103).

For an effective implementation of transdisciplinary pedagogy in the classroom context, it is necessary to cultivate students' sensitivity and commitment to the importance of a comprehensive education. This education is in tune and reflects the different needs and educational contexts, but also takes into account the particularities and respects the points of interest of the subject in the process of knowledge construction.

According to Aguirre and Godoy (2020), the interstructuring learning model constitutes a significant advance in the way the individual interacts with elements of his or her environment that are relevant to his or her learning. Knowledge acquires meaning and value insofar as it can be directly associated with their existence and personal experiences. For this reason, the process must begin with the awareness of the protagonist role of the student in the process of knowledge construction, integrating the different constitutive dimensions that make it up, followed by the

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active involvement of educational agents in the task of transcending traditional practices and the different challenges that persist in education.

Interstructuring learning establishes a constant pedagogical dialogue between the student, the knowledge and the teacher, which contributes to an active construction and reconstruction of knowledge (García and Fabila, 2011). A process in which "mediators and students fulfill essential but differentiated roles; learning is an active and mediated process in which a variety of strategies must be used to ensure reflection, learning and dialogue" (p. 14). In this way, the approach not only makes possible the understanding of the challenges that characterize this era, but also promotes effective strategies to face the changing dynamics and constant transformations of contemporary reality.

Interstructuring learning definitely represents a significant evolution in education, whose approach seeks to create a dynamic and versatile learning environment that allows students to structure and continually restructure their knowledge, promoting critical thinking skills, creativity and adaptability in various contexts and situations (Aguirre and Godoy, 2020; Benítez, 2019). Throughout this discussion, the relevance of dialogue in the learning process has been underlined, which translates into close communication and collaboration in the exchange of knowledge.

In this context, teaching methodologies that complement and enhance interstructuring learning emerge. These include Problem Based Learning (PBL) and the STEAM method, to illustrate two. As Mena Zamora (2023) points out, "in order to conceive an appropriate use of one or more methodologies [...], which allow transdisciplinarity to be addressed, it is necessary that these show an integrating position of knowledge with a critical and contextualized vision" (p. 319). For this reason, pedagogical methods -integrating multiple fields of knowledge- encourage the active participation of students in their learning, promoting collaboration, creativity and innovation. This develops in them transversal skills and competencies such as critical thinking, problem solving and effective communication (Thomas, 2000).

The methodology of the PBL focuses on the interests and experiences of students, thus achieving more meaningful and timely learning for conflict resolution through active participation. The purpose of the PBL is to "base knowledge from the epistemology of complexity for the approach and analysis, so that all aspects that compose it are considered, to transcend the limits of specific knowledge" (Mena Zamora, 2023, p. 334).

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Likewise, the STEAM methodology is inserted, centered on "sciences (S), technology (T), engineering (E), arts (A) and mathematics (M)" (García Fuentes *et al*., 2023, p. 192) and which emerges as an interdisciplinary proposal with transversal potential, which favors an integrated and creative educational process. According to Yakman (2008), STEAM seeks to produce results with a solid and complete training in critical thinking, creativity and - as in the previous approach - conflict resolution in various areas of knowledge.

These types of methodologies allow students to see and understand the world in an integrated and sustainable way, addressing challenges from multiple disciplines (Stevenson *et al*., 2007). For these authors, these methodologies provide a propitious scenario to apply the philosophy of interstructuring learning. In this context, students are encouraged to explore and understand the complexity of natural and human systems, using their skills and knowledge acquired in various disciplines to propose and evaluate solutions that may be required in a given context.

Interstructuring learning, aligned with the principles of transdisciplinarity, is established as an innovative and relevant educational proposal that intertwines dialogicity with that of complexity and the higher epistemological level of disciplinary integration (Aguirre and Godoy, 2020; García and Fabila, 2011). This approach gives students the competencies and skills needed to address and solve complex challenges, promoting inclusive knowledge building, adaptability, and ethical responsibility.

With the purpose of forming holistic individuals, able to interact and thrive in a world of increasing complexity and interdependence, the interstructuring approach seeks to generate learning that transcends the physical boundaries of the classroom, to become an integral part of the daily existence of the student. This learning satisfies current educational needs and the skills and competencies needed for the future, providing a solid and versatile framework for comprehensive student growth in an increasingly interconnected and complex world.

To conclude this analysis of learning models, the article highlights their essential contribution to questioning simplicity in contemporary pedagogy. Compared to traditional models, rooted in linear and reductionist approaches, emerging models such as interstructuring and transdisciplinary models represent a paradigm shift. These new models challenge conventional methods by promoting deeper integration and connection among diverse areas of knowledge, reflecting the inherent complexity of today's world. They foster more enriched analytical and

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critical thinking, equipping students not only to store information, but also to synthesize, question and apply it in a practical way.

The transition to these more complex and holistic learning models is essential, not only as a challenge to simplistic approaches, but as a necessary and strategic response to prepare students to thrive in an increasingly interconnected and complex world. This change represents a fundamental stage in the evolution of education, laying the basis for the conclusions of this study and underlining the importance of adapting practices to the demands of an ever-changing educational environment.

Conclusions

This exploration has highlighted the transcendental evolution of learning models, from traditional approaches anchored in the paradigm of simplicity to more complex and transdisciplinary models, marking a paradigmatic change in the philosophy of education. The transition to these emerging models reflects a response to the needs of a dynamic society, recognizing the interconnectedness and multidimensionality of knowledge in an increasingly interconnected world.

This analysis suggests that the contemporary educational landscape, still rooted in the primacy of instrumental reason, techno-scientific knowledge and the paradigm of simplicity, needs a critical reflection on the reference frameworks that underlie current educational practices and structures, and an orientation towards approaches that value human complexity and its learning processes.

Following the transcendental evolution of learning models, the domain of simplicity in the configuration of monodisciplinary epistemology and heterostructuring learning models has been analyzed. Although this paradigm has laid the foundations of many conventional educational practices, it is observed that its approach, centered on isolated elements of knowledge, presents considerable challenges in the context of a society that demands a more integral and connected learning. The exploration of these practices reveals that, despite its historical usefulness, it falls short of the need to address the increasing complexity and interconnectedness of current knowledge.

In the progress towards more integrated learning models, dialogicity emerges as a crucial step, giving way to self-structuring forms of learning. This paradigm emphasizes collaboration, dialogue and disciplinary integration, and recognizes the students as an active protagonist in their

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educational process. However, despite representing a significant advance compared to simplicity, dialogue still does not fully reach the depth required to comprehensively address the complexity and multifaceted challenges of human learning.

Ultimately, it highlights the need to move beyond dialogism into the realm of complexity. Adopting this approach implies embracing a transdisciplinary epistemology and an interstructuring learning model, which promote a comprehensive and multidimensional educational development. This orientation favors an education that transcends the limits of the purely academic, considering the individual in its entirety -his cognitive abilities, values and practices- and aiming at a formation that is holistic and transformative. Given the pace of advances in science and the emerging challenges in society, the paradigm of complexity is not only relevant, but also essential for an education adapted to the realities of the current and future world.

This review highlights the potential impact of these paradigm changes on scientific advancement, social welfare and human development, advocating for a vision of education not as a simple product of consumption, but as a fundamental foundation for the construction of a more equitable society.

In conclusion, it is emphasized that, although the transition to more complex and inclusive learning models represents certain challenges, it is a necessary and achievable evolution within the educational field. Education plays a crucial role in this change, not only adapting to the new realities, but also leading the transformation towards pedagogical practices that foster comprehensive learning and deeply connected with human experience. Therefore, it becomes evident the need to redefine and restructure current educational models, so that learning becomes a transcendental and humanly enriching experience.

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Postdigital pedagogy as a synthesis of rhizomatic learning and the postdigital era

Pedagogía posdigital como síntesis del aprendizaje rizomático y la era posdigital

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Abstract

This paper is conducted around two central axes: rhizomatic learning and the post-digital era. Rhizomatic learning bases its principles on the construction of knowledge based on the contributions of students in real time, with the aim of understanding the community as a curriculum. For its part, the post-digital era is understood as the situation in which digital technology is an imposed social necessity. Since education, despite being public, is not free, digitization increases the socio-economic gap between students with access to digital tools and those who do not. Thus, the possibility of counter-digitization is proposed: using digital technology as another emancipatory tool, i.e., when it is possible, use it competently and equitably; however, when this situation cannot be achieved, we must have a post-digital praxis that understands the world-system with the same or similar possibilities. To this end, rhizomatic learning and post-digital era will be presented as inherent parts for the production of the upcoming pedagogical proposal: the possibility of establishing a post-digital pedagogy. To provide philosophical grounding, a literature review of the two aforementioned axes is presented from the work of Deleuze and Guattari, exposing a distant and rupturist approach to the digitalist positions of current techno-capitalist education.

Keywords

Educational philosophy, e-learning, critical thinking, information society, inclusive education, technology.

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Resumen

El presente trabajo se construye alrededor de dos ejes centrales: el aprendizaje rizomático y la era posdigital. El aprendizaje rizomático asienta sus principios en la construcción del conocimiento a partir de las aportaciones del alumnado en tiempo real, con la finalidad de entender la comunidad como currículo. Por su parte, la era posdigital se entiende como la coyuntura en que la tecnología digital es una necesidad social impuesta. Partiendo de que la educación, pese a ser pública, no es gratuita, la digitalización aumenta la brecha socioeconómica entre el alumnado con acceso a herramientas digitales y el que no. Así, se propone la posibilidad de contradigitalización: usar la tecnología digital como una herramienta emancipadora más. Esto es, cuando sea posible, utilizarla de manera competente y equitativa. Ahora bien, cuando esta situación no pueda darse debemos contar con una práctica posdigital que comprenda el sistema-mundo con las mismas o similares posibilidades. Para ello, aprendizaje rizomático y era posdigital serán presentados como núcleos inherentes a la producción de la propuesta pedagógica viniente: la posibilidad de establecimiento de una pedagogía posdigital. Como sustento filosófico se presenta una revisión de literatura de los dos ejes mencionados desde la obra de Deleuze y Guattari, exponiéndose un acercamiento rupturista con las posiciones digitalistas de la educación tecnocapitalista actual.

Palabras clave

Filosofía de la educación, aprendizaje en línea, pensamiento crítico, sociedad de la información, educación inclusiva, tecnología.

Introduction

The topic addresses the transformation of educational methods, especially in the transition from conductivist, cognitivist and constructivist approaches to connectivist learning, highlighting the rhizomatic model. It states the influence of the digital age and the need to explore new forms of education in the post-digital era.

The main objective is to explore the possibilities of educational counterdigitization to ensure equitable access to knowledge, proposing a postdigital approach that is aware of the socioeconomic and ethically responsible limitations in the use of technology.

The main question that guides this research is how to address educational counterdigitization to ensure equal access to knowledge, considering the socioeconomic and ethical limitations in the use of technology?

In order to answer the question, it is necessary to adopt a postdigital approach in education, recognizing digital obligatory education as a privilege, and proposing pedagogical practices that are competent, equitable and ethical, both in digital and analog environments.

The research topic highlights the importance of overcoming the socioeconomic gap in education, recognizing that the post-digital era requires a critical reflection on access to technology and advocating for more inclusive pedagogical practices. It is a current topic, it focuses on the reality of the year 2020, demonstrating the need to adapt to virtual

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classrooms and the digital gap, which underlines the urgency of rethinking educational practices in the post-digital era. Its relevance lies in the search for non-commercial educational alternatives, exploring new pedagogical territories that allow to reverse the digitalist vision of education and build a more equal perception.

Methodologically, this work raises the need to adopt a post-digital approach, recognizing the socioeconomic and ethical limitations in the use of technology, and exploring developments and possibilities for the application of rhizomatic learning from this perspective. To this end, an exhaustive review of the academic literature related to the subject of study has been carried out, selecting and critically analyzing key texts, theories and concepts. In addition, an analysis has been made from fundamental concepts related to the research topic, exploring gaps in knowledge and looking for connections between different concepts or theories, with the aim of generating new perspectives or research approaches. Hence, this article proposes new directions or approaches for applying rhizomatic learning in the post-digital context.

The work is conducted by dismantling various developments and possibilities arising from the application of rhizomatic learning in a post-digital context. In addition, it aims to explore vanishing lines that lead to a pedagogical protosystem: post-digital pedagogy. It is considered that memorization, repetitive mechanization and the production of chain knowledge typical of industrial and "post-industrial" society are partially replaced by digital educational resources during the digital era (Siemens, 2004). The intention is that students increase participation by looking for connections between contents, analyzing concepts, sharing the learning process, etc. (Starkey, 2011).

To this end, several authors agree that conductivist, cognitivist and constructivist learning must evolve towards connectivist learning, such as proposals similar to the pedagogy of cyberspace (Hermann Acosta, 2011) or, in this case, rhizomatic learning (Reigeluth, 2000; *Martín et al.*, 2011; Cabero and Llorente, 2015). Thus, it is intended, understanding the construction of knowledge in the network society (Hermann Acosta, 2013), to propose an alternative besides digitization to be able to work from the connectivism.

Rhizomatic learning is a new type of learning that moves away from the curricular hierarchies and is proposed as a break to the homogenization of contents, i.e., the construction of knowledge from the contributions of the subject of learning in real time, namely, understanding the community as a curriculum (Cormier, 2008). One of the main character-

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istics of this methodology is that it is established from a digitalist point of view, defending that ICTs are the main guarantors of constant, updated and multiple access to knowledge. This makes the use of digital technologies inherent to rhizomatic learning, which subjects the character to the condition of having sufficient resources to carry it out (Jandrić, 2020).

In this way, it is observed that learning based on a digital methodology seems to be precipitated when it comes to self-proclaim as global educational tools and free access. The problem lies in rooting the rhizomatic learning in the digital age, which was exhausted by the superposition of the obligatory access to the digital. Thus, the current situation must be understood as a post-digital era, namely, the period in which the fact of being digital will only be noticed by its absence and not by its presence (Negroponte, 1998). This causes an increase in the socioeconomic gap between students with access to digital tools and those who do not.

This phenomenon has been observed throughout 2020. Classrooms transformed into virtual spaces as open as they are inaccessible, where digital technology becomes a social necessity that denies access to education to the few and brings enormous benefits through an educational commodification process to the few others. The school system continues to perpetuate the punishment of students who do not adapt, in this case those without access to digital (Czerniewicz *et al.*, 2020).

In response, educational counterdigitization possibilities that allow access to knowledge similar to that offered by smart devices should be explored. It is not a question of formulating a "luddite revolution" that advocates the death of machines, but rather of seeking a practice that is capable of bringing digital pedagogy to new territories in which digital resources are limited, namely, where possible, to use it in a competent and equitable way. However, when this situation cannot occur, we must have an alternative that will become post-digital.

Becoming post-digital will refer to the ability to understand the privilege that is the incorporation of digital obligation into the school system and, in this way, an ethical and conscious use of digital in local and global socio-economic limitations should be made. Thus, post-digital ruptures must be applied in order to reverse the digitalist vision of education towards a more equal perception, which allows understanding the situation of the non-privileged population: "Could we do this activity without digital resources?", the teaching staff must ask. Throughout this work it will be made explicit how the construction of developments, such as the one mentioned above, must be carried out from the minority (Deleuze and Guattari, 1988). To become a post-digital minority is to

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denounce privilege, to look for non-commercial educational alternatives, to explore new pedagogical territories; it is, in short, to pack up: to tear down walls, to build bridges.

In the conduction of the research, the different developments and possibilities manifested in the application of rhizomatic learning from a post-digital point of view will be broken down. It also aims to navigate through the lines of flight that will gradually emerge in order to draw paths that converge in a pedagogical protosystem: post-digital pedagogy.

Precariousness and Capitalism in the Post-Digital Era

> *Period when the fact of being digital will only be noticed by its absence and not by its presence (Negroponte, 1998).*

Although the epigraph allows to establish and understand the starting point of the post-digital era, it is useful to turn to certain points, which allow a more precise description of the fact to be presented. The concept "post-digital era" is understood as the conjuncture that allows analyzing the effects and implications of the digital era (Agamben, 2002), so it implies a distancing from the typical digitalist enthusiasm of the previous era (Cramer, 2015).

The fetishization of the so-called "digital revolution" has involved the creation of exclusionary binarisms, socioeconomic computerization: ones or zeros, on or off, digital or analog (Pepperell and Punt, 2000). Therefore, the post-digital presents as a flexible response that multiplies the possibilities of digitization from an inherently extensive perspective, namely the post-digital landscape-network.

The landscape-network, from the digital perspective, is understood as the process in which digital technologies increase the possibilities of panoramic organization of a digitalized territory (Stam, 2000). This leads digital environments to try to synthesize natural and cultural aspects individually, i.e., landscape and inhabitants become entangled unity (Londoño and Gómez, 2011). The digital landscape-network is established in principle and similarity to the capitalist regime, perpetuating its power devices through the obligatory commodification of the digital.

On the other hand, the landscape-network from the post-digital perspective will be understood as a territorial palimpsest that uses the residue of the digital to create counterdigital -or post-digital- tensors that allow sketching the same or similar territorial lines as those offered by digital devices without the need to depend on them.

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The use of digital technology is understood as a prosthetic organic projection, i.e. it replaces organic functions by external devices (Kapp *et al.*, 2018). In the post-digital era, digitalism seeks prostheses necessary for the correct functioning of the individual (Smith, 2018). Thus, the optimization offered by digital devices is exploited by the capitalist system to create supposedly dysfunctional subjects to whom it can prescribe increasingly expensive prostheses: although it cannot be paid for, that prosthesis is necessary to walk, to study, to live (Jones, 2019). Drama of post-digital capitalism.

As in Foucault's Panopticon (1976), the individual who fails to adapt to the norms, in this case digital, is punished, i.e., those who cannot afford access to the digital. And the pseudo-solution to cost-cutting is not sustainable, because no matter how cheap a product is, there will always be people who cannot afford it. Thus, understanding post-digital capitalism as a reality, it is necessary to look for vanishing lines in the face of educational commodification.

These lines will be proposed as post-digital and counterdigital alternatives to the imposition of dysfunctionality: rehabilitation prior to prostheses. To do this, there must be an alternative capable of reactivating anatomical mechanisms in a post-digital key, namely: if a methodology in which it is intended to explore the non-digital potentials, the possibility of sporadic use of digital devices will allow the competent and equitable use of these tools. Be able to work functionally and, when possible and necessary, apply this rhythm to the prosthetic incorporation (Smith and Morra, 2006).

Once understood the context of this research, as well as the main problems of the post-digital era, it is necessary to specify what role the post-digital plays with education. First, it must be understood that digital is not part of a specific type of methodology or didactics, but that in the post-digital era it is part of the understanding that digital is inherent to human development (Lewis and Kahn, 2010).

The reality is that the academic training of teachers is quite limited and the new generations see how social digitization is still being processed in educational research (Knox, 2016), hence the ambition and difficulty of the project. For this reason, it is emphasized that the digital is understood as a sociological necessity and the rarity lies in the non-achievement of the digital fact, i.e., the lack of digital instruction, the scarcity of digital resources, the ignorance of the digital or the supine ignorance, among others.

From these conditions, the post-digital will be understood as an optimized return to the first educational concerns applied in a landscape in constant opening, already entangled and constituted by the omnipres-

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ence of the digital (Knox, 2019). Thus, it is observed that the digital tools used by teachers are not merely educational, but are part of an accelerated capitalist framework that aims to change education, i.e., the school becomes a Silicon Valley company, where qualification becomes statistical accuracy, the contents become data and the student becomes client (Srnicek, 2017).

The notion of open digital education has not been able to thrive as the capitalist machine has taken care of it. Ideological attempts at educational openness have resulted in a commercialization of the community, where there has not been an achievement of the ideal of sharing because access to digital creates socioeconomic parallels in which the privileged will glorify the benefits of its use, while the non-privileged will not be able to appreciate these characteristics because of the lack of capital that denies them access (Birchall, 2017). Thus, it is observed that open digital education is not inherently inclusive, on the contrary: the economic level of the individual will continue to perpetuate exclusionary structures that aim to focus education towards a specific client-pattern: middle and upper class students (Schlagwein *et al*., 2017). It is considered essential that teachers are able to appreciate this false sense of inclusion laundered by the capitalist system, as well as the main borders and digital boundaries that seek exclusion and educational socioeconomic homogeneity (Funes and Mackness, 2018).

To do this, the characteristics of digital education must be rethought, specifically, those most suitable for this work are the dynamics of critical digital pedagogy (Sweeny, 2004). This type of education states that teachers must be aware of the oppressive machinations prevailing in the digitization process of education offering a critical role in this, namely: focusing on the oppressed pedagogy of Freire (1972), it is intended to use digital tools to develop a conscious system of social inequality and discrimination (Hamilton, 2014). Thus, digital openness could break the hierarchical teacher-student binarism; focus their practices on community collaboration; remain open to continuous review according to local and global needs; create a cacophonous system in the educational community as found on the Internet; exit from methodological traditionalism (Stommel, 2014).

Therefore, from the critical digital pedagogy, the other great theoretical axis of this work is proposed: rhizomatic learning.

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Rhizomatic learning as pedagogical fertility

> *Rhizomes are anomalous developments produced by the formation of transverse alliances between different and coexisting terms within an open system (Deleuze and Guattari, 1988, p. 10).*

Rhizomatic learning is as an alteration of the hierarchical systematization of educational knowledge, as well as of contents, concepts and objectives, in order to seek a break from pedagogical sedentarism (Gough, 2006). To this end, nomadic thinking will be postulated as the basis for the formation of a creative teaching that questions the prevailing monoculture understandings or hegemonic knowledge.

The nomad refers to the condition of rejection towards the sedentary settlement of knowledge, thus, it is intended to leave the territory of instruction designated by the state in search of deterritorialized educational multiplicities: becoming lost curriculum (Zilcosky, 2004). Likewise, the claim will never be the loss of the curriculum from its destruction or accelerated transgression, but rather the possibility of opening this: curriculum in search, infinite curriculum.

For this, the curriculum in rhizomatic learning becomes community, i.e., it is understood the high competence of the group-classroom when creating hypotheses, building theories and exploring meanings (MacNaughton *et al*., 2007). Thus, one of the main pillars of this methodology will be the participation of students in relation to the construction of post-curricular contents that allow developing a relentless flow of knowledge (Chan, 2010).

The aim is to carry out a pedagogy of the minority that is not distinguished by the aggressiveness of its reformist perspectives, but from the rationalist development of the curriculum the students cannot be limited by any type of educational reactionary policy: even if the curriculum only contemplated three contents —god, homeland and family— the rhizomatic methodology involves the intrinsic construction of educational counterhegemonic multiplicities (Strom and Martin, 2013). And why?, and why?, *ad infinitum*.

The question will be understood as the main tool of pedagogical research in the classroom, capable of interrupting the proliferation of educational binarisms and hierarchies (Freire, 1972; Kennedy, 2009). Thus, it is observed how unexpected questions make rhizome, namely: they are presented as vanishing lines before the sedentary conformity of educational institutions seeking multiple alternatives of reform (Roy,

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2003). From the isolated concretion to the pansophic multiplicity, becoming complex.

The pansophic multiplicity refers to the constant potential for acquiring knowledge implied by rhizomatic learning, i.e., from the pansophic pedagogy it is intended to teach "everything to everyone" (Comenius, 1986/1633). Hence the optimized return to the first didactic concerns: Comenius, father of pedagogy, formulated the need to establish a pedagogy —pansophia— that would be able to provide access to all knowledge to the entire population, so that rhizomatic learning as a methodology in the post-digital era aims to be an approach to the Comenian utopia. From this perspective, approaches to a new construction of knowledge can be seen from the current educational reality (Moreno, 2012).

Regarding this theory of the teaching and learning process, it should be emphasized that the structuring of this theory in a set of norms, binarisms, technical concretions or educational patterns will never be possible, thus, methodological standardization cannot have a place in a system immanent to multiplicity (Sellers, 2005). Thus, requiring a classification that characterizes rhizomatic learning would be counterproductive. However, it is possible to speak of practical singularities that, in order to be able to comprehend this type of teaching, are presented below.

From polyvosity or becoming a pack

Contextualization. In the educational context, polyvosity emerges as a response to the traditional unidirectional relationship between the teacher and the student. It is based on the idea that learning transcends individuality and is enriched through the active participation of the student community. The approach of becoming a herd seeks to strengthen community ties, transforming the teacher-student universe into a transformative polyvocity, where the continuous contributions of students are essentially integrated into the process of rhizomatic learning.

Foundation. Learning abandons the traditional individuality in which "one" - teacher - speaks and "other" - subject - listens, as this is understood as a castration of psychosocial development. Thus, the goal will be to develop a herd of students: to strengthen the community bond, both in the center and in the classroom. To this end, the emasculating teacher-student universe becomes a transformative polyvinity, in which the continuous contributions of students will be an essential part of rhizomatic learning and -already as a herd- the student cooperates to achieve an interpersonal, intersubjective and open training (Carreño, 2018).

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From multiplicity or rhizome

Contextualization. In the educational field, multiplicity challenges the notion of static content and establishes that teaching should adopt a rhizomatic and dynamic structure. This approach implies a radical change in the educational perspective, focusing not only on what content is taught, but on how it is taught. The importance of openness and flexibility in the curricular approach is highlighted, allowing students to constantly explore and expand the limits of their knowledge.

Foundation. The contents are no longer watertight and are defined as inherently multiple, so the presentation of concepts and the curriculum work will be rhizomatic and dynamic, where the imposition of a script or teaching pattern becomes imperceptible because the point of view and access to knowledge changes radically. It is not what content is taught, but how they are taught, how much they are opened and how much the students achieve to stretch and tighten the curriculum: make rhizome, constantly create pedagogical multiplicity (Harris, 2016).

Territoriality or Geopedagogy

Contextualization. Geopedagogy recognizes the school as a territory in constant construction, inextricably linked to its environment and the educational community. This approach implies an analysis that starts from the local towards the global, considering contemporary globalization and its consequences. Rhizomatic pedagogy is committed to the harmony between the institute, the school community, the environment and its interconnections.

Foundation. The school and its environment are essential elements for achieving rhizomatic learning. This is because the educational institute will be understood as a territory in permanent construction, geopedagogical territory formed by its population and relationships, thus, the pedagogy can only be carried out in harmony with the school community, the context and its links (Soler *et al*., 2015). Thus, the idea is to work from an analysis that goes from the local to the global, understanding the current globalization system-world and its implications to, subsequently, develop a perspective-oriented learning not exclusive rooted in local immediacy.

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From tension, creepage and breakages

Contextualization. The tension in rhizomatic learning is manifested through vanishing lines, continuous processes in which the perspectives of the student constantly stress and reformulate the educational contents. These vanishing lines possess a creative power of escape, generating significant ruptures that reconfigure the teaching and learning process. The rhizomatic methodology embraces the idea that the transformation and enrichment of knowledge occur through these moments of rupture.

Foundation. Knowing that each line of the rhizome can be connected with any other, these lines will also be constantly subjected to stress processes, i.e., what is being learned is continuously reformulated by the students through the presentation of new perspectives that, in the form of incessant questions, strain the contents and concepts to the point of producing escape lines. These lines are characterized by their creative flight power: escaping from conceptual sedentarism, giving rise to significant breaks that allow rethinking the teaching and learning process, enriching and opening knowledge, making rhizomes (Sermijn *et al.*, 2008).

From school intensities or pace

Contextualization. The intensities in rhizomatic learning refer to the variations generated by the concatenation of experiences and their transformative impact. The rhizomatic multiplicity, besides being extensive, recognizes the constant reformulation, revision and rupture inherent to the construction of knowledge. The importance of the school rhythm is highlighted, understanding that the educational process involves moments of movement and rest, speed and slowness, being essential both dynamism and pause for conceptual grounding.

Foundation. The concept of "intensity" refers to the variations produced by the concatenation of experiences and their role as modifying a whole (Bergson, 2020/1925). Thus, rhizomatic multiplicity will always be intensive as well as extensive, i.e., not only will the numerical openness of a set of knowledge be taken into account, but also as the very construction of a multiplicity implies its constant reformulation, revision and rupture (Deleuze, 2002). In this way, rhizomatic learning must understand the intensities implicit in the exercise of teaching and learning, i.e., relationships of movement and rest, speed and slowness. When the educational process is considered as a constant change, there will be situations of movement, as well as rest, both inherently complementary to education. For this reason, the importance of the school rhythm and its speed and

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slowness relationships is emphasized, namely: a critical, rationalist and open learning cannot be streamlined, it will have accelerated moments and other pauses, here is the relevance of rest and interruptions for the conceptual settlement (Brown, 2007; Olsson, 2008; Semetsky, 2013).

From becoming a child or counterinfantilization

Contextualization. The contrainfertilization in rhizomatic learning represents a resistance to the infantilization prevalent in Primary Education. It is based on a counterhierarchical approach, where the objective is that the teacher assumes the perspective of the child to understand the complexity of his reasoning. This approach recognizes the benefit of children's ability to generate hypotheses without the restrictions of adult thought, facilitating the rhizomatic opening of concepts and contents.

Foundation. Rhizomatic learning is a methodology that is directly opposed to the infantilization prevailing in Primary Education because it is inherently counter-hierarchical, as explained above. Thus, one of the main objectives of the teacher will be to become a child: change the point of view in order to understand the complexity of the student's reasoning, i.e., the child is not as conditioned as the adult to the construction of certain hypotheses, since this is highly beneficial in terms of the rhizomatic openness of concepts and contents (Hickey-Moody, 2013). Teachers must therefore become children: constantly rethinking the contents taught, looking for possibilities of conceptual breakthrough, being able to make constant formulations of questions, etc. To make rhizome it is necessary to put into play a "cultural" system based on a creative involution: not to advance linearly towards an end —involution— allows to explore vanishing lines that will create new relationships and connections that will expand the capacity of creation and acquisition of knowledge —creation— (Semetsky, 2004).

In short, rhizomatic learning is a methodology that, far from the digital obligation, will be able to propose incessant academic openings, leaving the students and the rest of the school community to act towards the construction of a multiple, critical, rational teaching with openness pretensions.

Building knowledge and becoming the internet

In the post-digital era, the consensus reached is that the greatest source of collection and reproduction of concepts and knowledge is the Internet, for that reason studies related to digital education emphasize the relevan-

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ce of access to this tool for the acquisition of a pedagogy whose methodology and contents are in constant review. Because of this emerges the critique that considers that *e-learning* or *digital learning* cannot constitute a totality of the teaching-learning process, namely: it must be understood that digital tools, despite their unfathomable content, are nothing more than a resource that cannot be isolated from the socially tangible activities to which it is intrinsically connected (Fawns, 2019).

Thus, continuing with the above proposed, to explore the possibilities of counter-digitization, rhizomatic learning is considered from a post-digital perspective, so, just as the Internet is understood as the main guarantor of constant, updated and multiple access to knowledge, teachers must become the Internet.

This postulate is because academic literature influences the need for teachers to go through a professionalization process with regard to the application of digital methodologies, stressing on certain occasions the absence of an alternative to these methods (Kimmons and Veletsianos, 2015). In this way, this argument is considered classist because, as explained above, there are situations and social conjunctures in which there will not be a real investment in digital tools.

Likewise, it is no less true that the teaching staff must understand their role as a digital individual (Choi *et al.*, 2018) and, therefore, must be able to act as a search engine in situations of non-digitalization. This implies that, when accessibility to digital tools is not possible due to the impossibilities of the educational environment, teachers should acquire the role of researcher that from the relentless formulation and answer of questions offers multiple results to the commands introduced by the students, namely: to have an intelligent screening system based on relevance and timeliness when answering. Internet-teacher, search-engine-teacher, always ready to seek rhizomatic access to knowledge, supplying the digital obligation by post-digital openness.

In this way, the construction of knowledge from rhizomatic learning could occur —speculatively and reduced— from the following tetrad:

1. *Creative analysis and study of images*. One of the main characteristics of rhizomatic learning is its reflective nature. Therefore, the exhibition of images is considered a post-digital educational tool -analog capacity- that can result in a more open or multiple treatment of concepts and curricular contents. Thus, it is observed that the analysis and study of images allows the introduction towards a dialogic approach to concepts, which implies the acquisition of knowledge in an experiential — or material — way and in turn reflective (Papen, 2020). This dimension or

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rhizomatic line is inherently positive with an extrapolable nature to all educational levels, i.e., the course in which the creative analysis of images is carried out is not relevant, since as the academic level increases, the reflections will be more complex and will delve exponentially into the proposed concepts and contents.

In addition, its positivity is emphasized because there is a substantial change from the imposition of a signifier for each concept - single definition by word - to the acceptance of a construction of intersubjective meanings created from the alliance and educational multiplicity (Oztop and Gummerum, 2020). These meanings allow the students to make proposals and reflections regarding the contents exposed by the teachers, which allows establishing links between individual interventions that guarantee a construction of the knowledge that becomes the Internet: the students introduce a command —speech— obtaining multiple results —answers— that will be reflected as a conceptual *whole* that will be complemented by the reflections and answers of the teachers.

2. *The conceptual or pansophific 'whole'*. After multiple discussions with the teaching staff, the possibility of establishing minimum contents per course, coordinated at the level of the institution, is considered. This paper refers to the definition of the "pansophic whole", i.e., starting from the Comenian utopia, to define a finite whole in its infinity: a "whole" based on the multiplicity of dimensions and not on their quantity. Knowledge could be divided into plateaus, namely: concepts and contents treated extensively, creating relationships of multiplicity among them and avoiding reaching specific climax or ends (Bateson, 1998). These plateaus would be understood as minimum contents and thus, starting from these, the didactic programming and their respective didactic units would be established.

This dimension is postulated as a rhizomatic line of action that aims to establish an interconnected curriculum, where cycles follow a coherent development based on rhizomatic learning. One of the foundations of this type of teaching-learning system is the achievement of a future educational community and for this purpose the coordination of the teaching staff and the management team of the center is considered relevant. The coordination of the curricular contents and the establishment of this "pansophical whole" will exponentially increase the construction of knowledge in students and will allow exploring all kinds of pedagogical dimensions, following the rhizomatic principles of concordance, multiplicity, cooperation and connectivity, typical of connectivist educational theories (Homanova *et al*., 2018).

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It is usually found that the implementation of innovative methodologies by some teachers is limited by the subsequent return to traditionalism by other teachers: the efforts of a few are sunk into the majority pedagogical sedentarism (Voogt *et al.*, 2016). In this way, the establishment of a practice that seeks the establishment of conceptual lines and forms of action for the entire educational community, will allow the implementation of a rhizomatic learning based on the openness of the curricular contents and the construction of knowledge.

3. *Hypertextuality for the acquisition and development of concepts and contents*. Rhizomatic learning, being an open and multiple practice, implies that concepts and contents are shown and worked from a perspective, in addition to intense, extensive. Doing rhizome could be assimilated to stretching an unbreakable gum or to hypertextual internet browsing (Heinonen, 2015).

The posing of questions and the constant participation of the students will cause that a kind of navigation is put into play within the proposed concepts and contents: superficial and deep issues; adjacent to each other, juxtaposed; imperceptible to the naked eye, tensioning and with capacity of conceptual flight, etc. Always goes beyond the established, becomes internet. Thus, the idea of digital hypertextuality is extrapolated to the tangible educational reality, namely: rhizomatic approaches to the construction of knowledge allow the development of highly complex conceptual lines, which results in students acquiring advanced critical reasoning mechanisms (Movahedian *et al.*, 2020) or, inciding on previous expression, gives rise to creative reasoning "in leaps".

The role of hypertextuality, inherently rhizomatic, allows access to knowledge in a more mature, complex and dynamic way than when the provided definitions are watertight and have the final claim of conceptual fixation. A commitment to the extensive exploration of knowledge will lead to cognitive constructions that in the future will help students to develop a more open and powerful mentality and attitude.

4. *From non-error and individuation*. As with the Internet, error is a fundamental part of knowledge construction. In this case, when error is referred to as a pedagogical tool, it is not from the perspective of learning by working conditioning by Skinner (1975) or Thorndike (1905). Rhizomatic learning does not have as an end the establishment of a system in which the student should be guided —behaviorism— towards success, but works with the supposed error in its own uniqueness: it is about understanding the implications and the creative power for the individuation process of the student.

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Individuation is understood as a process constituted by a cluster of acts that allows to determine the singularities of individuals. The study of the individual is inherent to rhizomatic educational practice, i.e., to make rhizome and to create multiple alliances it is necessary to understand the individual singularities of the students, put them into play and establish incessant connections between them (Brugnera, 2013).

In this way, the construction of knowledge from rhizomatic learning also lies in offering students the possibility of enunciating hypotheses, assumptions and elucidations: moving forward and stopping, without systematically assuming that it is right or wrong. This is the way of achieving individuation acts that allow a construction of the knowledge that becomes the Internet. The faculty, which becomes the search engine, will collect all these data and actions —none wrong, all necessary— and incorporate them into the "classroom *cookie* policy", creating an interconnected network of rhizomatic nature in which the group whole is understood and intended to achieve interindividual growth —both individual and group— in all its possibilities.

This tetrad is a kind of exemplification or putting-into-action the power of a post-digital and rhizomatic approach to the construction of knowledge that becomes the Internet without needing this tool. After this reflection, it is possible to analyze the contents and their treatment from a possible post-digital pedagogy.

Curricular contents and transformative polyvicity

One of the fundamental pillars of rhizomatic learning is pedagogical polivocity, namely: an educational praxis that expands the capacity for critical transformation in learning through the review of traditional power relations (Arnold and Brennan, 2013). Contrary to the unambiguous perspective in which, usually, a subordinate relationship is established in which teachers teach and students listen and trace the discourse, polyvocity characterizes by giving rise to a construction of knowledge from the multiplicity of voices, i.e., the participation of the entire educational community.

The participation in the herd allows to approach the objectives and curricular contents from a rhizomatic perspective that, from the non-hierarchization of schools, leaves room for any contribution that is wanted to be made, offering the students an active role in which they will be able to develop their thoughts, concerns and reflections. This allows a transformation of education, particularly the curricular contents (Field-

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ing, 2011). Therefore, a brief compendium of the dimensions or transformative capacity of pedagogical polyvocity is exemplified in the form of a triad and how students, through rhizomatic learning, are able to understand the contents.

1. *Methodology as content or irrelevance of contents*. One of the main characteristics of transformative polyvosity is the irrelevance of content, i.e., the methodology itself becomes curricular content. With irrelevance it is not intended to postulate that the contents have no place in this pedagogical system, rather the opposite: it does not matter whether we are faced with a curriculum with great continent wealth or a poor curriculum, fixed, organized and censored. Obviously, the greater the fertility of the curriculum, the more opportunities there will be for educational openness. See the following example of maximum curricular poverty: in the face of the possible imposition of the contents "god, homeland and family", polyvocity will transform the curriculum clandestinely or imperceptibly. Tool of educational resistance. Students, by hearing and participating in the multiple perspectives regarding the content presented, will not adapt to the curricular objectives due to the rhizomatic nature of their thinking, namely: however reductionist the curricular contents may be, the dimension of polyvocity will give rise to rich non-curricular reflections (Bilek-Golias, 2014). Polyvocity can potentially transform all relationships: god-ethics-love; homeland-territory-landscape; family-environment-pack.

This is what is understood as the irrelevance of content, where irrelevance becomes pedagogical flexible (Aktan, 2021). Defining and concretizing a series of curricular contents, even if it is from the maximum degree of coercive specificity, will not be a problem from the rhizomatic learning; it will not have a negative relevance. Faced with the policies of inquisitorial reductionism of the educational legislation in terms of what content to treat, polyvocity -building of learning alliances- allows students to understand the curricular contents from a wide and multiple spectrum, thanks to the coexistence with the perspectives of the classmates.

2. *The evolution of polyvocity or subjective resonance*. Given the dimension related to polyvocity and its transformative role, it is considered necessary to delve into the reason of this capacity for change and its transformations: metamorphosis.

Once the contents are presented, the students are able to search curricular vanishing lines that they always encounter thanks to the construction of a postsignifying intersubjectivity, i.e., a process of collective subjectivation is established that allows the overcoming of systematized

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signifiers (DeMaria, 1991). Thus, the evolution of transformative polyvicity could be established in the subjective resonance, which is nothing more than the dimension that allows to carry out the postsignifying intersubjectivity processes explained above. This dimension occurs through coordination and connection between interactive-social cognition and collaboration in the construction of the sense of logic (Mühlhoff, 2014).

Collaboration in the construction of the sense of logic is understood as a system of non-accidental correlation between the behaviors or attitudes of a group of individuals (De Jaegher and Di Paolo, 2007). These inter-individual connections are what allow polyvocity to become subjective resonance, creating the students a multiplicity of redefined conceptions of the curricular contents: thus, giving a constant metamorphosis of the contents.

3. *From the quantum flows and the school*. Understanding the subjective resonance of polyvocity, it is considered necessary to make explicit, as a conclusion, the process that allows the formation of the polyvocal, as well as the nature of its dimensions and their pedagogical applications.

For this, we find the term referring to the flows of quantum, namely: material flows dominated by beliefs and desires; fluctuations that are created and endlessly exhausted; intersubjective relationships and alliances that allow to establish a post-significant rhizomatic network (Cole, 2019). The flows of all are based on an objective relational indeterminacy called "intuition". This intuition is the one that allows the construction of the fluctuating alliances and connections explained above and consists of three processes, which are those that constitute the quantum flows (Deleuze, 1988):

- The problematization, which involves the understanding and analysis of current problems, as well as the relentless construction of new problems.
- Differentiation, which involves diverging and converging according to how different natural joints are understood. Understand the relations of synonym and opposition.
- Temporalization, which implies understanding the non-homogenization of things. The famous "everything changes nothing remains": material fluctuations.

Thus, the students go through the process of intuition as the polyvocity is built: they understand the problems and raise new ones in a constant way, since they are aware that learning is not fixed or stagnant. "And why? And why? And why?"

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Understanding the relations of synonymy and opposition makes the students go through different processes of intuition, there is the importance of differentiation. Once a cluster of differences has been established, it continues to problematize its relationships: constant problematization because all these relationships fluctuate, they are temporalized (Cole and Throssell, 2008). The flow of the few and their consequent creation of mobile alliances leads to an accelerated individual development, propitiated by the intuitive flexibility of the idea of the group.

Therefore, it is considered essential to study the relevance of the flows of quantum in school: students, through intuition, build relational indeterminations based on their capacity for problematization, differentiation and timing. These relationships are part of the interactive-social cognition or psychosocial development, so the methodological application of rhizomatic learning based on polyvocity will allow, not only the transformation and extensive evolution of the curricular contents, but also the development and construction of the individual from a collective vitalism that understands the singularities of his own and of his colleagues.

Applicable Epitome and Evolution

The reading faculty may ask the author of this paper for a greater concretion in the applicability of post-digital pedagogy. However, in order to show the possibilities of rhizomatic learning in the post-digital era, it is considered necessary to have an impact on action-research, specifically on educational action-research. This is understood as the process by which the teaching staff becomes a researcher in the reality of the classroom (Stenhouse, 1984). This notion is literal: to investigate is to inquire, to discourse or to ask questions. No epistemological or methodological rigidities, no specific manuals.

The teaching staff, dissatisfied with the current state of the teaching and learning process, must identify the problems and their intensities for the subsequent formulation of hypotheses executable in school praxis: a rhizome of pedagogical hypotheses that involve the introduction of *N* possibilities for educational improvement. From these hypotheses, it will be possible to generate reasonings as to what potential future must be assumed by the teaching practice, what changes will be introduced, what are the objectives of these pedagogical reformulations, among other questions.

Therefore, educational research-action from a rhizomatic perspective involves a constant review and renewal of teaching methods and,

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for this to be possible, teachers must be highly involved in the methodological non-sedentary and willing to explore theoretical-experimental vanishing lines towards changes or breaks beneficial for the entire school community. Thus, throughout the concatenation of all the school events that happen during the teaching exercise and their respective intensive relationships - of movement and rest, speed and slowness - the teaching staff could develop a compendium of rhizomatic applicability and how these approaches allow the evolution of the school community.

Having said this, it is understood that the possible pedagogical applications of rhizomatic learning in the post-digital era are practically infinite since, from the study of a "conceptual whole" in which knowledge grows extensively, it is not possible to make a tour of all its possible practices. Therefore, it is intended to make an analytical compendium of the possibilities of application, namely: an applicable epitome. For which it takes into account the main rhizomatic lines or dimensions and their becoming:

- Understanding knowledge as a multiplicity: becoming a rhizome.
- Seeking an approach to digital from the counterdigital margins: becoming the Internet.
- Promoting the construction of community alliances: becoming a pack.
- Creating intersubjective hypertextualities: becoming transformative polyvocity.
- Seeking the extensive development of the contents: becoming a pansophia.
- Understanding the territorialities of the educational community: becoming an environment.
- Understanding the relationships of movement and rest: becoming a master-metronome.
- Promoting the intuition processes (to problematize, differentiate and temporalize): to become a flow.
- Enhancing the development of intra- and interpersonal singularities in the individuation process: becoming an individual.
- Adopting ethical mechanisms constantly: becoming pure power.

This last "becoming pure power" refers to the ability to open rhizomatic learning and, therefore, access to knowledge should be understood as a constant reformulation of the acquired contents, its implications and dimensions, territorialities and its borders, and possibilities of flight, etc. This development has a changing nature, in the power lies its main singularity: power that is understood as that real without being cur-

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rent yet, i.e., any possibility of development in all directions of a development that does not cease to progress and that does not expect a watertight completion or determined end.

These potentialities stand out for being the incessant process of becoming an individual that is so relevant at an educational level. The becoming of the individual moves away from the anthropocentric position of the subject and allows to understand the perspectives in which knowledge is located -territory and environment- towards its acquisition (Giorza and Murris, 2021).

Likewise, one of the main characteristics of the potential is its capacity of metamorphosis, which is necessary at an educational level. Not only for the implementation of hypertextual dimensions or polivocity towards the construction of changing knowledge; it is more about finding the vanishing lines within the dynamics of exploitation or asymmetric violence suffered by students (Snaza and Weaver, 2014). This refers to the position traditionally imposed on students in education, i.e., a mere reproducer of ideas without any interests and castrated in their capacity for intuition and critical thinking. To get out of these dynamics, the implementation of a pedagogy that understands the true relevance of the role that students should enhance allows the advance towards the construction of individualities that, later, will be connected in collective developments.

Therefore, rhizomatic learning, as a methodology in the post-digital era, is postulated as a real pedagogical alternative, multiple in nature and with immediate and non-classist applicability. Explore the margins of digital from analog reality; become the Internet so that, where there is no access to this digital tool, the teacher is able to promote multiple access to knowledge. Becoming the Internet is not becoming an encyclopedia: it is about giving way to polivocity, working with hypertextuality, empowering individuations, exploring unpredictable territories, making more flexible access to knowledge. Teaching is learning to make rhizome.

Contributions and limitations

Once the theoretical review has been completed and certain applications have been exposed to thinking, it is considered pivotal to launch a discussion that analyzes the contributions and limitations of rhizomatic learning in the post-digital era. To do this, the author will use the observations and reflections extracted from the bibliography used in this work,

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as well as the teaching exercise, emphasizing those aspects that are still considered necessary to deepen academically.

As has been analyzed throughout this work, rhizomatic learning is proposed as an alternative to the obligatory school digitization. This is considered a contribution to take into account, since a methodology is proposed that allows exploring the multiplicity offered by the Internet from a non-digital system. Innovation is not synonymous with digitization, the innovation lies in finding methods that are capable of being applied in any circumstances, with the resources available and without discriminating on socio-economic grounds. Another contribution is that rhizomatic applications have multiple nature, which does not seek the achievement of certain objectives or the fixation of the contents taught: it is about building intersubjective connections between the entire educational community —students, teachers and family— which results in learning being flexible and allows a more efficient construction of knowledge in which all students are part of their learning and the group.

There are also some limitations when it comes to understanding, studying and applying rhizomatic learning from the post-digital. One of the major barriers is to understand the situation of digitalist taxation and its implications in terms of socio-economic discrimination suffered by those who do not have access to digital tools. Academics, *mass media* and *mainstream* pedagogies *focus on* working from the digital at all costs, as the only possibility of teaching innovation, showing an excessive commitment to "cut costs" to universalize access to digital technology. Nothing could be further from the truth, since it could not be intended to provide digital resources to regions where they had not even had access to the pedagogical principles centuries ago. The West cannot continue to perpetuate its ethnocentrism in order to replicate its socioeconomic systems around the globe.

Another major limitation that arises in a recurrent way is the development of digital competence (DC): how can DC develop from a practice self-denominated as counterdigital? While it is true that the postulate here stands out for its capacity for analog application, it should be borne in mind that counterdigitization does not mean the same as anti-digitization or classical Luddism. Teacher training and the economic investment made in terms of digitalization is a good thing, so it is not about eliminating digital from school: rather it is about knowing how, when and why to use digital tools - if available. The teaching-learning process cannot be a redoubt of digitization of all possible contents and resources, but, understanding the privilege of the digital, it must be made an ethical and

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responsible use, it must focus the application of digital resources in certain occasions when its use is considered exponentially positive and this is possible to do so. The post-digital is to understand the socioeconomic limits of the digital and act accordingly, from the pedagogical openness, and therefore, the application of a post-digital pedagogy of the indeterminate and the unpredictable can be limited and obstructed in a digitalist juncture of the parameterized, performance and excellence.

Conclusion

Concluding this research, several reflections on rhizomatic learning in contemporary times are postulated, particularly in the context of the post-digital era, giving rise to the concept of post-digital pedagogy. Although this study is fundamentally attached to a theoretical approach, it emphasizes the inherent applicability of post-digital pedagogy in general educational practice.

In response to the research question about the application of rhizomatic learning in the post-digital era, it is evident that post-digital pedagogy emerges as a concrete proposal to address current educational challenges. The research highlights that, despite its theoretical basis, post-digital pedagogy is an intrinsic pedagogical practice to teacher intuition, where application and theory naturally converge.

The idea to defend highlights the autonomy and pertinence of rhizomatic practices in education, stressing that post-digital pedagogy does not require a formal theoretical justification. It is argued that teacher intuition acts as a driving agent of these practices, facilitating their implementation in an organic way and consistent with educational reality.

In summary, the wide scope of applicability of post-digital pedagogy is emphasized and the training of teachers is advocated, considering it a way to exploit its potential in improving educational practices. It promotes the adoption of an open and disruptive perspective, rejecting the predetermined systematization and embracing an education that is oriented towards the extensive construction of knowledge, participatory and without a concrete purpose, based on the variation of the educational chaos.

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Executive functions in the learning of university students

Funciones ejecutivas en el aprendizaje de estudiantes universitarios

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Abstract

The article addresses the topic of executive functions and learning in university students. It is considered relevant at the present time, due to the diverse affectations that are perceived in the academic performance after the pandemic; problems to regulate their learning, the little capacity to look for relevant information and difficulties to abstract significant aspects of the data of interest are more and more evident. From here, the relevance of better understanding the role of executive functions in learning is raised, for which, we start presenting several definitions that coincide in characterizing them as those that regulate, control, mediate the higher and more complex activities performed by the brain; they are located in the frontal cortex and have different rates of development throughout the life cycle, from childhood to young adulthood when they reach their full development. In addition to this, the components of executive functions are described, since they vary depending on the authors and their relationship with learning. The approach is eminently neuropsychological, but there is a brief dialogue with the philosophy of Heidegger, Hume, and Locke. It concludes with several suggestions of possible activities that can be carried out to develop these functions in students.

Keywords

Cognition, learning, university student, comprehension, knowledge, educational strategies.

Resumen

El artículo aborda el tema de las funciones ejecutivas (FE) y el aprendizaje en estudiantes universitarios. Se considera relevante en el momento actual, debido a las diversas afectaciones que se perciben en el rendimiento académico luego de la pandemia, siendo cada vez más evidentes los problemas para regular el aprendizaje, la poca capacidad para buscar información relevante y las dificultades para abstraer aspectos significativos de los datos de interés. Desde aquí se plantea la relevancia de comprender mejor el papel de las FE en el aprendizaje, para lo cual, se inicia con varias definiciones que coinciden en caracterizarlas como aquellas que regulan, controlan y mediatizan las actividades superiores y más complejas que realiza el cerebro; se las ubica en el córtex frontal y tienen diversas tasas de desarrollo a lo largo del ciclo vital, desde la infancia hasta la adultez joven, en la que alcanzan su pleno desarrollo. Agregado a esto, se describen los componentes de las FE, puesto que son variados dependiendo de los autores y su relación con el aprendizaje. El enfoque es eminentemente neuropsicológico, pero se realiza un breve diálogo con la filosofía de Heidegger, Hume y Locke. Se concluye con varias sugerencias de posibles actividades que pueden llevarse a cabo para desarrollar estas funciones en los estudiantes.

Palabras clave

Cognición, aprendizaje, estudiante universitario, comprensión, conocimiento, estrategias educativas.

Introduction

This article discusses the topic of learning and the role of executive functions (EF) have to achieve it, particularly in university students. This implies considering biological and psychic aspects in the training process and its relationship with the teaching task.

Based on these ideas, it is established as a primary objective to consider the relationship between learning in university students with cognitive functioning, focusing especially on what is called EF. When EFs are well developed, students tend to experience more effective learning and

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better academic performance. Difficulties in EF can negatively affect a student's ability to face academic demands. It is important to note that the relationship between EF and learning is two-way: a stimulating and challenging educational environment can also influence the development and improvement of students' EF.

In recent years, particularly after the pandemic, endless situations have been observed that have affected the very essence of the human being confronted with death; thus, there are several reasons to ask about the very meaning of existence and everything that involves living and learning in a different way (Ortega, 2021). From education, it has been perceived that students have suffered a cognitive and emotional impact. Regarding the first level, there is more difficulty among university students to select important aspects in the accumulation of information they have, often limiting themselves to just repeating what they find *without processing* the data; there is no detailed analysis of the information received from the different sources, thus revealing an impairment of the control and monitoring functions, which are the basis of adequate cognitive performance. For the second level, no detailed analysis will be done, since this work will focus on cognitive functions.

It is significant to rethink learning considering the biological and psychic aspects that are at the base of more complex mental processes. The teacher as a relevant educational agent when teaching in any field -particularly from the university- must take these elements into account when planning so that learning is possible, moving away from a practice in which teaching is only interested to realize the multiple determinants that intervene in the process and that come both from students in their condition of biological, psychic, social and historical beings, as the teachers, the institution and the society in which the process occurs.

Understanding the neuropsychological aspects can contribute to improve the ability of students to learn, i.e., to assimilate the information they receive, process it in their mind and use it in an appropriate way to find alternatives to the problems they face, both personally and professionally.

This challenge is relevant at all educational levels, whether with children or adolescents, and is more relevant with adults-young, since they are training for future professional performance, acquiring the skills and abilities necessary to carry out actions linked to their career, in which they will require skills specific to their future work and personal that help them to develop in an increasingly complex environment (Morin, 1999). This is a necessary aspect, due to the necessary integration that the disciplines must have in order to face the challenges of modern society (Varona, 2020).

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In this way, it is essential that a teacher takes into account these particular conditions of the students to then rethink and propose the contents to be addressed, so that it can better reach the student and facilitate a meaningful learning process (Palacios and Guisado, 2016).

The topic is current and new due to the impact that, at this moment, neuroscience provides, both in the educational context and in others, in which it is helpful to understand the cognitive processes settled in the brain.

This article has been prepared following a methodology based on the qualitative approach, systematic review type, for which the literature review was used as a technique. As for the instruments, due to their marked nature, bibliographic managers were used to collect the information, which was then organized, analyzed and interpreted, taking into account the essential aspects of the topic. Then, it was contrasted and expanded with the positions and approaches of authors who have been interested in similar topics. The procedure used was the collection of information, its organization, the selection of relevant data and its composition in an appropriate text.

The topic of EF is approached for conducting this work, considering some definitions, its components as well as the changes it undergoes throughout the life cycle. In this way, EF is characterized, and some models are considered to better understand them. Finally, some considerations about learning are raised.

The executive functions

Since its origin, humanity has been interested in understanding both the world around it and what happens inside it, especially in the brain, so there has always been great interest in certain cognitive functions such as thought, language, intelligence or learning, which have had a characteristic space in the approaches of all philosophers throughout the centuries (Rábano, 2018).

According to Ramos and Lozada (2015), one of the most interesting and widely developed fields in the cognitive field is the interest to understand the way in which a human being is able to regulate and control his behavior and face everyday situations. All this is linked to a group of functions that have been called "executive", i.e., they are related to the realization-execution and monitoring or control of actions and activities. Functions such as verbal fluency, working memory, planning, organization, inhibition, flexibility and impulse control are essential for

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the cognitive performance of people and even more so of university students, since they help to organize information in such a way that there is a coordinated and coherent response of what exists in the mind with what happens in the context of development.

For a better understanding of these functions, an interdisciplinary approach to the neuropsychological aspects involved in cognitive processes is required, as a result of the interaction between the biological base — the person's own— and the social environment in which it develops (Sastre, 2006), so it is necessary to make some definitions.

The term "executive functions" was originally used by Muriel Lezak in his article "The Problem of Assessing Executive Functions", published in 1982 in the *International Journal of Psychology*. Here they are defined as "the mental abilities essential to conduct effective, creative and socially accepted conduct" (p. 90). It amended its definition in 1995 (Lezak, 1995), considering them as "abilities that enable a person to function independently, for a particular purpose, with self-sufficient behavior and satisfactorily" (p. 38). Apparently, functions such as planning, organization, inhibition, flexibility and impulse control are intimately related to what is considered specifically human and that define actions and reactions of each individual in the environment in which he or she operates.

According to Sastre (2006), there is no single definition of EFs, so we will mention some of the most interesting, such as the one that points out that they group a series of "central self-regulatory skills that orchestrate basic processes or specific domain in order to achieve a goal flexibly [39], and that relate to the activity of cortical and subcortical regions that collaborate with the prefrontal cortex" (p. 144). These EFs are essential to the learning process, as they enable students to organize information, set goals, adapt to new circumstances, and regulate their behavior efficiently. Students who have a good functioning of these EFs tend to face academic demands more effectively and have a stronger performance in their studies.

Authors such as Barroso and León (2002) consider the EFs as those abilities that, jointly present in the human brain, can transform thought into actions, thanks to which each human being functions organized, flexible and effectively. The consequence of this operation is the adaptation to the conditions that are presented to each individual. It is a superordered system, in other words, made up of several elements to which it regulates, controls, supervises, directs and evaluates, while performing its functions, so that the human being can carry out a behavior or inhibit it if necessary.

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From another definition, they are characterized as "processes that associate ideas, movements and actions and guide them to problem solving" (Tirapu Ustárroz *et al.*, 2012, p. 90). In a way, it could be said that they are metaschemas, i.e., designs that orient the way in which the representations that each person has will unfold. Considering this definition, the authors extend their proposal conceiving EFs as:

> A set of skills that are involved in the generation, supervision, regulation, execution and readjustment of appropriate behaviors to achieve complex objectives, especially those that are considered by the individual as novel and require a creative solution (p. 91).

This definition is shared by other authors such as Verdejo and Bechara (2010), who emphasize the importance of these functions to manage and modulate the complex activities performed by an organism, linking information coming from the internal environment and assimilating it from the outside to give coherent and adequate answers to the difficulties of daily life, i.e., the EFs facilitate the adaptation of the human being to his context.

For university students, these skills are essential, as they must adapt to a number of new circumstances in a different environment, and they often do not always have adequate planning to respond to increasingly complex and demanding tasks. All these aspects can generate conflicts and problems for which some of the students must formulate creative responses, since there is no established guide or guidance. At university, many young people face known situations such as doing homework or studying for a test, but there are others that involve developing EF-related skills, such as monitoring their learning process or realizing the ways in which they best acquire information. Also, some tasks require little cognitive effort, such as making a mental map of known information, but others may be more demanding, such as solving a problem involving a task force and the teacher who sent it. These levels of complexity require learning other skills, which are linked to the EF, so that the student can adapt better in the university environment.

The role of the EF is essential in university students to manage the multiple stimuli from different sources, so it is possible to detail what are its components.

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Components of executive functions

According to the proposed definitions, it is possible to establish that there is no single classification of EFs, since, depending on the authors, they include several elements. However, there is consensus in pointing out that "the executive system" is constituted by related blocks, as expressed by Batista Núñez (2012) and Flores and Ostrosky-Shejet (2012), who point out that there are two: the first initiates, anticipates, plans and sets goals, monitoring the issued behaviors and making a forecast of the consequences they may have; while in the second block there are the capacities that modulate, activate or inhibit cognitive abilities.

Other authors such as Barroso and León (2002) consider that the executive functioning has four essential components and that they manifest themselves in the form of a process that goes from the approach of goals, the necessary planning to achieve them, the development of appropriate actions and their execution. Each of these components has distinct and specific objectives:

Table 1
Components and objectives of executive functions

Component	Objective
Formulation of goals	Identify needs and resources. Generate and select states that the person aspires for the future.
Planning	Select the steps required to achieve a goal. Anticipate possible changes and propose alternatives. Discussion of possible alternatives. Anticipate consequences of decisions.
Development or implementation of plans	Start, hold, stop, or switch between planned actions.
Execution	Monitor and correct activities. Regulate the intensity and timing of the action. Assess whether the objectives have been met and the expected results achieved. Choose the appropriate time to implement actions.

Source: own production from Barroso and León (2002, p. 30).

As mentioned, these skills are essential when controlling, supervising and regulating the cognitive and emotional activity of a subject so

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they have aroused great interest to know their role in learning, both in children, adolescents and adults. Therefore, it can be stated that there is extensive research in the area (Portellano and García, 2014; Ramos Galarza *et al.*, 2018; Ramos Galarza and Pérez Salas, 2017). All these investigations show that EFs are not the same throughout the life cycle, so it is interesting to know the changes that appear over the years.

Executive Functions During the Life Cycle

The EF experience variations throughout the life cycle of the individual, since according to Lozano and Ostrosky (2011), its greatest development occurs in childhood and adolescence, essentially, thanks to the maturation of the prefrontal cortex, and cortical area in which they are distributed, and they manifest and specialize in young adulthood when its maximum potential has been reached (if the conditions have existed) (Papalia *et al.*, 2010). It is worth mentioning that childhood and what happens in it is crucial to lay the foundations for a good development of the EFs. In this regard, Sastre (2006) says:

> Changes occur in the structure and functioning of the frontal lobe and in the prefrontal cortex [...]. These structural and functional changes of the brain are related to relevant gains in the first cognitive competences, in executive functions [15-17] and in the logical organization of action and knowledge [18,19] (p. 144).

Thus, cognitive development and subsequent performance in the formative years are the result of the more or less coherent conjugation of the information assimilated by the child (Piaget, 2007) with the maturity and action of EFs and the influence of social interaction (Sastre, 2006).

It should be noted that the development and maturation of the prefrontal cortex is related to social interaction. It is imperative to note that some years ago we know the impact that this has on the brain, for example, cortisol (the stress hormone) leaves a great imprint on cognitive structures (Olza, 2008). Likewise, it is known the profound influence that the characteristics of the people around them have on the child and their ways of reacting to their needs, determining, in many cases, their current and future social and relational development.

The age of 6 to 8 years is crucial in the cognitive development of children, because the capacities involved in executive functioning are activated (Barroso and León, 2002). This activation of new cognitive functions arises due to the neurobiological development achieved, as the

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father and mother decrease the control they have over the activities of children, so they become more autonomous to carry out their learning activities and, consequently, require better control of their performance.

Skills such as inhibition, working memory, cognitive flexibility, motor control, planning and organization are gradually being improved, as children's physical growth occurs and their involvement is increasing in learning activities. Between the ages of 6 and 12, boys and girls are learning the bases of knowledge they will need for their future training, both at the middle and university levels. This shows that it is the stage in which the foundations for good cognitive performance are consolidated (Linares, 2007).

In this development, the stage of adolescence is also relevant because it allows the total maturation of the prefrontal cortex when confronting the subject to all the changes that occur in the physical, psychic and social areas and that require a profound modification of their being and identity (Erikson, 1985). Thus, adolescence is a crucial stage in which a series of changes are taking place at the physical level — with the appearance of secondary sexual characteristics — at the psychic level — with the development of an identity of its own — and at the social level — with adequate interpersonal performance. In this development is crucial the role of the prefrontal cortex that becomes the area par excellence that allows the control and regulation of the behavior of the adolescent.

The prefrontal cortex "acts as a conductor, and in it are found the functions of the human being that most differentiate him from other living beings and that best reflect his specificity" (Tirapu Ustárroz *et al.*, 2012, p. 90). It is a cluster of neurons that harbor those higher and much more complex and advanced functions that human beings possess.

Locke (1994) and Hume (1984, 1994) have provided clear and concise positions about these ideas. Locke (1994) stated—long ago—that ideas come from two sources: *sensation* and *reflection*, and that their accumulation generates knowledge. Ideas that come directly from sensory experience have to do with the characteristics of objects, such as size, weight, shape, color and so on; this is called *simple ideas*. The *complex ideas* are based on reflection and refer to three levels:

- The *modes* that are combinations of simple ideas that do not contain the existence of things in themselves, like the ideas of numbers, triangles or melodies.
- The *substances* that are combinations of simple ideas that represent the existence of particular and concrete things, like the ideas of a car, a door or a flower.

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- Relationships are combinations of ideas that express the connections between various ideas, such as ideas of causation, kinship, or friendship.

On the other hand, Hume (1981, 1994) proposes that the origin of ideas is found in impressions, on the one hand, that coincide with the sensations of Locke (1994) and the ideas themselves that arise from "weak images of impressions, when we think and reason" (p. 87) that coincide with the reflection proposed by Locke (1994). In addition, Locke (1994) points out that for ideas to appear in the mind of a human being, the first step is perception and then memory, which he considers the "store of ideas" (p. 129), adding that ideas are fixed in the mind thanks to other processes such as attention and the subsequent repetition of the idea; just like other sensations (*i. e.* pleasure and pain). The author mentions other aspects, such as discernment and abstraction, that favor the construction of ideas and help distinguish them from each other, and although Locke (1994) has not defined them as EFs, because of the regulatory or control role they have, they could well be understood as such.

According to Rosales Sánchez (2019), "for Hume, sensations, understood as impressions, produce simple ideas. Then the mind makes combinations with different simple ideas that produce complex ideas" (p. 134). It is a cumulative process, on the one hand, and hierarchical on the other, since the ideas built are grouped into segments, each time larger, of information that allow the organization of increasingly complex information.

This process completes in childhood with the ability to prioritize information, which is the necessary basis to organize the various aspects that children will have to learn throughout their training process. This will be a necessary condition to understand what is learned throughout life, from the multiple ways of doing it. As seen, here are the foundations of the learning regulation so necessary for good cognitive performance, and then activated in students at the university level.

It can be said that sensations are part of the defining entity of the human, i.e., they are a constitutive part of the essence of humanity. It implies recognizing the centrality of sensory experience in the construction of reality and human self-understanding. The human cannot be conceived outside of what he perceives not only with his senses, but with his *intellect*, the main faculty that differentiates him from other beings. Likewise, as far as perception is concerned, Bello (1881) states that:

> It is, in general, an act in which the soul acquires knowledge of a particular quality or state of an object, by virtue of a certain action that the object currently exercises in it. We do not try to define perception, but

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> only to point it out or to manifest the circumstances in which this faculty is realized (p. 16).

Perception is a basic cognitive process on which all the possibility of assimilating information and converting it into useful data for the cognitive performance of a person is based. Children perceive certain aspects of the world around them based on their cognitive development. This suggests that the way children interpret and understand the environment is influenced by their level of mental and cognitive development at that specific point in their lives. This idea highlights the close relationship between cognitive development and the perception of the world in childhood. Adolescents in turn modify this perception because they have developed the hypothetical-deductive thinking capacity that empowers them to assimilate what they perceive, but then to order it, question it and use it for their best performance. As adolescents acquire this cognitive ability, they are able to process and assimilate perceived information in more complex and abstract ways. In college students, these skills are further enhanced because of the environment in which they find themselves and which empowers them to the limit, their learning and the resources they have to regulate.

According to Oliveira and Mourão (2013), there are two main currents of thought about these psychic sensation and perception processes: rationalism and empiricism.

> Rationalists base their knowledge entirely on reason, which is why they attribute great value to mathematics as an instrument for understanding reality. The human mind is, in rationalism, the only instrument capable of reaching the truth (p. 42).

The origin of ideas and, deductively, the relationship between them can be deduced from the position of these great philosophers thanks to the EFs that, as previously pointed out, do not always develop at the same time (Flores Lázaro *et al*., 2014). Some of the EFs appear very early as is the case of the detection of risk situations that are already present in childhood; other processes such as inhibitory control appear early as is middle childhood; while functions such as working memory or mental flexibility and even planning appear later; while verbal fluency and abstraction appear late.

In a study carried out in Medellín (Castañeda *et al*., 2022), it was concluded that the level of schooling has a great impact on the progress of certain EFs, especially those of regulation, working memory, verbal fluency and information processing, among others. These results allow us to conclude that the educational process has a great influence on the development and maturity of the different EF.

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Other studies have focused on the mediating role of EFs in memory problems (Molina 2018), finding that these and stress explained 57 % of subjective complaints regarding memory. The EFs most involved in this mediating role are executive control, attention, and regulation of social behavior.

Another research (Gutiérrez Ruiz *et al.*, 2020) highlights that some EFs can better predict student performance at the university level, such as working memory, verbal fluency, cognitive flexibility and categorization. Out of these three functions, it seems memory has the greatest impact in university years, since it involves essential tasks for academic achievement and the fulfillment of goals: following instructions, sustaining attention, controlling the quality of the tasks performed and generating solutions to problems that are essential when performing academically.

Although cognitive flexibility and abstraction are linked to academic achievement, however, they are not as important as working memory. These two functions have to do with the assimilation of new concepts and the construction of different abstractions as answers to new information so they are necessary to order the information that students receive in academic training but their use will be much more enhanced in professional performance. Academic performance is more closely linked to information retention operations and their use in managing day-to-day student activities. The connection between academic performance, information retention and its application in the management of daily activities highlights the importance of not only memorizing data, but also understanding and using information in a meaningful way. Memory and the practical application of information play a central role in student performance.

As seen, there is a clear association between individual development and the use of EFs by students. Each life cycle has different demands and requirements, so it is logical that some functions should be developed before others. The academic world, on the other hand, requires more use of memory aspects -to integrate the information received- than other functions such as planning that will be evidenced, in a clearer way, in professional performance. Due to these differences, it is necessary to review some characteristics of the EF.

Characteristics of executive functions

Given the above, EFs are essential when selecting relevant information, planning, executing and evaluating a given course of action, i.e., they have some characteristics that allow them to act on other instances of cognitive functioning to regulate and guide it.

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Tirapu Ustárroz *et al*. (2012) have pointed out that EFs have some characteristics, such as *input* independence, regulation, information retrieval and the interrelation that makes them that "conductor" of cognitive functioning and human learning. Following these authors, we will describe these properties and make brief mentions of the implications for learning in university students.

First, EFs combine information from various areas such as perceptions, memory, emotions, and relationships with output systems, both perceptual and motor. The information that goes to the frontal lobe does not determine what is going on in the frontal lobe. This characteristic has been called *the independence of input*, which means that the prefrontal cortex combines relevant information that comes from several sectors and not only reacts to it.

This function is very useful for learning since it allows to combine information already existing in the brain with that which is assimilated in classrooms and, the person, can choose, the type of information to which he wants to react. This gives students some leeway to respond so that they are not just reaction beings, but can stop and reflect on the course of their actions.

As mentioned, EFs regulate internal (thoughts, memories, emotions) and external (behavior) processes, so that the system has greater viability and adapts better to the environment in which it operates. This is the second characteristic of EFs and is called *regulation*. This aspect is key in learning, since it is essential to order the activity and cycles that will be dedicated to tasks, study and leisure. Failure to do so would imply a predominance of chaos and disorder, which may ultimately affect performance.

The third feature is *information retrieval*, which is complementary to regulation, since regulation is only possible because the person is able to retrieve information stored in memory about known aspects and generate predictable responses to new situations. In addition, by doing so, the person can foresee a particular course of action based on the information available. This feature of the EF is key to learning, since teachers can make a review of previous information that the students have to be able to link it with the new information they will review. In addition, this action allows students to envision different responses and behavioral possibilities to broaden their field of action and reaction.

All these aspects are more enhanced and developed during youth, due to the theoretical and conceptual richness that young people learn in university classrooms. The new information that they assimilate allows

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the construction of different thought schemes, which influence decisively in their action. In addition, young people understand that they can have different options and act better accordingly.

Fourth, there is the characteristic of *interrelation*, which implies that the EF are in permanent interaction with other cognitive processes essential to carry out their activities, such as working memory and attention without which they could not carry out monitoring and review behavior and responses to problems experienced by a person. This feature is helpful since it helps the students to realize the ways in which they learn best and empower them to facilitate the assimilation of the new knowledge that they are reviewing throughout their student years.

In addition to the aforementioned characteristics, Barroso and León (2002) emphasize that they are "adaptive and directed to a goal" (p. 31), i.e., they favor the adaptation of students to the university environment and are activated to lead the person to the achievement of goals and objectives valuable to him. To better understand them, some models have been proposed. One of them is reviewed below.

Executive Role Model

Due to the interest by EF, authors such as Tirapu Ustárroz *et al*. (2017) have proposed a model to organize them in a better way. This model mentions that EFs are made up of three levels (Figure 1).

The first level, called *self-awareness* or *self-analysis*, allows to carry out two relevant actions: representing experiences by linking them with previous learning and controlling mental activity by using the knowledge that already exists to solve current problems and guide the decision-making process.

The second level encompasses functions that contribute to *the resolution of problems*. It combines the activities by which a person anticipates events, selects goals based on this, formulates and pre-plans possible solutions, and initiates appropriate responses. In addition, it shows the possible consequences, an essential skill when planning tasks and activities related to knowledge and its construction, in the case of a research, for example (Morales *et al*., 2018). These functions allow executive control of the remaining cognitive functions.

The third level consists of two skills: *management and temporary organization*. The first one allows the beginning and maintenance of a mental or motor activity and the second one favors the maintenance

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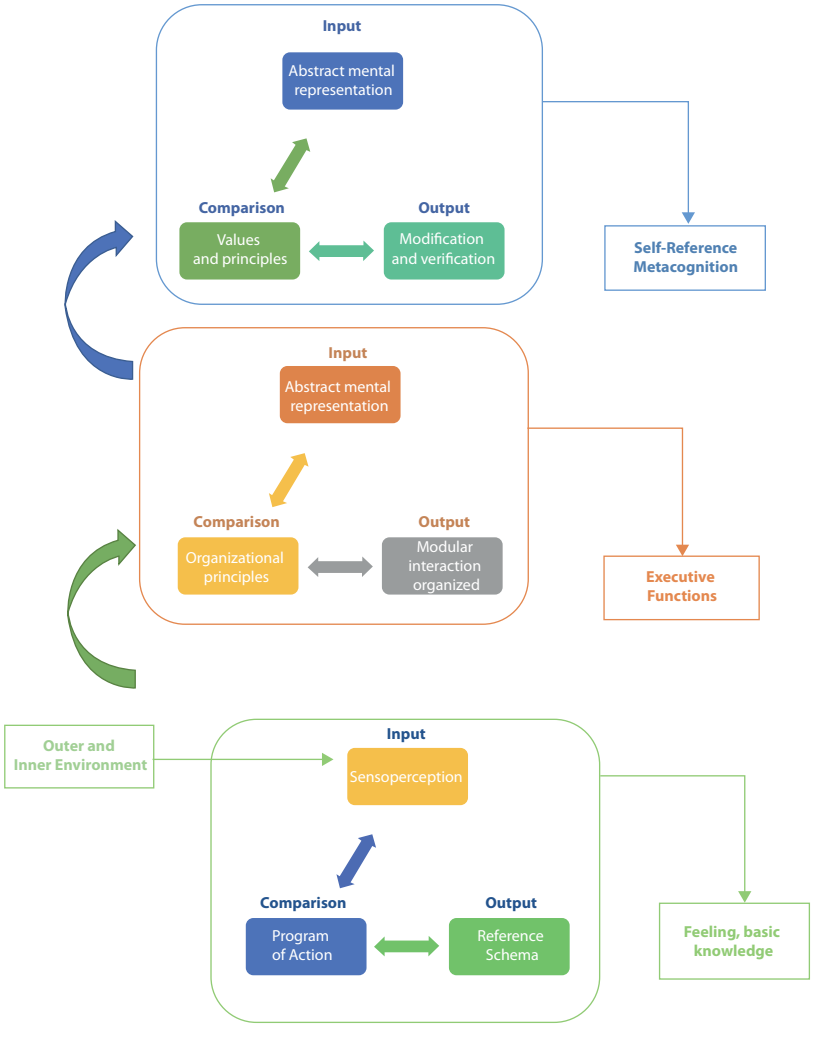
of successive chains of information and the perception of the passage of time. At the same time, each of these levels maintains a procedural scheme consisting of an input system, a comparison system and an output system that interact with the other levels and feed back to each other.

Figure 1
Model of executive functions



Source: own production from Tirapu Ustárroz *et al.* (2012, p. 93).

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The basis of this whole process lies in the feelings and perceptions that each individual has about the world and himself (Oliveira and Mourão-Júnior, 2013; Rosales Sánchez, 2019). The information obtained at this level is then consolidated and organized thanks to the support of other functions such as memory and thus constitute the second level of organization, formed by the EF. The cognitive process ends with the level of more complexity in which self-reference and metacognition are found, abstract abilities that determine the action of each individual.

Cognitive development reaches its most complex level when individuals acquire the capacity of self-reference and metacognition. These abstract abilities are essential for self-knowledge, self-regulation and continuous adaptation, which significantly impacts the actions and decision-making of each individual. Therefore, it is possible to carry out a deep and wide exploration of EF to make predictions about the functional capacity of the subject (García Molina *et al.*, 2007).

Tirapu Ustárroz *et al.* (2017) have carried out studies on some of the best known EFs, such as the following:

1. *Verbal fluency*, which retrieves the long-term information stored in the corresponding memory and carries out the activation of the processes of search, retrieval and emission of the words. This function must be expanded and improved in students, confronted with all kinds of verbal expositions and tasks that require verbal communication.

2. *Working memory*, able to record, encode, retrieve and use the information assimilated by the subject and which must be empowered in students to remember the most basic aspects associated with their academic performance and their profession.

3. *Processing speed*, referring to the ability of a person to handle information that helps him to carry out his cognitive operations, which can be affected by the multiplicity of stimuli that young people have around them in all types of electronic devices, especially their phones.

4. *Inhibition*, considered as the ability to retain a given response at a given time and avoid interference from other stimuli that could affect it. According to Sastre (2006):

> Inhibition relates to control and planning: (a) it stops the execution of a predominant action or the processing of irrelevant information; (b) it selects the relevant actions and representations in an activity; and (c) it favors the consequent *shifting* or effective activation after a stop signal (p. 145).

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Inhibition is an ability that favors the emergence of new schemes or their management, as well as resistance to internal and external interference that arise. When inhibition decreases, perseverance appears in a dominant behavior or response, which can affect the academic performance of a university student by preventing this progress considering other aspects different from a given situation.

5. *Dual execution*, which is a capacity that allows people to simultaneously pay attention to two or more situations at once, and perform several tasks at the same time, usually one verbal and one visospatial; which is highly developed by young people since they are very often connected to several devices at the same time.

6. *Cognitive flexibility*, understood as: "The ability to alternate between different tasks and behaviors, when the situation requires it [...] or to keep two or more plans in action, alternating the focus of attention between one plan and another, until reaching the respective goals" (Fernández Cordero, 2015, pp. 27, 28).

This capacity is being formed and consolidated as a person advances in their training process. From the initial moment in which are seen only two possible answers (black or white), through a moment in which many options are feasible, until the moment when it is realized that there is not a single path to solve the situation, but that there are different alternatives that lead to possible scenarios.

Cognitive flexibility is enhanced by developing the *ability to plan*, i.e., to think about a viable course of action. The planning establishes the possibility of carrying out tests in the mind regarding the possible solution alternatives to a problem. It is an ability to think about various possible courses of action and, as far as possible, about the consequences of such processes. This allows a better control of responses and actions to the problems raised. This ability is increasing as the years of study progress, since a student is confronted little by little to fulfill different demands related with the tasks he must perform and the activities he must fulfill during his training process.

7. *Decision-making*, understood as a complex process involving cognitive but emotional variables. It determines the responses that an individual gives to a given situation. Here it is relevant to consider the issue of emotions and their role in the *sui generis* way of being of each person, since they influence their process of knowledge, since it is one of the main elements of this work, as expressed by Morales *et al*. (2018), and in the variety of human actions.

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It was Descartes who pointed out the importance of thought in human action, since humans can base their best certainties on their cognitive functioning (as long as there is no mental problem). This certainty is synthesized in its famous phrase: "*Cogito ergo sum*", which gives priority to thinking about existing.

Traditionally, logical-discursive knowledge has been given a lot of importance and the way to approach the sciences has been through cognitive abilities. However, human beings can learn through emotions, i.e., the emotional brain — as well as the cognitive and pragmatic brain — can favor a better performance during the teaching process (Joaqui and Ortiz, 2019).

Heidegger (1997), for whom *dasein* cannot evade the moods, is the author who most delved into the topic of emotions, from a philosophical point of view: *dasein* cannot evade the moods, since they are manifested simply in the being, as *dasein*: when it comes into contact with the world, with objects and with others, it is always submerged by a state of mind, otherwise *dasein* would be impossible, since existing necessarily implies an emotional experience.

Heidegger (1997) spoke of "affective dispositions" that contribute to a direct existential opening to the world. They are the preferential link established between *dasein* and the world, precisely because they have direct access and have no intermediation of reason. Therefore, the *dasein* can let itself be carried away and give in to moods, since it is always submerged by one of them; otherwise, its existence and being in the world would be impossible, as they imply, necessarily, an emotional experience. According to Heidegger (1997): "In the affective disposition, *dasein* is always placed before itself, it has always been found, not in the form of a self-perception, but in that of an affectively disposed being" (p. 160).

This characteristic of direct existential openness to the world that enables the affective dispositions of impregnating the being, without being able to be completely owners of them, determines its ontological character: the opening of the condition of thrown, i.e., being in the world as a whole and being given to the world from which can arise what concerns us and for the control and supervision of these states, it is undoubtedly required the action of the EFs, especially those of regulation of these emotional states.

If this organization does not occur, the student may be immersed by his emotions, which will prevent him from acting properly. The notion of "cast" emphasizes the fundamental existential condition of human beings, the connection with the world, the surrender to it and the aware-

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ness of what concerns us in our existence. Supervision and control, in this context, refer more to an understanding and accountability rather than an active and direct domain.

After considering the different EFs that a student may develop during his training, it is possible to review, briefly, the implications of these functions in learning.

Executive Functions in Learning

The EFs intervene or are part of a series of interconnected processes that constitute the neuropsychological basis of the own activities of the human being, so its analysis and understanding is very relevant in the educational context, being intimately linked to learning. The EFs determine the social and academic performance of students, so they constitute an area of special interest for professionals who work with people during the training cycle and relationship with themselves and with the other (Joaqui and Ortíz, 2019); taking into account that these skills have a preponderant role in decision-making, function as a filter for the selection and recording of information obtained in the environment and are basic when planning, organizing and regulating action.

There are studies that point out the role of inhibitory control and supervision on the regulation of learning, whose absence or impairment generates behaviors that influence learning, since the person is characterized by "difficulties in impulse control, act automatically and without an awareness of the consequences of the acts performed, limitations in the proper supervision of tasks, abandonment of activities without ending them" (Ramos and Lozada, 2015, p. 30).

There are reports that affect the regulation of their learning (Tene and Piedra, 2013) and show low academic performance (García and Muñoz, 2000), although apparently this happens more frequently in childhood (Fonseca *et al.*, 2016), since there are other reports (Barceló *et al.*, 2006) that indicate that there is not much difference in EF when evaluating students with different performances (high and low), except in language tests, in which the results show different skills in this area and others.

It should also be taken into account that EFs are related to two cognitive processes important for learning, such as attention and memory (Gross, 2012). In order for the latter to function and have access to the information it possesses, it is necessary to maintain a certain degree of focused attention and avoid the stimuli that can hinder the task. If this is

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not possible due to some interference or affectation, the memory will be prevented from recording the new information that comes to it and this will undoubtedly affect learning.

Similarly, attempts have been made to generate proposals that contribute to learning considering the EFs (Yoldi, 2015). Most of these actions consider essential tasks such as the early detection of students who present difficulties in any function and then their permanent monitoring throughout the training process, in order to help them develop the function with the deficit.

According to Yoldi (2015, p. 14), the activities mostly mentioned are the following:

- Working in small groups to improve the attention and response level given by students.
- Minor modifications in the environment in such a way that visual or auditory interference is reduced.
- Offering clear rules of behavior, through brief regulations that can even be made visible through posters in the classroom.
- Dividing complex tasks into smaller, sequential activities so that students can understand the process of solving the most complex task.
- Establishing and implementing routines during the class to favor impulse control and monitoring of the work done.

Other authors, such as Payer (2009), propose to promote work among peers of different skill levels, so that they become benchmarks for those with less skill and thus can use the "near development zone" proposed by Vygotski or the use of modeling for learning, both by the teacher and more advanced peers, and then practiced by all students.

As observed, there are different practices that, being focused on the use of FE, contribute to develop these practices in university students. There are specific educational approaches and learning strategies designed to enhance and strengthen students' EFs. EFs are superior cognitive skills that play a crucial role in planning, organizing, self-monitoring, decision-making, and other complex mental activities.

Such is the case of Osses Bustingorry and Jaramillo Mora proposal (2008), which emphasizes the use of metacognitive skills in all academic tasks, which promote the development of superior skills of reflection and self-regulation. Therefore, there are many small activities that teachers can carry out that favor and consolidate the different EFs. By implementing educational strategies that take these functions into account, the objective is to improve the ability of students to face academic challenges and promote more effective and autonomous learning.

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Conclusions

The study and use of EF in learning are the most interesting fields of analysis and understanding, due to the impact they have on the academic performance of university students. They do not have a single definition, but it seems that the EFs encompass all those skills related to control, supervision, analysis of the environment, synthesis and abstraction that make a human being something special and different.

The components of EF and their importance for regulating the activities carried out by a person during the training process have been analyzed, for that reason the changes experienced in these functions throughout the life cycle have been considered.

The main characteristics of EF have been raised and the different models to understand EF have been pointed out. Most of them present them in interrelated blocks that, in turn, are linked to other cognitive functions such as language, sensations and perceptions, which contribute to the functioning of the organism as an organized and unitary whole.

Finally, it has been considered the relationship between EF and learning in university students, so it is significant to take into account these functions in the teaching practice, to perform a practice that allows the development of these skills in students, which will facilitate their adaptation to the environment around them and their development in the tasks related to their professional practice.

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Psychoeducational proposal on emotional competencies in university students

Propuesta psicoeducativa sobre competencias emocionales en jóvenes universitarios

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Abstract

Several studies have reported a link between emotional competencies and academic achievement in higher education, and about the need to implement strategies for young university students to face educational demands. Along this line, the aim of this study is to explore the characteristics of emotional regulation that affect the academic performance of a group of university students, with the purpose of designing a psychoeducational proposal aimed at strengthening the emotional self-management of this population. For this, a diagnostic phase was carried out in which 80 university students participated, 33.8 % male and 66.2 % female, aged between 18 and 25 years (M = 21.09; SD = 1.92), to whom the Difficulties in Emotion Regulation Scale (DERS) instrument and the *Pontificia Universidad Católica del Ecuador* (PUCE) Learning Assessment Scale were applied. The results showed the presence of difficulties in goal-orientation behaviors, as well as a significant association between academic performance and lack of emotional acceptance and clarity. With these findings, the Logical Framework methodology was used to design a proposal of seven workshops to promote the development of competencies related to emotional recognition and management, stress and anxiety management, decision making and conflict management, intrinsic motivation and self-knowledge, time management and administration.

Keywords

Emotional competencies, emotional regulation, academic performance, emotional development, psychoeducational proposal, higher education, university students.

Resumen

Varios estudios han reportado una asociación entre competencias emocionales y logros académicos en educación superior, y sobre la importancia de implementar estrategias para que los jóvenes afronten las demandas educativas. En esta línea, el objetivo del presente estudio consistió en explorar las características de la competencia de regulación emocional que inciden en el rendimiento académico de un grupo de jóvenes universitarios, con la finalidad de diseñar una propuesta psicoeducativa orientada a fortalecer la autogestión emocional de esta población. Para ello, se realizó una fase diagnóstica en la que participaron ochenta estudiantes universitarios, 33,8 % de sexo masculino y 66,2 % de sexo femenino, con edades comprendidas entre 18 y 25 años (*M* = 21,09; *DE* = 1,92), a quienes se les aplicó el instrumento Difficulties in Emotion Regulation Scale (DERS) y la Escala de Valoración de Aprendizajes de la Pontificia Universidad Católica del Ecuador (PUCE). Los resultados mostraron la presencia de dificultades en conductas dirigidas a metas, así como una asociación significativa entre rendimiento académico y falta de aceptación y de claridad emocional. Con estos hallazgos, se empleó la metodología del Marco Lógico para diseñar una propuesta de siete talleres para fomentar el desarrollo de competencias relacionadas con reconocimiento y gestión de emociones, manejo de estrés y ansiedad, toma decisiones y manejo de conflictos, motivación intrínseca y autoconocimiento, gestión y administración del tiempo.

Palabras clave

Competencias emocionales, regulación emocional, rendimiento académico, propuesta psicoeducativa, educación superior, estudiantes universitarios.

Introduction

The term "competences" encompasses a set of characteristics by which people develop the skills necessary to develop assertively in various contexts, such as the family, interpersonal or work. Therefore, higher education must include, in addition to academic knowledge, the development

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of the essential emotional competences so that future professionals can perform more efficiently in their areas.

The aim of this study is to explore the characteristics of emotional regulation competence that affect the academic performance of a group of young university students, in order to design a psychoeducational proposal aimed at strengthening the emotional self-management of this population. In this sense, it defends the idea that emotional competencies favor the achievement of academic competencies necessary for professionalization. This topic is important during university life, since the higher education of the current era requires the development of the capacity to understand the world, internalize it, establish relations with it and seek its transformation (Ospina-Carmona *et al.*, 2022).

In line with this objective, this document presents a bibliographic review on the topics of study: emotional and academic competences in higher education, its foundation and relationship. Then, the results of the diagnostic phase are shown, in which eighty university students participated, to whom the instrument DERS (Difficulties in Emotion Regulation Scale) (Gratz and Roemer, 2004) and the Appraisal of Learning Scale established by the Pontifical Catholic University of Ecuador (PUCE, 2022) were applied in a self-report form. Based on the results obtained, a psychoeducational proposal was designed consisting of seven workshops that address issues related to emotional self-management, anxiety and stress management, conflict resolution, decision-making and time management. Finally, the discussion and conclusions of the study are presented, related to the results and the proposed objective.

State-of-the-art

A brief review of the approaches of some of the agencies related to higher education allows to observe that the concept of competence is used to refer to the theoretical and practical knowledge that university students must acquire during their training. Although it can be assumed that the achievement of cognitive-technical skills includes the development of the necessary emotional competencies, there is no evidence in official documents of an explicit mention on the subject, which may lead to a lack of attention to this important field of higher education.

For example, UNESCO (2022) argues that students should be provided with the essential competencies to respond to the constant changes of the labor market. At the national level, the Academic Regime Regulation (ETUC, 2022) mentions that student evaluations have to be

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comprehensive, progressive, permanent and focused on measuring the achievement of competences and learning outcomes (art. 66). Similarly, the Regulations of the Organic Law on Higher Education (LOES, 2022) provide that the components of the examination of professional qualification must ensure that applicants possess the necessary competences for their professional practice (art. 32).

These attributes, which are those that are sought to develop with university education, are related to what Kennedy (2007) calls "knowledge and its instances, skills, responsibilities and attitudes" (p. 21), considering that the concept of competences is not restricted to the cognitive field, since it encompasses a greater set of characteristics. In relation to higher education, the achievement of competences implies an education in the academic and emotional spheres, related to the profession, so that university students acquire the necessary skills for conducting their work activities not only with solid knowledge, but with positive attitudes. At this point, the critical discursiveness and dialogicity proposed by Vergara (2022) for a higher echorelational training would be nourished by more empathic postures, product of the development of the emotional skills necessary to interact in society.

Emotional competences: dimensions, factors and scope

The concept of emotional competences emerged with Saarni (1999), who defined them as the set of skills that allow an adapted and efficient development. They are acquired skills based on emotional intelligence (Goleman, 2000), a construct that refers to a series of skills that contribute to the assessment, expression and proper regulation of emotions, as well as to motivation, planning and achievement (Salovey and Mayer, 1990). According to Goleman (2000), emotional intelligence is likely to be encouraged and strengthened, as its poor development can negatively influence people's well-being and success.

These approaches support the importance of emotional education, defined as a dynamic, continuous process that seeks to train integral people with skills to reduce vulnerability and maximize resilience to problems (Bisquerra, 2020). It is an essential complement of cognitive development, since through self-reflection and awareness, emotional education promotes the development of competences related to awareness, regulation and emotional autonomy, social interaction and skills for life and well-being (Bisquerra, 2020). Although all of them provide people

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with the ability to properly mobilize their emotions, the leading role of emotional regulation in the academic achievements of young university students has been reported (Moreta-Herrera *et al*., 2018).

Regarding emotional regulation, most authors agree that it is the capacity by which people can properly manage their emotions (Kinkead *et al*., 2011). This management involves becoming aware of the association between emotions, cognitions and behavior, thanks to which humans can modify their emotional expression, modulate their emotions and feelings, strengthen their coping skills and increase their competence to generate positive emotions for themselves (Bisquerra, 2020).

Various biological, environmental, and cultural factors associated with emotional regulation have been mentioned (Martínez, 2016). In terms of biological factors, the importance of several components stands out, among them: the activity of the cerebral amygdala that generates or initiates emotional processes (Calixto, 2018); the adrenocortical-hypothalamic-pituitary system, responsible for the production of cortisol that, at high levels, is associated with stress, anxiety and depression (Dionisio, 2022); the vagal tone that controls the heart rhythm versus emotional challenges (Martínez, 2016).

Regarding environmental factors, it has been reported that emotional regulation is related to attachment links and parenting models (Díaz-Mosquera *et al*., 2022; Martínez, 2016). The cultural factor, on the other hand, includes the variables of sex and gender. The first refers to the biological conformation while gender is associated with the roles that each cultural context grants to people (Lamas, 2018; Martínez, 2016) and against which the individual makes particular decisions.

The contributions of the aforementioned studies account for the holistic dimension of the human being and allow us to observe that the level at which people develop emotional competences refers to a series of factors, which affect the way in which each individual manages his experiences. It is important to highlight, therefore, the importance of transdisciplinarity in higher education, which involves the participation of all human dimensions in the learning process, including the emotional and affective world of students (Pauta-Ortiz *et al*., 2023).

Competences for Professionalization and Academic Performance

Academic competences refer to the theoretical and practical knowledge in specialty subjects that people acquire and that, in the case of university

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education, are aimed at professionalization (CES, 2022; UNESCO, 2022). The achievement of this type of competences is evidenced through academic performance, a multidimensional and complex construct associated with the achievement of learning results (Mora, 2015), which is generally reflected in the grades.

Research on the subject has identified in higher education a number of variables involved in the academic performance of young people: personal, family, social and institutional factors (Martínez-Benítez *et al.*, 2020), these account for the multi-causal dimension, internal and external, which influences academic achievement (Borja *et al.*, 2021; Garbanzo, 2013) and the quality of professional training.

Personal factors are related to personal characteristics such as motivation for learning, perceived self-efficacy and self-concept, self-management skills and emotional regulation, level of satisfaction with one's life, career choice and the results achieved (Borja *et al.*, 2021; Garbanzo, 2013). Family and social factors are associated with the context of the student, for example: the characteristics of the family environment in terms of functionality, support and positive relations; the level of formal education of parents; the socioeconomic level of the family, which facilitates or limits the essential material resources for the study (Borja *et al.*, 2021; Garbanzo, 2013; Rodríguez and Rosquete, 2019). Among the social factors are the quality and type of relationships of the student with the environment, their friends and people they interact, including those relationships generated online. Institutional factors refer to the conditions of the university environment (Zapata *et al.*, 2016), for example: the characteristics of the study curriculum and the level of complexity, the methodologies used in the training process and the relationships with teachers and classmates (Borja *et al.*, 2021; Zapata *et al.*, 2016).

Some of these factors are associated with each other, depending on individual differences, and can generate varying levels of tension and anxiety in students (Caballero *et al.*, 2007).

Emotional and Academic Competences in the University Context

As mentioned, the achievement of academic competences is closely related to emotional experiences, which can favor learning or rather hinder it (Merlino and Ayllón, 2015; Moreta-Herrera *et al.*, 2018), depending on the type of emotional experience and how it is self-managed.

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Adequate emotional regulation at the university is related to the ability of students to manage stress levels that can arise as a result of educational situations, such as preparation of exams and elaboration of tasks. It is also associated with the presence of fewer emotional distractors that interfere with the performance of academic activities, thereby increasing the chances of achieving a successful academic performance (Pulido and Herrera, 2017). However, there are cases in which stress is not assertively managed, so that some students have difficulty adapting to the demands of university life, which can trigger exhaustion, negative attitudes, loss of interest (Caballero *et al.*, 2007), procastination (Moreta-Herrera *et al.*, 2018), etc., which affect student development and academic achievement.

Several studies and literature reviews have reported the relationship between emotional management and achievements in university performance (Fried, 2011; Merlino and Ayllón, 2015; Gordillo, 2023; Moreta-Herrera *et al.*, 2018; Pereno *et al.*, 2012). In fact, an electroencephalographic study found that an important predictor of success in higher education is behavioral control that occurs thanks to the process of emotional regulation (Reynoso, 2016). Likewise, Pulido and Herrera (2017) found in their research that students with higher emotional regulation skills obtained higher grades.

On the other hand, emotions, besides being linked to cognitive processes, influence the intrinsic motivation of people (Borja *et al.*, 2021; Calixto, 2018; Fried, 2011). In this sense, positive emotions generate more and better cognitive resources, which increase the creativity of responses, psychological well-being and health of students (Pereno *et al.*, 2012; Calixto, 2018). In contrast, negative emotions such as fear, anxiety, and stress hinder deep information processing and thus impair academic performance (Pereno *et al.*, 2012).

A useful way to carry out emotional education, in topics such as self-management and emotional regulation at the university, is through psychoeducational intervention, understood as an action that combines psychological and educational strategies with the purpose of promoting development and personal well-being (*i. e.* Manjunatha and Ram, 2022). In this field, several academic works on the subject are registered, carried out with the participation of students of different schooling levels, which report satisfactory results (*i. e.* De la Hoya, 2021; Ervacio, 2022; Gómez, 2017; Torres, 2021).

Materials and methods

This study was carried out in two stages. At first, a diagnostic phase was conducted using a mixed approach of research, descriptive-exploratory

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type and cross-sectional (Hernández *et al.*, 2014), in order to identify the areas related to emotional regulation competence in which difficulties occur and appreciate their association with academic performance. In the second phase, the methodology of the Logical Framework (Ortegón *et al.*, 2015) was used to design a psychoeducational proposal that addressed the needs identified in the first stage.

Regarding ethical considerations, it should be mentioned that this study is derived from a dissertation in Educational Psychology, in all its stages, approved by the Research Directorate and the Committee on Ethics of Research in Human Beings (CEISH) of PUCE.

Diagnostic phase

Participants

The participants were eighty university students, selected by a non-probabilistic sampling and by casual grouping (Yuni and Urbano, 2020), who met the following inclusion criteria: undergraduate students of PUCE, enrolled at least in second level of university education and from 18 to 25 years old.

Out of the participants, 33.8 % (n = 27) reported being male and 66.2 % (n = 53), female, with an average of 21.09 years old (SD). In terms of career, 8.8 % came from Nursing, 18.8 % from Geography, 5 % from Engineering and 67.5 % from Psychology.

Assessment

A sociodemographic data sheet, the DERS instrument and the PUCE Learning Assessment Scale were used for the evaluation.

To assess the presence of difficulties in emotional regulation competition, the DERS scale (Gratz & Roemer, 2004), adapted to Spanish, was used by Hervás and Jódar (2008). The DERS is a self-report instrument that consists of 36 items, some of them posed inversely, to which it is answered by a scale of 1 (almost never) to 5 (almost always). The items are distributed in six subscales:

- Impulse control difficulty (DCI, 6).
- Limited access to regulatory strategies (ALE, 8).
- Lack of emotional acceptance (FAE, 6).
- Interference of goal-directed behaviors (ICM, 5).

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- Lack of emotional awareness (FCE, 6).
- Lack of emotional clarity (FCL, 5) (Gratz and Roemer, 2004).

As for the cut-off points, scores from 0 to 14 on the total scale indicate no difficulties in emotional regulation. 15 to 24, normal. From 43 onwards, there is presence of difficulties (Zumba-Tello and Moreta-Herrera, 2022).

In reference to the reliability and validity, in the original scale an adequate internal consistency was found (range of 0.80 to 0.89 in the subscales and 0.93 in the total scale), as well as an appropriate predictive and criterion validity, and a good test-retest reliability (Gratz and Roemer, 2004). More recent studies have reported similar Cronbach alpha indices. In Argentina, for example, a α = 0.93 was found in the total scale and a range between 0.74 and 0.89 was found between the subscales (Michelini and Godoy, 2022). In Ecuador one study found reliability coefficients of α = 0.90 (Reivan-Ortiz *et al.*, 2020), while another study recorded coefficients of α = 0.87 (Zumba-Tello and Moreta-Herrera, 2022). For this study, the internal consistency indices recorded were: BCI α = 0.75; ALE α = 0.779; FAE α = 0.744; BMI α = 0.828; FCE α = 0.684; FCL α = 0.772; DERS total scale α = 0.915.

On the other hand, the technique of providing information (Hernández *et al.*, 2014) was used to assess academic performance, in this case, by the young participants, using the learning assessment table of PUCE (2022), which is contained in the General Student Regulation (art. 49). This is a quantitative scale on 50 points, with its corresponding equivalence established as follows: 45 to 50 = excellent; 40 to 44 = very good; 34 to 39 = good; 30 to 33 = regular; 29 or less = failed.

Procedure

With prior authorization, several teachers from the PUCE were contacted and asked to allow a space in their classrooms to explain to the students the aspects related to the study. With those who expressed their free and voluntary decision to participate, the document of informed consent was signed, and the information was collected, which was coded numerically to ensure the anonymity of the participants' information.

The SPSS version 25 statistical package was used for data processing. Descriptive statistics and percentages, according to the case, of the sociodemographic data and the scales were calculated. With the results of the DERS, tests of normality and, according to needs, parametric and non-parametric tests for contrast by sex and by subscales were used, as well as correlations. In addition, a descriptive interpretation of the items with the highest percent-

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age of response was made in options 4 ("most of the time") and 5 ("almost always"). With the results in academic performance, the T test was used to contrast independent samples in order to appreciate the differences by sex. Finally, the chi-square test was used to assess the association of academic performance reported by participants with the results of the DERS scale.

Analysis and results of the diagnosis

1. *Emotional regulation*. With respect to emotional regulation competence, descriptive statistics obtained on the DERS subscales and the total scale, by sex and globally, are shown in Table 1. It is observed that in the ICM subscale, the mean and median values are higher.

Table 1
Descriptive statistics by gender in DERS subscales and total scale (N = 80)

	Sex								Total			
	Men				Women							
	M	*FROM*	*Med*	*RI*	*M*	*FROM*	*Med*	*RI*	*M*	*FROM*	*Med*	*RI*
DCI	2.41	0.90	2.16	1.67	2.46	0.84	2.41	1.00	2.45	0.85	2.33	1.29
ALE	2.19	0.84	2.06	1.41	2.57	0.75	2.50	1.03	2.45	0.79	2.37	1.13
FAE	2.35	0.85	2.25	1.46	2.51	0.88	2.50	1.33	2.46	0.87	2.41	1.29
ICM	2.74	0.91	2.60	1.45	3.11	1.06	3.2	1.55	2.99	1.02	3.10	1.55
FCE	2.46	0.60	2.33	0.75	2.60	0.80	2.33	1.21	2.55	0.74	2.33	1.17
FCL	2.23	0.74	2.30	1.05	2.56	0.82	2.50	1.20	2.45	0.80	2.40	1.20
DERS total	2.38	0.60	2.26	0.95	2.62	0.62	2.62	0.81	2.54	0.62	2.56	0.83

DCI = difficulties in impulse control
ALE = limited access to regulatory strategies
FAE = lack of emotional acceptance
ICM = goal-directed behavior interference
FCE = lack of emotional awareness
FCL = lack of emotional clarity
DERS total = values on the DERS total scale

Source: own elaboration

With the Kolmogorov-Smimov normality test, a p value < 0.001 was recorded on the FCE subscale, in which medians and non-parametric tests were used for processing.

As for the sex of the participants, no significant differences ($p > 0.05$) were presented with the T test for independent samples be-

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tween the means of the subscales DCI, ALE, FAE, ICM, FCL and in the total scale of the DERS. Nor were gender differences found in the medians of the FCE subscale with the Mann-Whitney U test.

For comparing ICM, which records the highest values (table 1), with the means of the subscales DCI, ALE, FAE, ICM, FCL and with the total scale, the ANOVA test was used. The results indicated that ICM showed statistically significant differences with DCI ($F = 3.49$; $p < 0.001$; $\eta 2 = 0.572$), with ALE ($F = 3.75$; $p < 0.001$; $\eta 2 = 0.591$) and with the total scale ($F= 5.81$; $p<0.01$; $\eta 2= 0.572$). The values of Eta square (η^2) indicate that more than 50 % of the variability in DCI, ALE and total scale are explained by the presence of ICM. For contrasting ICM with FCE medians and Wilcoxon test were used, in this case, statistically significant differences between the two subscales were also recorded ($Z = -3.36$; $p < 0.001$).

Table 2 shows the correlations recorded between the subscales and the total scale of the DERS. As seen, all correlate with the total scale and with each other at a significant level, except for FCE, which does not correlate with FAE or ICM.

Table 2
Correlations between subscales and the DERS total scale (N = 80)

	DCI	ALE	FAE	ICM	FCE	FCL
DCI	1	0.644***	0.442***	0.473**	0.349**	0.471***
ALE		1	0.618***	0.630***	0.315**	0.586***
FAE			1	0.312**	0.181	0.330**
ICM				1	0.169	0.376***
FCE					1	0.470***
FCL						1
DERS						

DCI = difficulties in impulse control
ALE = limited access to regulatory strategies
FAE = lack of emotional acceptance
ICM = goal-directed behavior interference
FCE = lack of emotional awareness
FCL = lack of emotional clarity
DERS = DERS total scale
***p < 0.001
**p < 0.01
*p < 0.05

Source: own elaboration

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To obtain an average result of the implementation of the participants in the DERS scale, the average of each of the 36 items was added. The result was ∑ = 91.12, indicating the presence of difficulties in emotional regulation, in accordance with established cut-off points (Zumba-Tello and Moreta-Herrera, 2022). For assessing where these difficulties occur in most cases, the percentage of responses to the items' approaches, grouped by subscales, were calculated, which were located in options 4 ("most of the time") and 5 ("almost always") (Table 3).

It was found that, at the level of the subscales, the average percentage of options 4 and 5 ranged between 19.34 (FCL) and 38.72 (ICM). Likewise, items with higher percentages belong to ICM, confirming the impact of emotional dysregulation on goal-directed behaviors. It was found that 51.3 % of participants indicate that when they have some emotional distress they cannot develop their activities normally, 43.1 % state that, in these cases, it is difficult for them to concentrate and, 37.1 % report difficulties to perform their work.

As for emotional acceptance, 38.8 % of participants reported discomfort when faced with angry situations. Regarding impulse control, 37.5 % indicate that in such situations they lose control over their behavior. In terms of access to regulatory strategies, 36.3 % say they are emotionally overwhelmed and 32.6 % say they have difficulty reassuring themselves. In relation to emotional awareness, 33.8 % feel that they do not carefully analyze their feelings, while 30 % manifest difficulty in recognizing their emotional states, which is also seen in emotional clarity, in which also 30 % report difficulties in realizing how they are feeling.

Table 3
Percentages of items (by subscale) in DERS options 4 and 5

Subscale: Impulse control difficulties (DCI)					
No.	**Item**	**% Op 4**	**% Op 5**	**% Sum**	**% Avg**
3	I feel like my emotions dominate me and I can't control them.	11.4	6.3	17.7	
	When I feel annoyed:				
14	I can't control myself.	17.5	5	22.5	
19	I feel like I'm losing control.	16.3	11.3	27.6	
24r	I keep control over my behavior.	30	7.5	37.5	
27	I find it difficult to control my behavior.	8.8	6.3	15.1	
32	I lose control of my behavior.	13.9	8.9	22.8	22.80

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Sub-scale: Limited access to regulatory strategies (ALE)					
No.	**Item**	**% Op 4**	**% Op 5**	**% Sum**	**% Avg**
	When I feel annoyed:				
15	I think that bad mood is going to last a lot.	10	2.5	12.5	
16	I think I'll be depressed later.	13.8	2.5	16.3	
22r	I know I can calm down.	26.3	6.3	32.6	
28	I don't think there's anything I can do to make myself feel better.	13.9	1.3	15.2	
30	I'm starting to feel bad about myself.	11.7	13	24.7	
31	I think the only thing I can do is to keep thinking about it.	13.8	11.3	25.1	
35	It takes me a long time to feel wwbet-ter again.	18.8	6.3	25.1	
36	I feel my emotions overwhelm me.	23.8	12.5	36.3	23.48
Subscale: Lack of Emotional Acceptance (FAE)					
No.	**Item**	**% Op 4**	**% Op 5**	**% Sum**	**% Avg**
	When I feel annoyed:				
11	I reproach myself for it.	13.8	10	23.8	
12	I'm uncomfortable being like this.	22.5	16.3	38.8	
21	I'm ashamed of myself for feeling this way.	5	6.3	11.3	
23	I feel like I'm a weak person.	8.8	7.5	16.3	
25	I have feelings of guilt for being like this.	7.5	10	17.5	
29	I'm irritating myself for being like this.	13.9	11.4	25.3	22.17
Sub-scale: Target-Directed Behavior Interference (ICM)					
No.	**Item**	**% Op 4**	**% Op 5**	**% Sum**	**%Prom**
	When I feel annoyed:				
13	I have difficulty doing my job.	17.9	19.2	37.1	
18	I find it very difficult to concentrate on other things.	26.6	16.5	43.1	
20r	I can continue to carry out my activities normally.	27.5	23.8	51.3	
26	I find it hard to concentrate.	21.5	15.2	36.7	
33	I find it hard to think of anything else.	12.7	12.7	25.4	38.72

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Subscale: Lack of emotional awareness (FCE)					
No.	**Item**	**% Op 4**	**% Op 5**	**% Sum**	**% Avg**
2r	I pay attention to how I'm feeling.	15	2.5	17.5	
6r	I carefully analyze my feelings.	26.3	7.5	33.8	
8r	I attach great importance to my feelings.	21.3	5	26.3	
	When I feel annoyed:				
10r	I recognize the emotional state I'm in.	27.5	2.5	30	
17r	I consider my feelings valid and important.	13.8	8.8	22.6	
34r	It took me a while to reflect on what I'm really feeling.	16.3	5	213	25.25
Subscale: Lack of emotional clarity (FCL)					
No.	**Item**	**% Op 4**	**% Op 5**	**% Sum**	**% Avg**
1st	I think I have clarity about all my feelings	23.8	1.3	25.1	
4	I have no idea how I'm feeling.	5.1	2.5	7.6	
5	I have trouble understanding my emotions.	11.4	2.5	13.9	
7r	I think I know exactly how I'm feeling.	22.5	7.5	30	
9	I have confusion about my feelings.	13.8	6.3	20.1	19.34
Average Percentage					25.47

% Op 4 = percentage of responses in option 4 of the scale
% Op 5 = percentage of responses in option 5 of the scale
% Sum = sum of the percentages of options 4 and 5
% Prom = average of the percentages of options 4 and 5 in each subscale
The "r" accompanying some item numbers indicates that the item is inverse

Source: own elaboration

2. *Academic performance*. In terms of academic performance with the information provided by the participants, the percentages shown in Table 4 were calculated. It can be seen that a total of 55 % of participants (men = 59.2 %; women = 52.8 %) said that their average in the previous semester ranged between "excellent" and "very good", while 45 % (men = 40.7 %; women = 47.2 %) said that they obtained an average between "good" and "regular". No participant was placed on the "failed" scale.

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Table 4
Self-report of participants on their academic performance (N = 80)

Scores	Equivalences	% of participants		
		Men	Women	Total
45-50 points	Excellent	11.1	7.5	8.8
40-44 points	Very good	48.1	45.3	46.3
34-39 points	Good	37	41.5	40
30-33 points	Regular	3.7	5.7	5
29 or less	Failed/Insufficient	0	0	0

Source: own elaboration

Although the percentage of male participants is higher than that of female in the excellent and very good equivalences, and lower in good and regular, with the T test for sample contrast there were no significant differences at the statistical level by gender ($p > 0.05$) in academic performance.

3. *Emotional regulation-academic performance*. The chi-square (X^2) tests were used to assess the association of academic performance reported with the subscales and with the total DERS, and the Cramér V tests were used to assess the degree of the association. It was found that the reported academic performance is significantly and moderately associated with the FAE subscales ($X^{2 = 72.56;}$ *p = 0.047; V = 0.553) and FCL (X2* = 63.255; *p0.037; egyptism),* which shows that discomfort and confusion regarding emotions is associated with the grades achieved.

Proposal for psychoeducational intervention

Technique

The logical framework methodology (MML) was used for elaborating the proposal, which is a useful tool for the design, implementation and evaluation of projects, from the identification of the problem and the alternatives of solution, which leads to an operational and practical planning through the Planning Matrix of the Logical Framework" (Ortegón *et al.*, 2015). MML is an internationally used technique in different sectors, including the health sector (Cárdenas *et al.*, 2022).

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Procedure

The analysis of the problem identified in the diagnostic phase, which consists in the presence of difficulties in emotional regulation that affect the academic performance of the young university participants in the study, was performed, with which the problem tree was elaborated. Some of the causes identified were: difficulties in raising awareness, recognizing and analyzing feelings and emotions, poor ability to manage conflicts, low intrinsic motivation, difficulties with organization and time management. As consequences were identified: difficulties in goal-directed behaviors, discomfort in the face of emotional discomfort, emotional interference in the development of activities and concentration, high levels of stress and anxiety.

From this analysis, the tree of objectives was elaborated placing in positive, as goals to reach, the components of the problem tree. In this way, the main purpose was to promote the development of competencies related to emotional regulation that favor the academic performance of young university students. Awareness, recognition and analysis of feelings and emotions, conflict management, intrinsic motivation, organization and time management were identified as means to achieve this goal. It was considered that the goals would be achieved: to increase behaviors aimed at goals, to reduce discomfort in the face of emotional discomfort, to minimize the influence of emotions in the development of activities and in concentration, to reduce stress and anxiety levels.

After this step, the analytical structure of the project was developed with its components: recognition and management of emotions, management of stress and anxiety, management of conflicts and relaxation techniques, intrinsic motivation and self-knowledge, management and time management; then, activities were proposed for each component.

Finally, the planning matrix of the logical framework was constructed. The "narrative summary" integrated all the aforementioned aspects in terms of purposes, objectives, components and activities. The "indicators" column identified the expected results of the evaluations to be used for each section of the narrative summary. Verification "sources" noted the places where the information could be verified, in this case the digital files. Finally, in "cases", aspects related to the assistance and participation of those involved were considered.

The psychoeducational proposal was planned considering these inputs, which was previously subjected to a validation process with the participation of three professionals who demonstrate experience and knowledge on the subject.

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Analysis and results of the intervention proposal

The main objective of the proposal was to promote the development of competences related to emotional regulation in university students, which favor their academic performance.

To this end, seven workshops were planned with their respective specific objectives, activities and resources, each with an average duration of 1 h 45 min. For the approach of activities, an exhaustive search was carried out on the Internet, in order to select and adapt those that best fit each of the specific objectives proposed. Each workshop begins with a welcome and framing, a space in which the topic, objectives and activities to be carried out are explained. At the end of each workshop, an evaluation is applied in which the participants give their criteria on the activities carried out and on the learning achieved.

Table 5 provides a synthesis of the suggested approach for each workshop.

Table 5
Synthesis of the approach in each session of the proposed psychoeducational intervention in emotional regulation

1	Theme	Emotion recognition and management
	Objective	To foster the ability to identify situations that occur due to the predominance and lack of management of a negative emotion.
	Activities	• Dynamic: Guessing emotions. One participant guesses the emotion that others are dramatizing. • Emotional compass: Participants identify, describe, and analyze situations in which they have experienced the emotions indicated in the compass (Lifeder, 2020). • When I get angry...: Participants notice and reflect on their reactions to an angry situation. • Sociodrama: Activity in groups about coping with a problematic situation. • Closing: Participants indicate what they liked and get from the workshop.
2	**Theme**	**Stress and anxiety management no. 1**
	Objective	To recognize reactions related to lack of emotional regulation in situations of anxiety and stress, and their consequences.
	Activities	• Observation: A film in which the protagonists face situations of anxiety and stress is observed in a group (suggested film: *Whiplash*; Chazelle, 2014). Participants record situations that attract their attention and situations in which the characters show little or no emotional regulation. • Closing indication: Bring the annotation sheet to the next session.

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3	Theme	Stress and anxiety management no. 2
	Objective	To analyze the behaviors observed in the film, which show a lack of emotional regulation in the management of stress and anxiety
	Activities	• Working groups: Present in the groups, what each participant noted and analyze a document with questions of emotional regulation in the management of stress and anxiety in the observed film. • Exhibition of each work team. • Intergroup discussion. • Closing: Each participant indicates what is taken from the workshop.
4	**Theme**	**Relaxation techniques**
	Objective	To familiarize with the use of various relaxation techniques that promote stress and anxiety regulation.
	Activities	• Dynamics: The web. A ball of wool is thrown between the participants. The recipient expresses a class situation that causes stress/anxiety. • Presentation: Explanation of relaxation techniques by means of slides • Breathing and relaxation with background music (Gómez, 2007). • Artistic expression: Painting mandalas, free painting or constructions with clay, depending on the participants. Exhibition of the works on the wall of the living room so that everyone can look at them. • Closing: Forming a circle, each participant expresses how they felt with the workshop. Breathing exercises.
5	**Theme**	**Decision-making and conflict management**
	Objective	To promote the development of skills aimed at conflict resolution and decision-making to be used in everyday situations
	Activities	• Dynamics: Turn the sheet over. In groups, participants will place themselves in the center of a cloth placed on the floor and try to turn it around without leaving the cloth (Group Dynamics, 2023). • Model against time: In groups, they must build a model of what the participants decide, in 20 minutes, using only the material provided (cardboard, magazines, sheets), without using others, such as sticks, scissors, staples. Analysis of what was elaborated, the difficulties encountered and the ways of coping them. • Reaching the island: Each group receives a list of elements that are on a ship and that must continue to throw into the sea in order to reach the island (Group Dynamics, 2023). Reflection on the decision-making process. • Closing: Participants express how they can apply what they have worked, in their daily life.
6	**Theme**	**Intrinsic motivation and self-knowledge**
	Objective	To provide information and strategies regarding motivation and self-knowledge, which contribute to the formulation of the objectives of your life project

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	Activities	• Dynamics: Brainstorming. Write individually what comes to mind in front of the word *motivation*. Glue the paper to the board. In groups, they reflect on what each wrote. • Comment: Video about a commencement speech (suggested to take from YouTube). Analysis of the impact of motivation, self-knowledge and timely decision-making in achieving goals. • Wheel of Life: Each participant selects eight important areas of their life and places them around a circle, numbering them from 1 (least important) to 10 (most important). Reflection on how to act to address each area. • ROLE. To address the aspects identified in the "Wheel of Life", in a sheet with four quadrants, participants must identify: (1) R = internal resources: strengths, qualities, abilities they possess; (2) O = opportunities: external factors that benefit some area of their life; (3) L = internal limitations: aspects of themselves that they observe as limiting; (4) A = threats: external factors that hinder the achievement of their goals. • Life project: It is elaborated from the exercises "Wheel of life" and ROLA. To do this, a sheet with four columns is given to them: scope, goal or objective, time or time frame, and strategies. • Closing: In a sentence, each participant expresses the area of his life in which he considers he must work harder.
7	**Theme**	**Time management and administration**
	Objective	To encourage the use of personal resources in the planning of activities aimed at proper management and administration of time
	Activities	• Dynamics: The Sword of Time. In groups, participants put together a five-piece puzzle, in which only one has an identifiable figure (Group Dynamics, 2023). • How do I organize my time? (Marchena *et al*., 2017): Participants fill out the questionnaire, then identify in themselves strengths and weaknesses in the organization of their time and reflect on strategies that could be useful. • Time management matrix (Sáez, 2023): In a sheet of 4 quadrants, participants identify what is for them (1) urgent and important; (2) not urgent and important; (3) urgent and not important; (4) not urgent and not important. • Presentation: A slide on *Guidelines for Self-Management* is presented (Marchena *et al*., 2017). Participants give examples. • Closing: Forming a circle, each participant expresses the resource or strategy that he/she uses in favor of his/her time management.

Source: own production.

Discussion

The objective of this paper is based on the findings of previous studies in which the importance of emotional self-management in university life has been documented (*i. e*. Gordillo, 2023; Luy-Montejo, 2019; Mórtigo and Rincón, 2018) and the need to promote the development of emotional competences (Goleman, 2000), so that people can reduce their vulnerability and increase their resilience to everyday problems (Bisquerra,

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2020). In particular, the important role of emotional regulation in academic performance during university (Michelini and Godoy, 2022) has been reported.

Regarding the findings of the diagnostic phase of this study, no differences by sex were found at the statistical level in the competence of emotional regulation, evaluated with the application of the DERS. This indicates that, in the participating population, this competence manifests itself similarly in both men and women. However, the results demonstrated the presence of difficulties in different dimensions of emotional regulation, especially in behaviors aimed at goals, suggesting that the emotional situations of the participants hinder the achievement of their achievements.

In addition, it was found that emotional awareness is not correlated with emotional acceptance, nor is it correlated with goal-directed behavior, which is further hindered by the absence of impulse control and the lack of emotional clarity. In other words, little or no recognition of one's emotions prevents their acceptance, generates emotional confusion and, at the same time, interferes with achievements, since there is a tendency to impulsive execution that negatively affects the access of participants to regulatory strategies. This finding leads us to consider the need to work, first, with the emotional recognition of university students as a fundamental pillar of their emotional self-management. In fact, when performing the item analysis on the DERS scale, it was found that the main difficulties are characterized by emotional interference in the concentration necessary for the development of activities, discomfort in the face of emotional discomfort and loss of control over one's behavior, since there are difficulties in analyzing one's feelings, recognizing, and becoming aware of emotions.

In relation to these findings, it is important to mention that reviews and research on the subject indicate that emotional awareness and the resources that derive from it, such as self-control, reaction modification, high tolerance to stress, among others, are coping strategies that positively influence academic performance (Andrés *et al.*, 2017; Bisquerra, 2020). Therefore, inadequate management in the emotional sphere has a negative effect on student achievement. In fact, in this study it was found that about half of the participants obtained an average between good and regular in the previous academic semester and that their poor performance was associated with a lack of acceptance and emotional clarity, suggesting that the discomfort caused by negative emotions and confusion against them have an impact on grades, as they interfere with cognitive processes and, therefore, learning.

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The psychoeducational proposal of this study was developed considering the fundamental role of emotional regulation competence in reducing anxiety, managing stress situations, tolerance to frustration (Santoya *et al*., 2018) and the importance of time management to reduce the level of procastination (Moreta-Herrera *et al*., 2018). In fact, several authors have pointed out the need to implement programs aimed at developing emotional regulation skills that contribute to academic achievement (Andrés *et al*., 2017; Moreta-Herrera *et al*., 2018; Pulido and Herrera, 2017; Rodríguez, 2017; Rodríguez and Rosquete, 2019; Sarmiento, 2022), with the idea that, under certain conditions, emotions can limit executive functions and cognitive resources necessary to manage and process educational information (Andrés *et al*., 2017). In this sense, without a support program, students with more ease to modulate their emotions would be at an advantage over those with more difficulties in this field (Davis and Levine, 2013).

Considering this, the proposal is formulated in seven topics organized from the most basic, according to the results of the diagnostic phase, which, in this case, is the recognition and management of emotions. If implemented, the team in charge should follow up on the implementation of the workshops and the sustainability of the learning. It is also important that those who are responsible for its execution be alert to the emotional manifestations of the participants because, if a prolonged negative emotional state occurs in any participant, individualized psychological support should be recommended.

It is important to mention that the product has the necessary endorsement to become a support tool, whose purpose is to ensure and promote mental health for the benefit of the academic achievements of young university students, hence its development has considered the age range of the beneficiary population. However, variations can be made as necessary to adapt it to the characteristics of other population groups.

A limitation of this research is that the diagnostic phase was carried out with students enrolled in a private institution of higher education in Quito. Therefore, it is suggested that new research on the subject focus on other types of university, such as public institutions or those located in other cities, as well as on people with other conditions of development, for example, people with special educational needs or with any disability. Thus, contextualized results can be obtained that contribute with knowledge of the management of emotions and their influence on academic performance in other sectors of the population.

In addition, it is recommended to generate in university institutions, spaces for emotional education, given the importance that it has in

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all areas of life, as demonstrated in this study and in works on the subject by other authors (*i. e*. Puertas-Molero *et al*., 2020).

Conclusions

The state-of-the-art and the findings of this study allow us to conclude that higher education poses cognitive challenges that mobilize a series of emotions in young university students, which add to the individual problems related to personal characteristics and the characteristics of the family and social environment in which they operate. Therefore, the level at which each student has developed the emotional competencies needed to deal with their circumstances, and it has an impact on his academic performance. In this sense, academic performance, as reflected in grades, is the result of several factors that impact on learning.

Because the adulthood demands people who can function with solvency from the different spaces in which they operate, it is necessary for human beings to develop personal skills to face the challenges of life. In the case of young university students, the dimensions of emotional regulation that need to be strengthened to benefit academic performance and professional training have been evidenced, which in turn become a protective factor that promotes one's well-being.

Based on the analysis, it has been observed that some of the emotional skills that should be promoted in this population sector are awareness, recognition and analysis of feelings and emotions, conflict management and time management, which would increase the behaviors aimed at goals, while reducing both impulsive execution and emotional discomfort and their impact on concentration and the performance of activities. In the present study, a psychoeducational proposal has been designed to work on these topics through workshops aimed at young university students, with the purpose of favoring the development of competencies related to emotional regulation, which benefit academic performance.

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The role of emotions in the performance society

El papel de las emociones en la sociedad del rendimiento

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Abstract

In recent years, the South Korean philosopher living in Germany, Byung-Chul Han, has been setting new paths for philosophical reflection using the theoretical potential that arises from the understanding of the new social, political and economic realities that mark this era of neoliberal evolution and of technological development in the context of the Fourth Industrial Revolution. Thus, topics such as the transformation of biopolitics into psycho-politics become a very relevant point for the analysis of current societies and their drifts. Hence, this article aims to delve into Han's arguments, exploring the crucial role that emotions play in societies of performance, fatigue and lack of democracy, resorting to the metaphor of the "hamster wheel" as an image evocative of the dynamics of current societies. In this way, an innovative perspective of the complexity of the 21st Century is presented by delving into certain nuances of Han's thought in connection with the palpable reality of the emotions that act as the fuel that propels each individual in his/her own "existential wheel". This proposition with emotional experiences contributes significantly to contemporary discussions about human nature in contexts of technological innovation.

Keywords

Performance society, emotions, cognition, infocracy, psycho-politic, neoliberalism.

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Resumen

En los últimos años, el filósofo surcoreano radicado en Alemania, Byung-Chul Han, viene marcando nuevos derroteros para la reflexión filosófica usando el potencial teórico que surge de la comprensión de las nuevas realidades sociales, políticas y económicas, que marcan esta época de evolución neoliberal y de desarrollo tecnológico, en el contexto de la cuarta Revolución Industrial. Así, temas como la transformación de la biopolítica en psicopolítica se convierten en un punto muy relevante para el análisis de las sociedades actuales y sus derivas. Con este trasfondo de pensamiento, el presente artículo tiene por objetivo sumergirse en las argumentaciones de Han, explorando el papel crucial que desempeñan las emociones en las sociedades del rendimiento, del cansancio y de la infocracia, acudiendo a la metáfora de la "rueda del hámster" como imagen evocadora de las dinámicas de las sociedades actuales. De esta forma, se presenta una perspectiva innovadora de la complejidad del siglo XXI, al adentrarnos en determinados matices del pensamiento de Han, en conexión con la realidad palpable de las emociones, que actúan como el combustible que impulsa a cada individuo en su propia "rueda existencial". Esta articulación con las experiencias emocionales contribuye de manera significativa a las discusiones contemporáneas acerca de la naturaleza humana en contextos de innovación tecnológica.

Palabras clave

Sociedad del rendimiento, emociones, cognición, infocracia, psicopolítica, neoliberalismo.

Introduction

Hamsters have an active, restless, genetically inclined nature to move, for this reason humans have designed for these rodents the mechanism of the "hamster wheel", where they can run for several minutes in an exercise that is often curious, strange, entertaining or simply absurd. We ask ourselves, why does the little animal run and run in an impetuous action of movement? Experts in the field say that they do it so to burn the natural energy that the species has and that, being in captivity, it can not do otherwise.

For the purpose of this article, the hamster wheel image is suitable to examine certain philosophical positions that portray current society and the accumulation of emotional experiences aroused by consumer capitalism. The philosopher Byung-Chul Han, in some of his most emblematic works, has raised the discomfort of this era by showing us a world where the slogans "You can", "You are a successful being", "You will achieve it" constitute the common place where thousands of people converge in pursuit of personal optimization and increasing efficiency without limit (Han, 2012). "You can do it at work..." in the gym, in the family, in social relationships, in couple life, in business entrepreneurship, etc. But, in both the hamster and human beings, emotions play a fundamental role as they are constantly motivating actions, attitudes and behaviors. The hamster is moved by basic emotions, typical of the cognitive development of its species, and the human animal is moved by complex emotions in

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which judgments, beliefs, and acts of valuation about the world play a pivotal role (Pinedo and Yañez, 2020).

The impact of emotions on what Han has called the "performance society" has not been sufficiently analyzed. The 21st century introduces a unique emotional configuration, intrinsically intertwined with the neoliberal perspectives that dominate worldwide. The logic of neoliberal economics exercises its dominance over human experience by taking the dynamics of capital to remarkable extremes, powerfully influencing the design of the entrepreneurial subject of itself. Slowly, we are immersed in the illusion that the yearning for a fulfilling life can be quelled by accelerating consumption. Thus, we witness the constant substitution of products, with the mistaken belief that the acquisition of a new commodity can provide a more lasting happiness (Censi, 2022). In reality, however, no commodity has the power to satisfy fully human desires and provide a genuine sense of fulfillment. Capitalism, centered on hyper-consumption, is then driven by a set of emotions and thoughts that lead us to the grueling race that characterizes the hamster wheel. This emotional factor is the one that rightly deserves to be investigated in the current performance society.

Considering Han's diagnosis of the social, political and economic atmosphere of our time, this article approaches certain theoretical assumptions of the South Korean philosopher, but in the light of certain understandings from the philosophy and psychology of emotions, especially, exploring the reflections of an emblematic author of our time: Martha Nussbaum (1997, 2003, 2008), aspect that opens new drifts to continue discussing the human condition and its fate in the midst of the whirlwind of changes that mark this historical epoch of transition.

In this context, a connection can be established between these perspectives when considering how emotions, according to Nussbaum, could be influencing the self-exploiting behavior that Han (2014a) details in his analysis of the performance society. Specifically, anxiety, fear of failure, and constant dissatisfaction could be propelling emotions that drive people to submit to self-imposed *pressure, seeking to perform better and achieve ever-higher standards in terms of productivity, personal success, or social recognition.* At the same time, we could also point out that Han's critique of the performance society highlights the risks of social alienation and disconnection, which can arise from the obsession with constant productivity, and these implications could have links to Nussbaum's ideas about the importance of social relationships and emotional management for a full human life (Silva *et al.*, 2023).

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That being so, although Nussbaum and Han come from different philosophical traditions, it is feasible to explore the convergence of their ideas by asking how emotions influence and are influenced by the performance society, and how do these dynamics of the current world affect the ability of people to lead satisfying lives or with purpose?

To clarify the interrelation between emotion and performance society, the reflection is addressed in two sections. In the first part, some relevant cognitive theories about the origins of emotions are examined. These theories conceptualize emotions as valent reactions to events, agents or objects, highlighting the representations, beliefs and evaluations of the world that underlie emotional states. After outlining the cognitive structure of these human experiences, the article focuses on Byung-Chul Han's thought to analyze the influence of emotions on the 21st century individual, characterized by the omnipresence of technologies, virtual environments of social interaction and consumer culture that significantly influences the configuration of both their individual and collective identity.

The cognitive structure of emotions that drives the hamster

In the ancient world, Stoics stand out among the first thinkers to perform a detailed analysis of passions from a cognitive approach (*πάθος*, a term related in Antiquity with intense affective states that cause a significant change of mood). Stoic treatises about passions prefigure with authenticity various topics that will be taken up by philosophy and contemporary psychology of emotions, hence their value to understand some current proposals that defend a strong link between emotion and cognition, and a close relationship between the emotional dimension of the human being and moral life (Knuuttila, 2004). Authors such as Nussbaum (2003) refers to stoic thinking as a source of what is today called "intelligence of emotions" or also "cognitive structure of emotions", in this regard the author says:

> Stoics thus offer us a precise vision of passions: emotions are not simply blind eruptions of affection, shaking or sensations that are recognized and distinguished from one another by the quality felt in each of them. Unlike appetites such as thirst and hunger have an important cognitive element. Emotions embody ways of interpreting the world, the feelings that accompany them are linked and supported by beliefs or judgments that constitute their basis or foundation, so that emotions as a whole can be appropriately characterized as true or false, as well as rational or irrational, according to our assessment of the beliefs that underpin them (Nussbaum, 2003, pp. 459-460).

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Considering the latter, we can move forwards in the analysis of this "cognitive-evaluative" doctrine about emotions, which will put us in context to understand certain symptoms that arise in the current performance society. An old text *On Passions* is attributed to Crisipus, which contains various Stoic teachings on the subject. This is a document recovered doxographically by Diógenes Laercio and other authors such as Galeno, it tells us about a certain ancient conception of emotions understood as beliefs or value judgments (Long, 1996). According to the Stoic doctrine, emotions are related to the way in which objects and situations are valued with a good or bad valence, and in relation to a present or future time. If it is about an object or event of the present, the judgment will involve emotions of pleasure (*hedoné*) or pain (*lupé*), and if it is about the future it will involve an emotion of appetite (*epithumia*) or fear (phobos) (Knuuttila, 2004).

Crisipo, therefore, introduces the idea of passions (emotions) as a type of belief (*doxa*) or evaluative judgment (*krisis*), which determines a good or bad property in objects: this is X, and X is a great good or a great evil, therefore, it reacts to X in a certain emotional way. Fear, for example, implies the thought that bad and important things may happen in the future that we cannot prevent. Anger is stimulated by the thought that someone else has seriously damaged something to which we attach great worth. Grief implies the thought that we have been deprived of something or someone extremely important (Nussbaum, 1997).

As seen, this reflection highlights the idea of valuation or cognitive evaluation that is necessary for an emotion to arise. We pass through life with diverse opinions and belief systems about the way the world works, about the kind of creatures we are on this earth and also about the goals we aspire to at different times in our lives (Graver, 2007). For Crisipo, ordinary people, motivated by particular beliefs, assign an intrinsic value to countless external goods, for example, to friendship and love, goods that by their nature are unstable and beyond our control. In addition, most people see themselves as social beings who wish to be recognized in a certain way in the political community to which they belong; for this reason, the loss of the good social position or privileges to which they are usually accustomed, causes them to develop within themselves the belief that something intrinsically valuable has been lost in their life or that they have moved away from the happiness that others enjoy (Crisipo de Solos, 2006).

Many individuals also believe that the good life cannot be attained without a certain amount of food, money, housing, body health, beauty, honors for success achieved and the wide enjoyment of sexual pleasure,

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objects they consider necessary for *eudaimonia* or full and accomplished life. By conceiving of emotions as value judgments, Stoics consider that parents, the people who care for us during childhood, pedagogues and the same ideas present in the society to which we belong, can generate false beliefs that influence the appearance of uncontrolled emotional states (Pinedo, 2021). Crisipo tries to attribute a good part of the origin of passions (or emotions) to external elements: the customs that teach us since childhood, the values that society pursues and the ideas present in the environment that persuade us that all pain is an evil, and that, on the contrary, every pleasure, fame and recognition is good, hence these cognitive valuations begin to take root in our soul from very early generating their respective emotional states (Brennan, 2005; Tieleman, 2003).

In this context of Stoic ideas, the thesis stands out that there are false beliefs that disturb our life, but not all are on the surface of the self, many of them penetrate deeply into the soul, often exerting their silent influence below the level of consciousness, and then become visible through the passions that we express daily. These false beliefs become a disease of the soul when they make us dependent on things, people and situations rather than our own judgment, and when they finally hinder human flourishing (Nussbaum, 2003). False beliefs take root in the neighborhood, in school, among friends, in the family, and over time each develops its own cultivation in the mind, no longer remembering where it acquired the seeds of many emotional states that dominate it.

It is surprising how, more than two thousand years away from the current world, the Stoic doctrines already had a prominent critical stance towards the society of their time, based on the analysis of emotions. Crisipo, Seneca, Marco Aurelio and other highly qualified voices of this current already pointed a sensitive topic in human beings: the cognitive structure of emotions and its consequences in the social world. Crisipo's thesis remains one of the most remarkable in the history of philosophy, stating that passions are forms of false judgment or false belief (Bergua, 1936). The ancient thinker also brought forward a solution to the situation: if passions are modifications of rational faculty, then a suitable therapy that modifies sufficiently the judgments, searching for the right ones and placing in place the false ones would be a good alternative to continue in the complex art of living (Crisipo de Solos, 2006).

In more recent decades there has been a renewal of interest in understanding the cognitive dimension of emotions in formulations such as those proposed by Arnold (1960), Lazarus (1991), Frijda (2007), Solomon (2003) and Nussbaum (2008), which affirm how the physical change that

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occurs in some emotional experiences is not enough to explain the diversity and richness of human emotional expression, because deep down what we evidence is that emotions, mainly, are preceded by valuation acts that trigger diverse attitudes and behaviors.

A cognitive theory of emotion, of which there are philosophical and psychological versions, is one that constitutively includes some aspect of thought, usually an evaluation, judgment or belief of a certain type, which is essential to the concept of emotion (Plutchik and Kellerman, 1980). This notion includes the approach according to which emotions have intentionality and therefore have intentional objects. The concept of intentionality, as understood here, is a feature of certain mental states that consist of "being about something" or heading towards something. What an intentional state of mind is or is directed at is recognized as its intentional object. It is a term that refers to the thesis proposed by Brentano in his texts *The Origin of Moral Knowledge* and *Psychology from an empirical point of view*. In this last work, published in 1874, the psychologist raises how consciousness has an intentional structure, i.e., acts of consciousness are intentionally directed at objects, which means that they allude to people, things, or situations: anyone who thinks, thinks about something; and anyone who is afraid, is afraid for something. It is in this context that emotions are claimed to be intentional acts based on intellectual phenomena and directed to values (Brentano, 1935).

Anger, jealousy or guilt is about something, they have an object to which they are directed. If Peter experiences anger because John offended him, that emotion focuses directly on John as an object, because of the perceived insult he believes he has received. In this way, the emotion of the tendency to irrationalism is removed, pointing out its capacity to inform and orient us about a certain part of the world we are related to, while at the same time it is a motivation for our actions (Ortony *et al.*, 1988; Solomon, 2007).

Philosophers and psychologists defending the cognitive-evaluative theory of emotions believe that cognition and emotion are interdependent (there are reciprocal interrelations between emotion and cognition). The background of emotions is basically rational, therefore, it is not possible to establish the traditional border between reason and emotion that is an inheritance of the old philosophical dualism that dominated much of the history of philosophy:

> Emotions are the product of reason because they are derived from the way we value what is happening in our lives. Indeed, how we evaluate an

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> event determines how we react emotionally to it. This is what leads to talk of cognitive emotion (Lazarus, 2000, p. 98).

Emotions are complex responses of an individual to the stimuli of the environment and although they involve physiological reactions, they are characterized primarily by a positive or negative (*appraisal*) of an intentional object (person, thing, event or situation), as well as a tendency to action according to the evaluation carried out: harmful, beneficial or threatening object (Lyons, 1993; Roseman and Smith, 2001).

Cognitive theories thus assume that emotions are based on judgments about situations, people, or states of affairs, and these judgments may be right or wrong, superficial, wrong, or illusory. For most, if not all, people, the emotion that will emerge depends on how they view the object they have seized or believe they have seized (Lyons, 1993; Greenspan, 2004). Likewise, these cognitive theories contemplate illusory objects and a series of beliefs that we would consider irrational. For example, someone may feel appreciation or love for another simply because they discover that they share particular beliefs or tastes. It can also turn their admiration or sympathy into contempt, if the person subject to the emotion assumes a different political orientation that produces in the subject total repulsion.

The cognitive considers both predictable forms under standards of rational adequacy and beliefs, bizarre, incoherent and pathological behaviors. Here the notion of irrational beliefs refers to ideas that are inconsistent with reality, without foundation or illogical, but that individuals consider true in their way of processing the information they receive from the world (Pinedo and Yáñez, 2017).

The human beliefs that provoke emotions are quite complex and constitute a differentiating criterion from the emotions experienced by animals. Human beings have a wide variety of beliefs that interact at different levels with emotional processes, inducing particular forms of behavior or action tendencies: beliefs about the emotions of other people, beliefs about the intentions and motivations of other individuals, beliefs about states of imaginary things and beliefs about future situations, among other thoughts that are part of our cognitive universe (Elster, 2002; Suárez and González, 2021). All these elements configure the causal link that goes from cognition to emotion and emotion to cognition, while making a difference with visceral states such as hunger, thirst and other appetites that indicate bodily needs, but have no cognitive background or intentional objects.

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Performance Society and Emotions

Previous inputs allow us to approach Byung-Chul Han's positions, but now equipped with new theoretical assumptions. The South Korean philosopher, in his most emblematic works such as *Psychopolitics* (2014a), *The society of tiredness* (2012) and more recently in *No-things* (2021) and Infocracy (2022), makes a type of portrait of the current society and also denounces what we are living. Perceived fatigue results from the frantic pursuit of performance. A performance often self-imposed, but emotionally driven by a society that invites you to believe that you can always give more: work 100 %, you set the goal, success waits for you, there are no limits, limits only exist in your mind...

If we observe -following the Stoic doctrine and the cognitive theories of valuation- the background, what circulates is an overstimulation of beliefs based on hyperpositivity, which alter our emotional state. Han (2014a) attributes this new social outlook to the implementation of neoliberal psychopolitics as a new framework of domination: to increase productivity, body resistance is not overcome, but mental and psychic processes are optimized. In these areas, which are very well conceived by consumerism and the proliferation of non-tangible objects such as information and programs, the emotional states that characterize today's men and women will grow.

The affirmative plural *Yes, we can* is the expression of the emotional positivity of late-modern society, contrasting sharply with the disciplinary society described by Foucault (2008), where the principles of "should" and "should not" shaped individual and collective behavior. Thus, the condition that it is possible to do everything and the imperative that every day is an opportunity to develop a new and better version of oneself, become the cognitive sources of beliefs that generate a cluster of emotions that function as a sensitive energy foundation of action in contemporary global society (Malaspina, 2022).

Society makes us believe that success, recognition, or fame is most valued, and that underpins the true meaning of life. We often hear about the "successful man or woman", which usually translates as economic success and social recognition: a more luxurious house, travel, cars, eccentricities, etc. Since we were children, we get on the hamster wheel under the idea that "we are what we have". And in adulthood each new day is a hamster wheel that swirls to get the latest cell phone or technological *gadget*, get the most *likes* on social networks, and be somehow recognized in the new infosphere that governs the fate of our life (Han, 2022).

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If a call were made to participate in a conference entitled "The successful man and woman", surely many would sign up motivated by curiosity and the idea of innovation generated by these typical announcements of *coaching* events. However, if the theme of the meeting was solidarity, compassion, altruism or generosity, the number of people interested decreases drastically and perhaps the event would not be held. Indeed, social media, television, and even the world of series are full of success stories, but success is often understood as reaching the top of the *American way of life*, but these contents do not necessarily represent the lives of those who have globalized solidarity and service to others. The important thing here is to point out the relationship between cognition and emotion, or to be clearer between valuations, beliefs and emotions. Each one takes to the streets in his own hamster wheel driven by the hypercommunication of digital media that exalt success and performance, as portrayed by Han in the *Tiredness Society* (2012).

In neoliberal society, the wheel of every human hamster circulates through information and stimuli that are difficult to structure; in the streets and workplaces, there are loudspeakers who announce: You have to get the right income, you have to concentrate all your energies on personal fulfillment, you have to stay young, you have to appear without being. Even if we are empty inside, we must show ourselves in an interesting way, show the *cool* photo, the super cheerful and even retouched *selfie*, the party with friends, the food in the luxurious restaurant, in the football game, because the important thing is to generate a narrative and a fiction of the successful man and woman that always moves in the atmosphere of well-being:

> The neoliberal regime presupposes emotions as resources to increase productivity and performance [...]. Rationality is perceived as coercion, as an obstacle. Suddenly it has stiff, inflexible effects. Instead, emotionality enters the scene, which runs parallel to the feeling of freedom, to the free display of personality. To be free even means to give way to emotions. The capitalism of emotion uses freedom. Emotion is celebrated as an expression of free subjectivity. The neoliberal power technique exploits this free subjectivity (Han, 2014a, p. 71).

After this exhausting journey in everyday life, for a few months, the hamster wheel addresses the only cause that deserves one to mobilize for it: the holidays, to once again show on social networks the life they believe they deserve. This happens because our interpretation or valuation of the world is already tainted by false beliefs—as the old Stoics would say—or misconceptions about the true meaning of life (Han, 2014a).

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If so, to the extent that people find themselves full of beliefs about money, fame, or the cult of beauty as fundamental goals to achieve, they will soon be gripped by a mass of emotions of sadness, anger, envy, heartache, or shame, seeing that this is not fulfilled in reality. At this point it is crucial to remember, according to Nussbaum's statements, that judgments related to emotions such as sadness are *eudaimonistic*. This implies that they evaluate the external object not from an impartial and impersonal world perspective, but from the point of view of the agent's goals and projects. In that sense, the initial belief that an emotion is based may be unfounded, but this may be intensified as we become unfounded illusions about money or social recognition (Nussbaum, 2008). It is also important to take into account the phenomenon of "emotional contagion", where a person shelters inside and externalizes an emotion towards another person, which is transmitted to a third person through a type of contagion, generating that the behavior of the first person has a disinhibiting effect on the third person by transmitting the signal that it is acceptable to succumb to certain emotions that we would normally keep under control (Elster, 2002).

However, it should be noted that in this continuous exposure to multiple erroneous beliefs the mass media, *influencers*, entrepreneurship gurus, "celebrities" and show business, which have a powerful presence on the Internet play a prominent role. These characters contribute significantly to the formation of culture, both locally and globally, assuming here by "culture" a way of understanding the shared beliefs and values shown by individual members of a society. Thus, so-called "influencers" actually affect the assessments and judgments underlying emotions, and the specific behaviors that result from certain interpretations of reality (Silva *et al*., 2023). Likewise, these individuals contribute emotionally to define behaviors that can be seen as appropriate objects of scorn, shame, praise or admiration.

It is very revealing that for many people the words and way of life of a recognized athlete, a fashion singer or an influencer (often without education, without judgment or who spreads disinformation) have more impact on their affections than the content of a good book, the statements of a noted intellectual or the ideas contained in a scientific theory (Lazzarato, 2015; Saidel, 2016). It is true that the world of entertainment and the intellectual world are two distinct areas, but the weight given to each in everyday life accounts for the real values and beliefs that motivate our actions:

> We let ourselves be overly affected by information that happens quickly. Affections are faster than rationality. In affective communication, it is

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> not the best arguments that prevail, but the information with the greatest potential for excitement. So *fake news* attracts more attention than the facts. A single *tweet* with a fake news story or a decontextualized piece of information can be more effective than a well-founded argument (Han, 2022, p. 35).

At this point, it is important to say that these reflections are not aimed at abandoning genuine efforts to achieve a better quality of personal or family life, which can be a noble ideal. Nor is it a message against the desire for improvement that many of us harbor within us, the underlying issue is to realize the false beliefs that may be dominating our reason for being in this world or the path we are taking every day to end up in the opaque society of tiredness described by Byung-Chul Han. In the background, the thesis prevails according to which the assessment that a person makes of a situation that induces an emotion is intimately connected with what one thinks it should be and with the goals we pursue, also with the "ideal self" we seek. The point is that in consumer capitalism this ideal self is under question for its burden of fatigue.

For Han, the sovereignty of technology, in conjunction with the "imperative of happiness" of the neoliberal regime, leads life as an existence that takes place in a sum of moments to lose its way, to be immersed in the confusion of the mass and the passing of the superfluous situations in which the individual cannot be authentically himself. Laurent Berlant (2020) had already announced certain ideas along the same lines as Han: this neoliberal society and culture brings a poison within it, aspirations to a good life, social ascent, "success" and comfort become, paradoxically, an obstacle to human development (Berlant, 2020). The race to happiness ends, for many, in the goal of disenchantment with the world and a feeling of rupture with the other, even with their closest relatives: there is no time to listen, people no longer live life as a whole, people no longer want to wait and let it mature, everything must be satisfaction in the act; friendship and love become conceived as occasional fun of the moment. It is not surprising, then, that the technological allies of these experiences are video and chat, because they are the appropriate communication form for the mass, they are the means that quickly transmit what wants to be known and can be forgotten immediately.

For those who live in jail on social media, the issue is even more pressing. Since face-to-face presence is not possible on an ongoing basis, networks are an instrument to call for attention, friendship, affection, and a certain sense of community. However, what we see growing is that in the society of "non-things" (Han, 2021) we are moving from being subjects to

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becoming data packages, mere information that is consumed quickly and left aside when the time for novelty or shocking passes. Thus, with the accumulation of information we receive and send (publications, *selfies,* memes, etc.), finally, we do not focus on anything or anyone.

Paradoxically, we demand attention and affection in the digital community, but few really provide that, because, just as we superficially dispatch the information of others, other people quickly consume our information and then follow in their own hamster wheel (Garavito and Bula, 2020). The result is an emotional restlessness or a tiredness, because the belief that I will be valued or recognized as I really want does not occur or occurs incompletely and unsatisfactorily in this swarm of indifference and superficiality (Han, 2014b).

There are contradictions in the acceleration inherent in these experiences: social networks are making the other one in a vanishing trance. They are technologies of expulsion of the other, make us deaf to the voice of the other, stimulate an exacerbated narcissism that does not know the other, although we long to be seen by others (Han, 2022). This contradiction occurs in two ways: because it is impossible to recognize oneself without the gaze of the other and because Internet algorithms -as they detect our tastes- present us with information that is increasingly reduced to our personal worldview, away from opposing ideas or positions, i.e., from the other.

At times, the emotional *burnout* syndrome is the fate that many feel after resting for the fatigue that implies being in the hamster wheel or what is the same: being in this wheel of existence created by *Homo economicus* and *Homo digitalis* according to neoliberal principles. This wheel has a stifling centripetal force, and it is difficult for an individual to escape from its dizzying interior, because the belief that success is around the corner, along with the obligation to be happy, leaves no room for other existential considerations.

In *No-things* (Han, 2021) regarding the emotional world becomes finer and sharper:

> The *selfie* announces the disappearance of the person charged with destiny and history. It expresses the way of life that is playfully given to the moment. The *selfies* do not know grieving. Death and fleetingness are completely alien to them (p. 52).

Selfies *as* mere digital information make the memory, destiny and history disappear, they are linked to today and are not a means for memory; their condition resembles that of a message heard on an answering

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machine that is then deleted, that is why they are not instant things that dilute the true links with others. People are struggling to take as many *selfies* as they can, to immediately post them on WhatsApp's "statuses," and then discard them as quickly as they were taken. The *selfie* is not-a-thing, it is a soulless photo, so many are seen on social networks that do not generate a real affection for someone.

Finally, in the informatics society it can be said that the *smartphone* is the privileged instrument to structure our beliefs and, therefore, our emotions. The hamster wheel now comes with an integrated *smartphone* display on which we delegate our perceptions of the world and our cognitions in some form:

> We perceive reality through the screen. The digital window dilutes reality into information, which we then record. There is no contact with things. We no longer perceive the material beats of reality. Perception becomes disembodied light. The *smartphone* goes around the world (Han, 2021).

The *smartphone* is the instrument that dominates our emotional repertoire in many areas, but not always to build the human community or to consolidate affective links with the real other that I have in front of me. It would seem that we do not realize that we are not the ones who use the *smartphone*, but the *smartphone* uses us.

The *smartphone* is one of the engines of the hamster wheel, we are subject to the authority of that small digital informomata that dominates us without commandments or prohibitions. Its *smart* function is not to make us docile, but to make us dependent and addicted by breaking our will and emotions (Han, 2013, 2021). The emotional world of the 21st century is shaped in various ways by the "dataism" of the *smartphone* and its package of false beliefs. We have gradually slipped into digital totalitarianism. Now a new ally of the *smartphone* seems to also take the reins of human life, artificial intelligence, with its concrete expressions like the Chat GPT, which has made a successful appearance in the scene of current dataism to reaffirm that subjugation is inexorable. Belief in the measurability and quantifiability of life dominates the entire digital age and in the new temples of information that is the preaching given in the new cult of non-things.

Conclusions

The hamster wheel is a symbol of one of the most vivid problems of the present: the work on the psyche in the neoliberal society of performan-

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ce. Human reality, taken both individually and collectively, seems to be driven to run on the hamster wheel. Nevertheless, Han's work allows us to approach the philosophical reflection from a new perspective to face these challenges of the current society of fatigue.

They have opted for a recovery of "nostrity" in the midst of digital dataism, a term that refers to the metaphysical tendency of the human being to the constitution of a "we" and to the authentic attitude of openness to the other. Each person "understands" other human beings and gets to them to form a diverse us. But this nostrity cannot be formed in the "swarm" that has produced the neoliberal society of *Homo digitalis* (Han, 2014b). There is no real otherness in the swarm of digital communication technologies because the personal realization that is emphasized is more focused on selfishness and individuality, rather than on a sense of community, so what prevails is a cult of a dominant self of the other. On the other hand, we emphasize otherness, the tendency to the "other self" under a sense of "comuniversality", a neologism with which we designate the tendency of humanity to form the universal community. A community where the other does, because he is a person, with a face, a soul, a story, with a life full of intensities and sometimes of pain.

Even in the "transparency" that characterizes *Homo digitalis,* there is no real nostrity. People allow others to enter their lives through social networks, images and cameras, erasing the boundaries between the public and the private, but in that intrusion that observes the tastes, desires and projects of the other there is no genuine communion, only curiosity, consumption of rapid information and fleeting attention that is then forgotten in the flow of data offered by the mass (Mallamaci, 2017). In the swarm no one forces others to have a panoptic visibility, each one, without coercion, wants to let himself be seen, wants to be focused to become information of the other. The swarm is not a reciprocal "you" who is spoken to by his own name, nor in the face-to-face of personal affection, where the you appears as a complementary and necessary reflection of the self. In contrast, there is a *like* that is given to many and an emotion that is shared with automatism, just to indicate that I was on the internet and that I effectively consumed the information I found. In the swarm the other is in a vanishing trance, his being is in crisis because we no longer hear or recognize his speech, there is only an effective exchange of information between functional units of the dataist universe. In the digital world, the other is hastily dismissed with a simple "like," an addition to the calculable and optimized life that will again be said in the form of an algorithm when I meet again on the net with your data package.

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In this context, the important thing is to recognize how that individual who runs frantically on the hamster wheel is driven by an engine of emotions that are based on a cluster of beliefs about the meaning of life and the value we give to other people. When beliefs are centered on performance, personal success, and hyper-productivity, the result is a series of emotional behaviors that undermine ostracity or attachment to others. Digitization produces beliefs that destroy each other's faces, memories, and contacts.

Following Han's ideas, in this world of non-things, the task of philosophy is to create a space for argumentation and self-examination, so that recognizing the *telos* of the digital order that seems to prevail, we have to be vigilant against this avalanche of desires, beliefs, habits and information that condition our emotions and perceptions. Philosophy reemerges as a medicine of the soul that leads the patient to an exhaustive exploration of his own interiority, to reach what the ancient Stoics already intuited: "You must make yourself better every day". Philosophy shapes the spirit, orders life, shows what should be done and what should be omitted, sits at the helm and through the dangers steers the course.

In this journey through the emotions and their influence on the society of performance, the ideas of Nussbaum and Han open ways to think differently and critically about the human condition of the 21st century. Today's societies face significant challenges, as they must unravel the complex power dynamics that are increasingly being perfected in new ways to subjugate the psyche, beliefs, and their drifts into emotions. Nowadays, human beings are exposed to the possibility of being deceived by their own mind, by their valuations and interpretations of the world, aspects that have become very valuable assets for contemporary capitalism, which invites self-exploitation. So moving away from a logic centered on performance, success, and the narcissistic mindset seems to be a task for every individual, for the philosophy to come, and for education.

In a society obsessed with productivity, information, and consumption, the therapy of emotions is once again a topic of remarkable philosophical relevance. Surely many who are running on the hamster wheel refuse to admit that their desires and beliefs are indeed negative for a flourishing life, therefore they may not be willing to accept the result of therapeutic arguments to improve their condition of submission to neoliberal psychoplitics. But the philosophy of the present and the future will continue to insist on bringing the health of the soul to all those who want to internalize these reflections. The thinking of Han and the old Stoics state that a there can be a good and happy life even in the noise of the infosphere.

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The value of applied ethics in engineering studies in a horizon of reliable artificial intelligence

El valor de la ética aplicada en los estudios de ingeniería en un horizonte de inteligencia artificial confiable

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Abstract

Political institutions such as the European Commission and the Government of Spain have expressed their interest and willingness to lay the foundations for ethical governance of Artificial Intelligence (AI). In particular, they have proposed the promotion of reliable Artificial Intelligence through a set of guidelines and strategies. Despite the benefit provided by these political initiatives, it is not possible to fully appreciate a specific educational strategy that contributes to the generation of an ethical AI ecosystem based on trust. In this sense, the main objective of this work is to demonstrate that the teaching of applied ethics in engineering studies constitutes a commitment to professional strengthening, ethical governance and responsible research and innovation. To achieve this objective, some of the essential aspects that give significant value to the teaching of applied ethics will be detailed, highlighting the social responsibility that universities present in this field. Secondly, a classification of ethics subjects related to engineering in the environment of Spanish public universities will be shown. And, thirdly, a theoretical framework rooted in discursive ethics will be offered, promoting a civic perspective in the educational context of the professions.

Keywords

Ethics, engineering, artificial intelligence, education, civic responsibility, university.

Resumen

Instituciones políticas como la Comisión Europea y el Gobierno de España han manifestado su interés y predisposición para sentar las bases de una gobernanza ética de la Inteligencia Artificial (IA). En particular, han planteado el impulso de una Inteligencia Artificial confiable a través de un conjunto de directrices y estrategias. A pesar del beneficio que reportan estas iniciativas políticas, no es posible apreciar en su conjunto una estrategia educativa específica que contribuya a la generación de un ecosistema ético de IA fundamentado en la confianza. En ese sentido, el objetivo principal de este trabajo consiste en explicar que la enseñanza de la ética aplicada en los estudios de ingeniería constituye una apuesta para el fortalecimiento profesional, la gobernanza ética y una investigación e innovación responsables. Para alcanzar este objetivo, en primer lugar, serán detallados algunos de los aspectos esenciales que dotan de un valor significativo a la enseñanza de la ética aplicada, subrayando la responsabilidad social que presentan las universidades en este terreno. En segundo lugar, se mostrará una clasificación de las asignaturas de ética relacionadas con la ingeniería en el entorno de las universidades públicas españolas. Y, en tercer lugar, se ofrecerá un marco teórico enraizado en la ética discursiva, promoviendo una mirada cívica en el contexto educativo de las profesiones.

Palabras clave

Ética, ingeniería, inteligencia artificial, educación, civismo, universidad.

Introduction

Artificial intelligence (AI) is a technology that brings important benefits, although it triggers numerous problems and controversies, for example, in terms of algorithmic biases (Angwin *et al.*, 2016; Eubanks, 2018), opacity of systems (Larsson and Heintz, 2020), sustainability (Crawford, 2023), etc. This ambivalence has motivated the European Commission and the Spanish Government to promote reliable AI, based on a *humanocentric perspective*, through a series of initiatives. While these proposals

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are a worthy response, they lack a specific educational strategy that can contribute to the development of AI aligned with the wishes and needs of citizens. Therefore, the main objective of this paper is to explain the value that applied ethics can transmit to technical studies, especially to engineering, in terms of professional strengthening, ethical governance and responsible research and innovation.

The methodology used to achieve this objective consists mainly in the bibliographic analysis of European and Spanish initiatives focused on a reliable AI ecosystem, various experiences that have favored the moral development of students and the cultivation of professional responsibility, as well as a set of essential references of civic ethics. In addition, a quantitative exploration of academic engineering curricula related to AI has been carried out in the context of Spanish public universities.

As for the structure, this paper is divided into four parts. Firstly, some elements that contribute to the European vision for reliable AI are detailed; secondly, a series of activities that emphasize the importance of teaching ethics are presented; in the third part it is possible to see a relationship of subjects linked to ethics and engineering; finally, a framework based on civic ethics is proposed to project a procedural, hermeneutic, dialogic and critical perspective in the engineering profession, through education, underlining the social character of professions in plural societies (Conill and Arenas Dolz, 2010).

Institutional Interest in Reliable AI

During the last decade, the European Commission and the Spanish Government have presented several initiatives that express their interest and will to pursue an ethical development of AI, especially through the conceptualization of a reliable AI. In the former case, this inclination has been expressed more prominently, as attested by the *Ethics Guidelines for Trustworthy AI* and *White Paper On Artificial Intelligence: a European approach to excellence and trust*. Regarding Spain, the various resolutions on AI point to the need to ensure an ethical future for this technology. However, the set of proposed guidelines to promote ethics do not detail specific educational mechanisms, as will be argued below.

Before analyzing some elements of the initiatives of the European Commission and the Spanish Government, a reliable approach to AI is necessary. Almost seven decades have passed since the Dartmouth Summer Research Project on Artificial Intelligence, an event symbolizing the

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genesis of synthetic intellects (McCorduck, 1991, pp. 95-96). Over the years, it has become increasingly clear that artificial systems not only provide important benefits, but also carry worrying ethical, legal, social, environmental challenges, etc. (Floridi, 2021). As a response to these challenges, a large number of calls have been formulated for a beneficial AI (Future of Life Institute, 2017), a responsible AI (Dignum, 2019; Université de Montréal, 2017), an AI for the common good (AI4SG) (Monasterio Astobiza, 2021), an ethical AI (Floridi *et al*., 2018), among others.

Beyond the complement used for AI, all of these manifestations emphasize essentially the same objectives – i.e., the need to maximize benefits and reduce or prevent risks and hazards. Within the European Commission, the Independent High Level Expert Group on Artificial Intelligence developed the *Ethics Guidelines for Trustworthy AI* (Comisión Europea, 2018) to provide a basis for reliable AI through the proposal of a set of principled ethical guidelines. The concept of reliable AI initially presented assumes that trust is an essential element for the constitution and strengthening of European society. However, the conceptualization of trust and the strategies that should be considered to promote it represent very complex tasks that are currently being discussed.

Later, in 2020, the European Commission launched *White Paper On Artificial Intelligence: a European approach to excellence*, another initiative that expresses the intention to make the European political community a global leader in AI innovation. The basic pillars of the *White Paper* are, on the one hand, a policy framework for establishing an environment of excellence through research and innovation driven by public-private partnerships; on the other hand, an environment of trust as an essential element for a future normative and respectful of the EU political project and a humanocentric development of AI.

Regarding the Spanish context, there are fundamental resolutions. Firstly, the National Strategy of Artificial Intelligence (Gobierno de España, 2020a), the most important bet to promote the development of AI as an engine of change and strengthening of institutions. The Government of Spain has expressed the desire to integrate ethics into AI research and innovation, with the aim of striking a balance between technical opportunities and social welfare through a set of actions, such as the design of GobTechLab, the ethical and legal evaluation of automated systems, the creation of citizen forums such as Digital Future Society, the elaboration of a "Digital Bill of Rights", among other activities.

Secondly, the Digital 2025 Spain Plan (Gobierno de España, 2020b) projects the digital transformation scheduled in the coming years.

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Its main objectives are to promote economic growth, reduce inequalities, improve and increase productivity and exploit the potential of new technologies. This plan consists of a set of ten strategic axes, among which is "Data Economics and Artificial Intelligence". Finally, in the Recovery, Transformation and Resilience Plan (Gobierno de España, 2021) it is also possible to appreciate a reference to AI in component no.16 of the 6th lever, entitled "Pact for science and innovation: strengthening the capacities of the National Health System". This component is articulated through the National Strategy for Artificial Intelligence, mentioned above.

The above initiatives are a worthwhile way to promote trust, however, they are limited by the rapid advance of technology and the risk of obsolescence of regulatory and self-regulatory frameworks. It is essential to emphasize the value of teaching applied ethics as a response to the challenges of AI. The challenges of this technology constitute a call to address central questions about the role of those affected by synthetic intellects, the principles that guide their development, the mechanisms that facilitate the generation of trust, the criteria that should be considered for evaluating the impacts, how to involve society in the changes, etc. (González Esteban and Calvo, 2022, p. 4). For these purposes, it is essential to encourage the adaptation of research and innovation to the needs of citizens. Therefore, it is desirable to base the education of the professional in a procedural, hermeneutic, dialogic and critical framework such as that offered by the civic ethical tradition. The lack of a specific educational strategy on applied ethics makes it difficult to cultivate moral reflexivity for fair and responsible management within pluralistic societies. Therefore, it is necessary to demand a greater role of applied ethics, particularly in the Spanish context, in order to pave the way to the generation of a reliable environment and cultivate a cordial, dialogic, inclusive and critical *ethos* in engineering professionals who are immersed in the universe of synthetic intellects.

The Educational Value of Ethics for Engineering

As technological innovation evolves at an increasingly accelerated pace, the ability and opportunity to reflect on the ethical aspects involved in engineering has become a reasonable demand (Bengoetxea and Mitcham, 2010). It is essential that professionals can identify ethical issues in their workplace, since AI represents a conglomerate of ideologies, practices, materials, energy flows, institutions, etc., that make up a complex sociote-

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chnical unit. Economic *accelerationism* has imposed a work rhythm that demands the availability of results in a short period of time, hindering ethical reflexivity. Additionally, the ideology of *technological solutionism* has permeated the engine of research and innovation, weakening critical judgment (Morozov, 2015). Consequently, this situation requires the promotion of the teaching of ethics as a vital activity that impacts on sensitivity and stimulates a significant improvement in moral reasoning skills (Clarkeburn *et al.*, 2002). The need to carry out ethical decisions has increased its importance in the environment of all professions, especially in engineering, in view of its social impact.

In response to this need, there are some proposals aimed at estimating the teaching of ethics. The Accreditation Board for Engineering and Technology (ABET) promoted, in 1998, a set of criteria contained in the *Engineering Criteria 2000* (EC2000), to encourage ethical commitment in American engineering education programs (Volkwein *et al.*, 2004). A few years later, in 2004, UNESCO launched the Ethics Education Program, which focused on providing information to policymakers, teachers and researchers through the exchange of experiences, training in teaching skills to promote the teaching of ethics and the development of a proposal for a basic curriculum for the area of bioethics, in line with the *Universal Declaration on Bioethics and Human Rights* (UNESCO, 2006). The success of this program in the area of bioethics invites a similar effort in other areas, especially in ethics applied to AI. Finally, another experience that illustrates the importance of the estimation of ethics in the professional environment and that deserves special attention is Ethos Living Lab (ELL), a project conducted at the end of 2018 by teachers and researchers in the area of moral, political and social philosophy of the Faculty of Philosophy and Education Sciences of the University of Valencia. The ELL links the university community with the Valencian professional colleges, with the aim of promoting and strengthening ethical skills, encouraging commitment and increasing moral sensitivity, both of the professionals and the academic collective (Terrones Rodríguez, 2023). In short, these initiatives point to the relevance of the estimation of ethics and an opportunity to identify the moral relevance of the most outstanding issues, which undoubtedly includes AI.

The experiences mentioned above suggest that the search for a place for ethics in the educational context stands out for its difficulty. In any case, it is important to emphasize the substance of education, in moral terms, with respect to instruction. While the former introduces ethical factors that shape *ethos* and personality, the latter deals with the transfer

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of technical knowledge and aspires to different epistemological interests (Gracia Calandín, 2018, p. 76). This consideration entails the recognition of the peculiarity of the teaching of ethics (Ortiz, 2008), since it is not a philosophical branch especially linked to knowledge and technical skills, but to attitude and character, as Diego Gracia points out (2016, p. 7). After this clarification, it is necessary to underline that the main purpose of ethics in educational action responds to moral development through intellectual instruments, such as reflection, and interaction skills, such as dialogue or deliberation (Terrones Rodríguez, 2017). In this way, an education that values ethics sufficiently recognizes the role of critical judgment, the influence of moral sensitivity and social commitment (Lönngren, 2020). However, it is appropriate to point out the lack of consensus regarding the definition of ethics and its teaching in the context of engineering (Hess and Fore, 2018). However, Joseph R. Herkert (2001, 2005) establishes a distinction between microethics and macroethics that constitutes an essential reference for this work. The North American ethicist states that microethics deals with ethical issues that engineers face from an individual level; while macroethics is oriented to the reflection of the social impacts of technological development and the responsibility of professionals. Although the microethical perspective is fundamental for professional performance, given the socio-technical complexity of AI, it is understood that it is necessary to invest more educational efforts in the macroethical field.

AI professionals are continually faced with the difficulty of making decisions that require ethical competence that involves much more than simply understanding theories. Ann Gallagher (2006) defines this competence as the possession of ethical knowledge along with the ability to appreciate the moral relevance of a situation (ethical perception); to reflect critically on what professionals know, are and do (ethical reflection); to highlight the importance of ethical practice (ethical behavior); and to be ethical. Although Gallagher brings together these five ethical skills with the intention of improving nursing education, it is possible to move his proposal to the field of engineering (Barry and Ohland, 2013). The area of care provides numerous *examples to highlight the substantial implications of integrating ethics into training plans (Byrne et al.*, 2015).

Likewise, understanding the significance of responsibility stands as a fundamental element. Its importance originates in globalization as a stimulant for generating questions about existing standards of excellence and current conceptions of internal engineering goods. The work conducted by Alejandra Boni and her colleagues (2019) at the Universitat Politèc-

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nica de València highlights the scope of establishing practical links with real contexts to stimulate the flourishing of professional responsibility.

The significance of professional responsibility and the deterioration of character caused by the capitalist machinery (Sennet, 2000), require a greater involvement of universities in ethical education. Agustín Domingo Moratalla (2010, pp. 104-106) argues that universities concerned with professional ethics must offer three models of responsibility: first, a responsibility aimed at mechanistic professionalization through a pragmatic economic commitment; second, the university has to be involved in civic modernization through civilizing professionalism, since it is convenient to understand professional responsibility as public co-responsibility; finally, the cultivation of responsibility can also be expressed in identifying professionalization, i.e., that involved in personal religion, complication and commitment.

Engineering is closely linked to AI, which gained its notoriety in the Fourth Industrial Revolution (Chen and Shen, 2019). As substantial changes are emerging in the political, economic and cultural spheres, as subsystems that integrate social reality, as a result of the evolution of artificial systems, the responsibility of engineering needs to be emphasized. In any case, with the interest of clarifying the reflexive task of this work, it is appropriate to direct attention to those engineering areas related to AI research and innovation, among which can be found specialties such as computer science, computing, *software*, robotics, data science, among others. These engineering projects offer an indispensable service to society and contribute to the strengthening of economic and social systems.

The peculiarity of engineering and the social commitment expected from it, are two fundamental elements that motivate the recognition of the substantial value of ethics and its teaching. Highlighting this value means betting on the social responsibility of universities, emphasizing their mediating vocation in promoting such important values as justice or solidarity (Domingo Moratalla 2005). In this framework, the integration of applied ethics in engineering university studies related to AI can contribute: first, to link strategic rationality with discursive rationality, considering not only subject-object rationality, but subject-subject rationality, where there is an important axiological contribution; second, to promote symmetry between interest groups affected by collective decisions, in order to legitimize decision-making processes; finally, to insist on a critical understanding of the ends (Lozano Aguilar, 2010, pp. 271-272).

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Ethics and its teaching in Spanish higher education

The most widespread strategy in Spanish public universities that offer undergraduate and master's degrees in engineering committed to AI knowledge and try to integrate an ethical perspective, consists in the use of an ethical approach. This approach has permeated some institutions and organizations, encouraging self-regulation and compliance with regulatory codes. Although ethics improves professional development, it is appropriate to stimulate moral reflexivity, in macroethical terms, especially on issues related to equal opportunities, transparency, explanability, the digital divide, sustainability, etc. Therefore, it is essential to call for an increase in the teaching of ethics, in order that it is not reduced to an optional and decorative element of training (Gracia, 2016, p. 170).

The review of the academic engineering programs linked to the study of AI shows a rough knowledge of the trends that arouse more interest. In the context of public Spanish universities, a general inclination towards the technical-professional perspective predominates. Out of a total of fifty universities, 19 offer subjects in undergraduate and master's studies that suggest an ethical reflection in their degree. However, after analyzing the programs, the majority, i.e., 30 out of 44, address ethics from a deontological point of view; followed by seven subjects in which the term "ethics" is used to refer to their denomination, although in their development issues specific to moral philosophy; are not addressed, ultimately, there are seven subjects that deepen the problems and social challenges of AI, and that could be located in the wake of applied ethics.

Table 1
List of subjects suggesting an ethical reflection in their degree

Degree	Subject
1. Applied ethics	
Autonomous University of Barcelona	
Degree in Computer Engineering	Ethics for Engineering
Degree in Artificial Intelligence	Ethics for Engineering
Carlos III University of Madrid	
Degree in Robotic Engineering	Ethics and social involvement of robotics
University of Barcelona	
Master of Fundamentals of Data Science	Ethics for Data Science

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University of Girona	
Master in Intelligent Field Robotic Systems	Ethics and technology
University of Granada	
Degree in Computer Engineering	Computer ethics and the information society
Universitat Jaume I	
Master in Marine and Maritime Intelligent Robotics	Fairness, Accountability and Transparency in AI
2. Ethics	
Carlos III University of Madrid	
Double Degree in Data Science and Engineering, and Engineering in Telecommunications Technologies	Legal and Ethical Aspects in Data Engineering
Bachelor in Data Engineering	Legal and Ethical Aspects of Data Engineering
Master in Computer Engineering	Legal and ethical aspects of engineering
Master in Applied Artificial Intelligence	Ethical and Legal Implications of AI
Double Master in Computer Engineering	Legal and Ethical Aspects in Data Engineering
Complutense University of Madrid	
Bachelor's Degree in Computer Engineering	Ethics, legislation and profession
Bachelor in Software Engineering	Ethics, legislation and profession
Degree in Computer Engineering	Ethics, legislation and profession
University of Barcelona	
Master of Biomedical Data Science	Ethics, legislation and privacy
University of Cantabria	
Degree in Computer Engineering	Values, ethics and the computer profession
University of Girona	
Bachelor's Degree in Video Game Design and Development	Legislation and professional ethics
Degree in Computer Engineering	Legislation and professional ethics
University of Granada	
Master in Software Development	Usability Engineering and Computer Ethics
University of La Laguna	
Degree in Computer Engineering	Code of ethics and legal aspects

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University of Oviedo	
Bachelor in Software Engineering	Social, legal, ethical and professional aspects
University of Valencia	
Degree in Computer Engineering	Ethics, legislation and IT
University of Barcelona	
Degree in Computer Engineering Services and Applications and Degree in Mathematics	Legal, ethical and professional aspects
Polytechnic University of Barcelona	
Degree in Artificial Intelligence: Ethical and Social Aspects of Artificial Intelligence	Ethical and Social Aspects of Artificial Intelligence
Polytechnic University of Madrid	
Double Degree in Computer Engineering and Technologies for the Information Society	Ethical and social aspects
Degree in Data Science and Artificial Intelligence	Ethical and social aspects
Bachelor's Degree in Computer Engineering	Ethical and social aspects
Bachelor of Engineering and Data Systems	Ethical and legal framework
Bachelor in Software Engineering	Ethical and social aspects
Degree in Technologies for the Information Society	Ethical and social aspects
Master in Data Science	Ethic/legal/social aspects in Data Science
Master in Artificial Intelligence	Ethical and legal aspects of Artificial Intelligence
University of Valencia	
Double Degree in Business Administration and Management + Computer Engineering	Ethics and professionalism
Universitat Pompeu Fabra	
Degree in Computer Engineering	Fairness, accountability, transparency and ethics in IT
Rey Juan Carlos University	
Degree Artificial Intelligence	Ethics and legislation in artificial intelligence
Universitat Rovira and Virgili	
Interuniversity Master in Biomedical Data Science	Ethics, regulation and privacy

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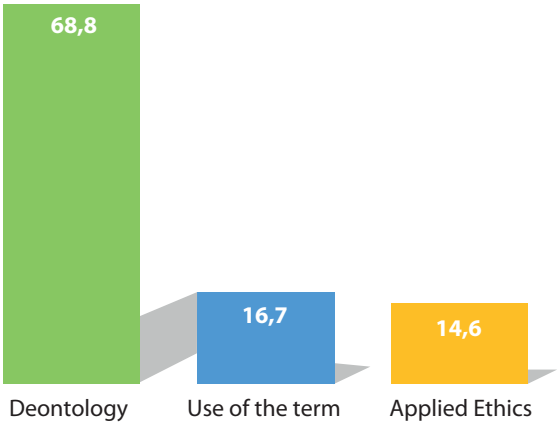
3. Use of the term	
University of Jaén	
Double Master in Computer Science and Computer Security	Ethical Hacking
University of La Laguna	
Master's Degree in Cybersecurity and Data Intelligence	Ethical Hacking and Forensic Analysis
National University of Distance Education	
Degree in Computer Engineering	Ethics and legislation
Master in Cybersecurity	Ethical Hacking Ethics and legislation
Master in Computer Engineering	Ethics and legislation
University of Valencia	
Degree in Computer Engineering	Ethics and professionalism Ethical Hacking
Master's Degree in Cybersecurity and Cyberintelligence	Pentesting and Ethical Hacking

Source: Curricula and syllabuses of the subjects of Spanish public universities.

The following figure shows the percentage values of the distribution of these subjects:

Figure 1
Percentage distribution of subjects



Source: Curricula and syllabuses for the subjects indicated in the table above.

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As seen in the graph, there is more inclination towards the integration of deontological elements to respond to the challenges of AI. Joakim Sandberg (2013) defines ethics as an ethical approach responsible for judging the morality of actions based on their adherence to a series of principles or rules, which usually divide moral actions according to three categories: mandatory, prohibited and permissible. The main value of ethics lies in its application to the environment of the professions, designating the particular ethics of a given profession (Ten Have and Patrão Neves, 2021).

In the path of ethics, it is appropriate to emphasize the presence of instruments and procedures for self-regulation of professional practice called "codes of ethics" (CE), formed by a set of guidelines expressed in documents of a regulatory nature (Bilbao *et al*., 2006). These codes are intended to provide guidance to professionals who, in the performance of their work, encounter moral problems and to provide a description of those values and principles that are desirable. In the field of engineering, Michael Davis (1998, p. 43) states that the main objectives of these codes are to guide the professional and help prevent bad behavior; to serve as a reference for other agents to judge his behavior, favoring the reputation of the profession as a whole; and to contribute to the definition of the image that a professional has of himself. In conclusion, it is possible to affirm that the deontological approach is mainly located in a technical-professional perspective.

Due to the complexity of the current challenges of AI and the exacerbation of certain problems, although they are necessary and are a useful element to satisfy the operability of responsibility, deontological self-regulation initiatives are insufficient to configure development alternatives that are based on dynamics of moral reflexivity and ethical inculturation sensitized with civic values (Davis, 2020).

First, as Adela Cortina points out (1996), applied ethics, by virtue of its critical hermeneutic nature, points out as an essential objective the discovery of those moral aspects committed in human activities. It also reflects on the adequacy of the means for the approach to the internal good, in harmony with the civic morality shared within a pluralist society. And it emphasizes the collaboration between the various parties affected by the implementation of the activities.

Secondly, the lack of interest in the deepening of moral reflexivity is another reason to point out the limits of deontology. The mere mechanical compliance with the codes does not imply normative questioning or motivate a critical hermeneutic perspective of human activities

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(Domingo Moratalla, 2018, p. 77). Moreover, strict compliance with the rules induced by ethics is insufficient, first and foremost, because the regulations indicate the legality or illegality of actions, but do not motivate the questioning of the good and the best actions, i.e., on what foundations are those that make it possible for a society to be better. Consequently, the strategy adopted by Spanish public universities to promote ethics in the AI environment is insufficient due to the limitations of the deontological procedure and the complexity of this sociotechnical system and the ambivalence of its results. Therefore, it is necessary to promote mechanisms of educational innovation to promote a sustained ethical inculturation in a procedural, hermeneutic, dialogic and critical framework such as that offered by the discursive tradition.

Despite the characteristics of his research, which has not had as its object the Spanish case, the work carried out by Byron Newberry (2004) contributes to identifying the possible causes that motivate the lack of recognition of the value of ethics in the engineering academic space. The apparent superficiality characteristic of the subjects hinders emotional commitment to ethics. The essentially technical environment does not favor the dialogic encounter with other knowledge, diminishing moral reflection. Likewise, the rigidity of the study plans to integrate ethics induces in the students a dogmatic vision about the technique and the underestimation of other knowledge, mostly humanistic.

To offer solutions to the many challenges of AI and its multiple natures, central problems that condition its development should be addressed by asking questions about the role of those affected by this technology, what mechanisms to undertake to promote transparency and explanability, what principles should guide its design and implementation, what criteria should be incorporated for the assessment of impacts, how to facilitate the generation of trust, how to include society to make it participate in these changes, etc. These types of questions stimulate civic awareness that can enrich the study of engineering and, therefore, professional practice through a strengthening of moral reflexivity, by integrating alternative sapiential elements to the technical dogma. The drift that research has adopted in the field of AI, reducing the understanding of systems to strictly technical aspects, causes an epistemological gap that hinders analyzes of the moral and political implications of artificial systems (Dahlin, 2021). Therefore, it is essential to conduct an encounter with the ethical-civic tradition, with the purpose of strengthening and complementing self-regulation and, at the same time, develop educational dynamics that lay the foundations of an ethical governance of AI, based

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on more participatory and deliberative processes, in order to achieve fair and responsible management that recognizes those affected in the context of technological societies.

Civic ethics as a normative framework for education

The discursive tradition initiated by Karl Otto Apel (1985a, 1985b) and Jürgen Habermas (1989, 2000) in the 1980s, and later extended by Adela Cortina (1986, 1990, 2007, 2010), Jesús Conill (2006) and Domingo García Marzá (1992, 1997, 2004), establishes that the process of the moral action of norms must result from the participatory discourse of all those affected by these norms. This idea consolidates in the discursive tradition as a regulatory idea or transcendental process of foundation that contains two essential implications: first, that all those affected by the rules must be considered valid and included in the dialogue, and second, that ideal conditions for a true rational dialogue must be established.

The ethical-discursive proposal is deployed in a moral horizon where the purpose of the discourse consists in searching common needs of all those affected by a conflict of interests. According to that assessment, it is possible to establish common interests so that all people concerned may have their subjective considerations recognized. In this sense, the correctness or fairness of a rule depends on the possibility of finding a general agreement among those affected (García Marzá, 1992, pp. 60-61). This discursive assessment establishes a common thread between moral questions and ethical questions, since subjective interests affect, to a greater or lesser extent, the rest of those involved in norms, considering that life is a common space that calls for a broader exercise of moral reflexivity, with an aspiration to the universal validity of norms or their legitimacy (Habermas, 2000, pp. 114-115). Therefore, the *factum* of discursive reason requires the participants of the discourse to assume, previously, the possibility of reaching a rational consensus that expresses the common interest of all those affected as a maximum of universal validity.

The discursive approach has motivated criticisms that revolve around an alleged idealization and abstraction. On the one hand, Horst Steinmann and Albert Löhr (1994), resorting to a philosophical postulate of Paul Lorenzen (1987), argued that the beginning of dialogue is the experience of conflict and a universal aspiration to peace, and according to this consideration, the transcendental foundation of communication proposed by the ethical-discursive tradition can be idealistic. On the

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other hand, Steinmann and Löhr (1994) insist on the impossibility of a rational dialogue between all those affected under symmetrical conditions. An additional criticism is formulated by Cortina and is directed to the excessive abstraction of the procedural approach of Apel (1985a, 1985b) and Habermas (1989, 2000), and to a position of reason too focused on logic. The position of the Spanish philosopher responds to the need to attend to the emotional dimension and the influence of the historical context, two elements, according to author, that have not been sufficiently addressed by the Germans. Thus, Cortina (1986, 1990, 2007, 2010) tries to overcome the criticisms to the discursive tradition through the presentation of a program of civic ethics that gathers the witness of some elements of hermeneutics. Its program brings together an ethical moment for the foundation of norms, the sense cultivation of the *telos* of human praxis, the assessment of the factual complexity of the real world and responsibility for the future (Cortina, 1986, 1990, 1994, 2001, 2007, 2010). The civic ethics proposed by the author responds to the complexity of a pluralistic society, where there are two levels: the first, formed by various valuative prescriptions that understand morality as an essential element for the design of a congratulatory way of life (ethics of maxims); the second level, referred to a shared civic morality within the framework of moral minima demandable to any person (ethics of minimums) (2001, pp. 202-206). The hermeneutic, critical and dialogic spirit that underpins civic ethics can contribute to the moral development of engineering professionals, with the intention of adapting research and innovation to the needs of citizens and, therefore, promote the generation of an European AI ecosystem inspired by trust.

Ethics applied to professions must honor the moral conscience reached in our time and accept as a reference a shared ethics, therefore, moral education in the space of engineering must assume the influence of an ethical and civic thought that is fundamental for coexistence in modern societies. Such a commitment implies the recognition and commitment to the values that Cortina integrates in civic ethics: freedom, equality, solidarity, active respect[1] and predisposition to dialogue (Cortina, 1994; Cortina *et al.*, 1996, pp. 27-38).

Although civic ethics recognizes the dignity of all professions on equal terms, it should be noted that, depending on their contribution to society, not all occupations have the same degree of responsibility (Martínez Navarro, 2006, p. 12). Especially engineering offers an essential service to society and contributes to its modernization, therefore, its professionals perform a particular task to which special attention must be paid.

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The particularity of engineering lies in the relationship it maintains with the technique, since it is conceived as a means and an end, which is why engineers are considered the preferred technicians (Gómez-Senent, 2000).

In the specific case of engineering involved in AI, it is not enough to have a professional ethic in itself that determines what are the good practices, since the challenges of technological societies require the definition of these practices in an inclusive and participatory way, recognizing the existence of a set of people affected by the profession. This recognition entails the acceptance of those affected as valid partners and attention to their needs, in view of a shared ethical benchmark essential to care for coexistence in pluralistic societies (Martínez Navarro, 2006, p. 7). As soon as the professional ethics of engineering has estimated the set of values of civic ethics and adapted the internal goods of their profession, it is important to explore what means are the most suitable to contribute to the cultivation of trust in the field of AI, and this is where the role of education intervenes to encourage citizen engagement.

A serious commitment to the axiological content of civic ethics will foster the creation of an European AI ecosystem based on trust, thereby involving civil society in research and innovation through practical adaptability mechanisms. The fair and responsible management of artificial systems through a balance between ethical acceptability and social need is possible if the technical professions, in this case engineering, as social institutions, integrate civic ethics as one of the pillars of their education. In a pluralistic society such as Europe, where institutions such as the European Commission and the Spanish government have shown an interest in ensuring responsible AI governance, it is crucial to emphasize the richness of civic ethics.

European and Spanish policy initiatives that express their interest in the generation of an AI ecosystem based on a humanocentric perspective, should invest more educational efforts to ensure that higher education institutions cultivate shared basic values, so that they institute inclusive, innovative and reflective societies.[2] As noted in a previous section, the goal of education regarding instruction is to incorporate ethical variables that model the axiological dimension of character and personality (Gracia Calandín, 2018, p. 76). In this sense, the cultivation and strengthening of civic and democratic skills in the engineering environment constitutes an act of educational responsibility that benefits social cohesion, fosters reliable scientific development and inspires new forms of sensitivity and rationality (Gazmurri Barros, 2022).

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Conclusion

All the initiatives of the European Commission and the Spanish Government represent a commitment to the ethical governance of AI. While most of these institutions' approaches are a worthwhile way to establish a trust-based ecosystem, they lack a concrete educational strategy in the higher education space. In particular, engineering studies do not have sufficient educational elements in the area of applied ethics. This deficiency makes it difficult to understand the controversial and ambivalent effects of sociotechnical systems, while decreasing critical judgment and moral sensitivity to recognize a number of aspects that may be neglected as a result of computational thinking and economic accelerationism.

It is essential that the proposals for the ethical governance of AI, based on a humanocentric perspective, recognize, first, the educational value of ethics for technical knowledge and, second, integrate intellectual tools and interaction skills based on the ethical-civic tradition in the curricula. Digitization has led to the emergence of new vulnerabilities that require increased reflexivity and moral sensitivity. Therefore, the drive for educational innovation to create meeting spaces between technical knowledge and humanities must be very present in policy initiatives aiming at ethical governance of AI and strengthening inclusive, innovative and reflective societies in Europe.

Notes

1 Adela Cortina (1998) argues that active respect consists "not only in stoically enduring that others think differently, have ideals of happy life different from mine, but in the positive interest to understand their projects, to help them carry them forward, provided they represent a respectable moral point of view" (p. 240).

2 To broaden the concept of this type of company, consult the Horizon 2020 Framework Program for Research and Innovation (European Commission, 2014).

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Psycho-politics and Big Data as new forms and tools for political organization

Psicopolítica y **big data** como nuevas formas y herramientas para la organización política

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Abstract

This article asks if the subject is an autonomous being in political deliberation or if are the thoughts, positions and forms of political organization mediated by the different communicational tools to which the subject is exposed who determine it. Thus, it analyzes the relationship between Mass Media and politics with the deliberative capacity of the individual when making decisions in the political context based on Han and Chomsky. The methodology is qualitative with documentary design, the instrument are bibliographic sheets applied to primary and secondary sources. Databases are used with the algorithm: "Neoliberalism, Psycho-politic, Big Data, Mass Media and Democracy". Thirteen (13) books and twenty (20) articles are analyzed. The argumentative text identifies the new forms and tools of political organization and the relationship between politics and the media. It is concluded that: 1) Neoliberalism directs the idea of a free market towards the individual himself; 2) Critical citizenship that has a more active role in democracy is necessary; 3) Psycho-politics is identified as a new form of political organization; 4) The new tool of politics is Big Data; 5) It is evident that the relationship between politics and Mass Media is linked to power groups; and 6) The emotionalization of political communication decreases individual autonomy.

Keywords

Big Data, democracy, emotions, Mass Media, neoliberalism, psycho-politics.

Resumen

El presente artículo indaga si ¿es el sujeto un ser autónomo en la deliberación política o son los pensamientos, las posturas y las formas de la organización política mediadas por las distintas herramientas comunicacionales a las que se ve expuesto quienes lo determinan? Así, analiza la relación que existe entre *mass media* y política, con la capacidad deliberativa del individuo al tomar decisiones en el contexto político, a partir de Chomsky y Han. La metodología es cualitativa con diseño documental, el instrumento son fichas bibliográficas aplicadas a fuentes primarias y secundarias. Se usan bases de datos con el algoritmo: "Neoliberalismo, psicopolítica, *big data*, medios de comunicación de masas y democracia". Se analizan 13 libros y 20 artículos. Se identifican las nuevas formas y herramientas de organización política y la relación entre política y medios de comunicación. Se concluye que: 1) el neoliberalismo direcciona la idea de libre mercado hacia el individuo mismo, 2) es necesaria una ciudadanía crítica que tenga un rol más activo en la democracia, 3) se identifica a la psicopolítica como una nueva forma de organización política, 4) la nueva herramienta de la política es el *big data*, 5) se evidencia que la relación entre política y *mass media* está vinculada con los grupos de poder y 6) la emocionalización de la comunicación política disminuye la autonomía individual.

Palabras clave

Big data, democracia, emociones, medios de comunicación de masas, neoliberalismo, psicopolítica.

Introduction

This paper addresses the correlation between politics and the media, from the perspective of authors such as the American philosopher Noam Chomsky and the South Korean philosopher Byung-Chul Han. From Chomsky's point of view, the article studies the issue taking as an example the role of advertising and the functionality that the media play in

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politics. On the other hand, Byung-Chul Han analyzes the new power techniques exerted by neoliberal capitalism and *big data*.

The objectives are to analyze the relationship between *mass media* and politics with the deliberative capacity of each individual for decision making, and to identify the new forms and tools of organization of political power. The research question inquires if the subject is an autonomous being in political deliberation or if are the thoughts, positions and forms of political organization mediated by the different communication tools to which the subject is exposed to.

The main idea of the document states the late-modern subject in the use of its deliberative capacity for the political and its critical apparatus, which may be undermined or diminished by the influence of social networks, which capture the emotions of the subject and his psyche under the dynamics of digital profiling, which develop the algorithms of *big data*, to which is added the neoliberal practice that defends the disciplinary transition from duty to self-exploitation of the subject through performance-oriented power.

The importance of the subject for present and future generations is in how philosophy, as an area of formation of the subject, must act as a preventive educational means for the awareness of the use of social networks and the limits of this subject-*big data* interaction, which has become a daily neoliberal practice to motivate the self-exploitation of the subject. This leads to deterioration of mental health and loss of autonomy, as well as preconfigured deliberative capacity in capturing thoughts, emotions, and behaviors.

In this sense, the topicality of the philosophical and social analysis made by Byung-Chul Han (2023, 2020, 2017, 2014) and Noam Chomsky (2002, 1995), is in their significant contribution on the precipitated transformations of the current society, which, after experiencing a pandemic by COVID-19 (Cabeza and Velasco, 2023; Flórez Pabón *et al*., 2 23), demonstrates the need to slow down the model of production and consumption that has co-opted the economic, political and social dynamics of humans, but this is not enough, but now it moves to the psyche of people and therefore their emotions (Han, 2014).

If philosophy makes this call to attention, the relevance of the subject with respect to the discourses of performance and its consequences in the political rests in its preventive language against self-exploitation, in favor of the care of the psyche and for the interaction with social networks in contrast to contemplation, ritual, party and leisure (Han, 2023).

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The methodology of this work is qualitative with documentary design based on literature review (Barraza *et al.*, 2021, p. 7). A search was conducted from Noam Chomsky's and Byung-Chul Han's books. In addition, secondary sources (Nussbaum, 2019; Roig, 2009; Foucault, 2007a and b; Handke, 2006; Bentham, 1979) and twenty articles consulted from open access databases and subscribed were used. On the other hand, to give context to the work, journalistic reports were used. In this sense, the articles analyzed were from the last five years. The terms or descriptors in the search algorithm obeyed neoliberalism, capitalism, *big data*, media and democracy. Keywords were established through the UNESCO Thesaurus.

In this context, this paper is structured in four sections. First, the context of the proposed problem and the analysis of the authors Byung-Chul Han and Noam Chomsky. Then, in Psychoplitics, Han's characterization of this issue is analyzed and the changes and differences between Psychoplitics and Biopolitics are highlighted. Third, it shows how *big data* is the tool that enables the exercise of psychopolitical control, an action that occurs after analyzing the data of users of different digital platforms. Finally, it presents the relationship generated between mass media and politics, from the examples given by Noam Chomsky and some events in Colombian society, thus showing the role that propaganda plays and how —with the exploitation of emotions— there are consequences that affect the autonomy of the individuals that make up contemporary society.

Analysis of the context of new power techniques

Byung-Chul Han (2014) believes that —from the implementation of a neoliberal form of government, manifested in psychoplitics, and directly related to the use of technological tools such as *big data*— there is access to the psyche of individuals, know their desires and emotions. This knowledge generates from the use of social networks or Internet browsing, a fact that can have consequences in the political sphere, since the information generated is used as a tool of rulers and political parties to grant and offer targeted information for specific purposes, in the search and achievement of power. This fact raises risks for the autonomy of the subjects, since there is an interference in decision-making through the use and capitalization of emotions.

On the other hand, Noam Chomsky (1995) highlights the relationship generated by the media with politics in democratic societies. This relationship was generated from the beginning of television and radio,

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where these media were influenced by governments or private power groups, who used the dissemination of content for private purposes. For this reason, it was sought to have an influence on individuals and thus exert a form of social control through elements such as propaganda and advertising.

Byung-Chul Han criticizes the neoliberal system in his book *Psychopolitics* (2014), where he talks about topics such as freedom, capital, man seen as a company, etc., topics that were mentioned by Michael Foucault in *The Birth of Biopolitics* (2007b). For Han, a biopolitics is no longer realized before man, but thanks to elements such as *big data* there is the possibility of accessing the psyche of the individual, which carries a string of inconveniences and consequences. Therefore, Foucault's work allows us to recognize the elements of a biopolitics that is directly related to liberalism and thus analyze, from Han, the transition that occurs from biopolitics to psychopolitics, to finally address the element that enables this change, i.e., *big data*.

One of the references that Han (2014) makes about Foucault is that the French thinker failed to address psychopolitics in the neoliberal system, insofar Foucault focuses his analysis of power on biopolitics and anatomopolitics. "In his lesson of 1978-1979, Foucault fails to deal with the analysis of neoliberal biopolitics" (p. 22), insofar as his lessons focus on the analysis of the docility of bodies. However, it is possible to mention several elements exposed by Foucault around biopolitics, after the review that he carries out on liberalism and neoliberalism, which he does from two aspects: German neoliberalism and North American neoliberalism, as extreme forms and power technology of contemporary governmentality (Raffin, 2021, p. 307).

This is how Foucault (2007b) approaches the issue starting from the historical analysis that he carries out on liberalism and neoliberalism, for which it is evident, according to Páez and Gómez (2021), that civil society should be the determining logic of the market, and not the State, insofar as the decisions and actions of the rulers now involve the continuity of life occurred in biopolitics (Cabeza Herrera, 2010, p. 105). In this way a policy of life will be imparted, making the subject another element that enters the market game and where man is mentioned no longer as subject or individual, but as a project of himself when seen as a company.

Han (2014) mentions that, from Foucault's perspective, disciplinary power "makes the body a machine of production" (p. 20), understood as a flow of income, which will depend on the capacities of the worker and vary over the course of his life, until this machine becomes obsolete

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to fulfill a certain function, i.e., until his old age does not allow him to continue working (Foucault, 2007b).

In this way, by making man a means of production, also cover regulatory measures for their health, longevity, population growth between birth and mortality (Han, 2014). A regulation that will be exercised by the State in order to maintain the proper functioning of market policies that would be directed to the individual and society. Michael Foucault (2007a), spoke directly of biopolitics by mentioning the administration of life, so much so that power:

> It was centered on the body-species, on the body transferred by the mechanics of the living and which supports biological processes: proliferation, births and mortality, health level, duration of life and longevity, with all the conditions that can make them vary; all these problems are taken by a series of interventions and regulatory controls: a biopolitics of the population (p. 168).

In this way, a stage of biopower begins, in which man, already seen as a company, as a means of production and as a machine, must be managed, so that, in the analysis proposed by Foucault (2007b), it is evident that the idea of an investment in human capital in the growth of capitalist society is originated, by linking elements such as: the upbringing of the child, the cultural level of parents and the care they exercise over their child, in addition to issues such as marriage and couple relationships. Thus, from an economic point of view, the demographic order is one of the analysis elements of the economy, and the data generated from it will be used to exercise a disciplinary power over individuals (Foucault, 2007b).

This way, the relationships of both the couple and the parents with their children are capitalized. Every child born is seen as a future worker, who will eventually be linked to working life and it is the State, as well as his parents, who must invest some resources in his welfare. This investment of the State is made thinking about what the child can contribute later to his nation, consequently, it is expected to obtain a benefit from this, characterized in that this child will become the labor and the indispensable workforce for the development and operation of the industry (Gozálvez and Cortijo, 2023; Rodríguez *et al*., 2018; Argüello *et al*., 2012;) and, on the other hand, the family is a production unit that ensures upbringing. Benefits are shared between the State and the family (Páez and Gómez, 2021, p. 10).

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This new approach to market policies directed towards the activities of man leads to the individual becoming *Homo oeconomicus*, an "entrepreneur and an entrepreneur of himself" (Foucault, 2007b, p. 264). Since man must be considered and must consider himself as a company, the individual becomes a tool on which an influence can be made, a power can be exercised, in this case a biopower, therefore, an articulated theory develops that invests in human capital, hence:

> The company is formalized based on the company model, which redefines the "*homo oeconomicus*" as entrepreneur of himself from the notion of human capital. The *homo oeconomicus* constitutes for itself its own capital, its own producer and the source of its income (Raffin, 2021, p. 316).

The investment that this man-company will make will be reflected initially on who is chosen as a couple, then in the education of the children that result from this relationship and later in the time of care that is dedicated to the infant. These activities will be seen and analyzed as elements of a company, which leads to the expectation that, after the investment of resources, a profit will be obtained. Therefore, "we should speak of 'biopolitics' to designate what brings life and its mechanisms into the domain of explicit calculations and makes power-knowledge an agent of transformation of human life" (Foucault, 2007a, p. 173).

Transformation through governmentality, which links power and government by subjecting life to a single possible logic (Raffin, 2021, p. 321). Governmentality then becomes a technology of power that is directed and exercised over civil society, over life (Toscano, 2018, p. 248), a fact that is framed and deployed in liberal thought and later in neoliberal thought, where market rationality was placed in aspects that were not necessarily considered economic: the birth rate and the conformation of families.

From Byung-Chul Han's (2014) reading, Foucault "expressly links biopolitics with the disciplinary form of capitalism, which in its form of production socializes the body" (p. 22), however, this does not happen with neoliberalism. With the implementation of a neoliberal policy, capitalism is transformed, focusing its attention on the psyche of the individual, thus generating a transition between biopolitics and psychoplitics, which will be addressed next.

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Psychopolitics as a domain of the psyche and human emotions

The first topic addressed by Han to develop his characterization of psychopolitics will be freedom, which must be understood in a different way at the time when the individual is constituted as a project of himself and accompanied by the feeling of freedom (Han, 2014, p. 7), since man considers that he is no longer subject to external elements, however, now he is the one who submits himself in search of continuous improvement, consequently, the existence of the subject develops in a society of performance.

Thus, in a capitalist society marked by a category of competitiveness, man has been involved in *neuro-enhancement*, which basically consists in the use of biomedical technology or drugs such as nootropics to improve his cognitive functions (*i. e.* memory or learning). This supposed improvement is exercised by healthy individuals who face a burden of competitiveness and intellectual performance (Martínez, 2016, p. 293). However, this improvement, in addition to the possible side effects, has as a main consequence the production of fatigue and exhaustion, linked to the excess of positivity and the forgetting of negativity.

In this way, the automaton man will only generate results, where the fatigue to which he is subjected will be faced and lived in solitude. For this reason, it is stated that "today's society is not primarily a disciplinary society, but a performance society that is increasingly exposed to the negativity of prohibitions and mandates and masquerades as a freedom society" (Han, 2017, p. 49). This is seen in the change of the verb duty by power, an element that has changed the psychology of man. Thus, the subject of today is a subject of affirmation, it says to itself that it can do things by pressing to achieve goals, in the search for an "ideal self", thereby generating a distance from the disciplinary society, unlike what was proposed by Arturo Roig (2009), where the subject recognizes and values himself and, from there, generates recognition of the other (Botero *et al.*, 2023).

Thus, the subject does not have as one of his maxims the fulfillment of duty and does not expect a moral gratification, but a gain in terms of pleasure. It is no longer another who exercises an order on him, but it is he who exercises that order on himself, for this reason, to the supposed liberation that has been obtained from the other, the subject presents himself as the new image of his coercion (Han, 2017, p. 50). The man of the performance society is required and self-demanded to constantly outper-

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form himself, regardless of whether to obtain such a result he has to use different substances. This results in mental illness or *burnout* syndrome.

As it stands, "illnesses like depression and *burnout* syndrome are the expression of a profound crisis of freedom. They are a pathological sign that today freedom becomes, by different means, coercion" (Han, 2014, p. 7). Therefore, the freedom that man believes he has by parting with the society he forbids is only illusory, since it is he who now destroys himself. Thus, from the neoliberal ideology, this freedom of the individual is related to the freedom of capital, i.e., the idea of free competition that was related only to the market, will now also be related to the subject. Thus, for the 'entrepreneurial worker' (p. 9), his success or failure is sold to him as a result of his own responsibility.

From this perspective, with the advent of digital media through the Internet and the consequent advent of social networks, the idea of unlimited freedom is presented. However, this alleged freedom becomes a means of control and surveillance, which are linked to the image of the panopticon presented by Jeremy Bentham (1979). These digital panoptics have certain characteristics, in which communication between individuals is stimulated, which provide their information freely through what is published on social networks.

This is made possible through a consumer capitalism, which sells meanings and emotions, making emotion a means of production. In this sense, "the neoliberal regime presupposes emotions as a resource to increase productivity and performance" (Han, 2014, p. 38). In addition, in the capitalism of emotion a gamification of work is performed that promises immediate gratifications, the same happens in the gamification of social communication, which manifests itself through *likes*, the number of friends or followers, after which, communication is commercialized and leisure is also capitalized, making life itself a form of production.

In this way, the acceleration of communication is used as a tool and the purchase is stimulated and needs are generated: the use of business self-help texts with the idea of creating better professionals, offering the individual the idea that by projecting a good image, he will be able to get the job and the life he wants, i.e., an issue based on emotions (Han, 2017, p. 39) to achieve psychoplitical control.

Neoliberalism, by emotionalizing the productive process, makes the human being stop being a subject and become a project of himself, building himself as a product that is a holiday and enters the becoming of supply and demand, thus breaking into all areas of life, since it is not only his work, but his private life that is publicized through digital media

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and new technologies. The communication that is exerted in the different digital platforms calls for transparency, with which it seeks to precipitate the obtaining of information (Han, 2014, p. 12) and in this constant flow of information, surveillance initially begins in the others, who are the consumers of the information that is offered to them.

At this point, politics becomes another element of consumer capitalism, "politicians and parties also follow this logic of consumption. They have to *provide*. In this way, they degrade to suppliers who have to satisfy voters as consumers or customers" (p. 13), which only participate to the extent that they complain or make a claim, thus establishing for Han a "spectator democracy" where the communication exerted transforms individuals into consumers, in the middle of a society where consumption is increasingly of masses (Lomelí, 2019, p. 352).

Thus, the power exercised is an intelligent power, which invites the subject to communicate, share and highlight their needs or concerns, thus revealing, through social networks, the most intimate details of his life. This power becomes not the one who denies or hinders freedom, but the one who exploits it, assessing conscious and unconscious thoughts (Han, 2014, p. 17). It does so by means of an analysis developed from the information produced from everything that is published on the networks or on the web pages that are visited. This intelligent power differs from the disciplinary power, which was not interested in the psyche, on the contrary, the intelligent power is able to interfere in the needs and desires of the subjects.

Another difference with Bentham's panopticon is observed, since it requires visual monitoring. With the digital panopticon, thought is accessed, unlike Foucault's disciplinary power. For Han (2014), neoliberalism will exploit and explore the psyche thanks to the emergence of *big data* (p. 21), since the elements of capitalism's production changed, insofar as the motivation for production is based on the immaterial and the incorporeal, from computer programs and digital information that move emotions.

Now, within the forms of exploitation exercised by neoliberal psychopolitics, there are workshops of personal *management*, which refers to the administration of personnel with the intention of optimizing the work of workers, or business *coaching,* which aims to motivate employees so as to obtain better results. These are part of the framework created for the optimization of the individual, which seeks the creation of an increasingly efficient worker, where not only improvements in working capacity are sought, but also interferes in other aspects of life, so that continuous improvement is shown as something necessary, even if it leads to total self-exploitation (p. 27).

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In addition to the above, one of the main characteristics of neoliberal psychopolitics is the excess of positivity, in which the imaginary is created that everything is possible, the idea is emphasized in the subject of "being able to do". This power is maximized in the information society, as everything is just a *click* away. In this context, an increase of words is generated with the continuous generation of information received, but that is also created. This time characterizes by the fact that the person who receives the information can also produce it, which generates an exacerbated increase of information (Silva *et al*., 2023, p. 127), which can result in the "information fatigue syndrome" (IFS) (Lomelí, 2019, p. 356).

The problems that arise from the perspective of man as an entrepreneur of himself and that is constituted as a project to realize, are evident in an environment where you have a strong sense of freedom, you are before a digital panopticon, in which you do not conceive the feeling of being watched, people feel free to share and spread their lives without external coercion, as a consequence, each subject is panopticon of their own being (Han, 2014, p. 35).

Thus, in the capitalism of emotion not only cognitive improvement will be taken into account, but also emotional (p. 35). From the capitalization of emotions, it is possible to achieve a psychopolitical control that will go unnoticed by the subjects (p. 40) and that with the use of *big data*, maximizes the influence that can have on him and his decisions to the extent that he usually decides based on emotion.

The big data as an enabler of psychopolitics

The effectiveness of *big data* as a digital panopticon lies in the fact that it does not escape the thoughts and desires of people, who do not have the feeling of being watched, since it addresses even their psyche through emotions to know their desires and thoughts. With the emergence of *big data*, in a digital age where everything is measurable — the temperature, the calories in food, the miles traveled — where everything relates to performance and efficiency, sensations and moods also begin to be measured. In this way a self-measurement and self-control is developed. These data that are generated are published and exchanged making the self-monitoring of each individual a self-surveillance, causing the individual "as a subject who illuminates and watches himself, is isolated in a panopticon in which he is simultaneously inmate and guardian" (Han, 2014, p. 49).

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However, it is not only the individual who registers all his activities. On the contrary, a trace of what is searched or the pages visited are recorded in that data - left voluntarily or without consent – creating a digital profile, which represents each individual, making the network perhaps know someone better than the same individual knows, to the extent that the role of artificial intelligence (AI), through algorithms, is to know the preferences of users of the different digital platforms, with which their tastes, priorities and needs are redirected (Lomelí, 2019, p. 357).

The *big data* does not forget or omit anything, it is extremely efficient and can be used to generate focused and personalized advertising. This can be seen in the electoral campaigns, where microtargeting performs an analysis of the data generated by groups with particular interests, which are provided or given a specifically designed advertising in order to influence their decisions in the elections and even predict the behavior of voters, making this data a tool of psychopolitics. Thus, "if *big data* provided access to the unconscious realm of our actions and inclinations, it would be conceivable for a psycho-politics to intervene deep into our psyche and exploit it" (Han, 2014, p. 51), a fact that can be demonstrated after the Cambridge Analytica scandal:[1]

> In 2014, the data analytics firm that worked with Donald Trump's and Brexit campaign, *Cambridge Analytica*, conducted a study in which it used Facebook's platform to conduct personality tests on hundreds of thousands of users of the social network. The aim was to develop models that would allow prediction of user behavior. However, the company used the occasion—supposedly for academic purposes—to extract information from the contacts of the subjects studied, producing a base of tens of millions of people. As known a few years later, the goal of data mining was to produce predictive models that were intended to influence the behavior of voters (mostly registered) by sending selective information (González, 2019, p. 267).

These practices cause serious implications, since with such actions they could manipulate the collective unconscious and adapt the behavior of the masses under a particular interest. This interest would be managed by whoever has the power or resources to buy that data and manipulate individual and collective life at will (Vidal and Olivares, 2021, p. 145).

There are various platforms in the digital market that categorize and separate individuals according to their functionality to later sell this data, there are companies dedicated to this exclusively: Xeerpa in Spain or Acxiom in the United States.[2] In addition, there are platforms such as Google or Facebook that offer their services for "free", however, they

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collect the data of their users through permissions that the user accepts without measuring the extent of the consent granted (Cubillos, 2017, p. 37).

When *cookies* are accepted or *the* permissions requested by the application are activated, access to the marketing of personal data is being granted, "refusing to provide data implies the loss of global services or the reduction of their quality and, consequently, being marginalized from global narratives" (Vidal and Olivares, 2021, p. 146). This is an act of coercion, since users of digital platforms, if they want to access the information hosted there, are forced to give their consent in order to use them.

The *big data*, as already stated, does not allow forgetting. The digital memory accumulates information and even when individuals believe they delete their files, searches or social media posts, each of these elements has been recorded. An example of this is that platforms such as Telegram,[3] which stores their information in the cloud, offers the service as a guarantee of privacy, however, in the cloud this guarantee of custody is not secure as it depends on external operators (Varela *et al.*, 2017, p. 145). This happens because each of the data that is on the Internet is susceptible to be intercepted or used by *hackers*, where the confidentiality of the data only makes part of a false security belief about them.

Through *big data,* human behavior becomes predictable based on the correlations generated by the analysis of the information of each individual, where the individualities are denied. The transparency generated by *big data* develops a coercion to eliminate the strange and the other, for this reason *bannoptikum* is used (Romero, 2023), in charge of identifying those individuals who are not useful for the system and thus discharge them as if they were worthless objects. Thus, a kind of digital social class is created, where men will be classified according to the functionality that can be achieved from them (Han, 2014, p. 58), with which this knowledge generated through *big data* enables a new way of doing politics, becoming a tool capable of generating social changes to the extent that:

> Psychopolitics is based on emotions and the logic of spectacle as axes of communication, making possible a control and exercise of power without parallel that, based on an almost total knowledge of society, is able to model behavior and direct impulses for specific interests pursued (Lomelí, 2019, p. 360).

The information currently received is consistent with the directions resulting from data analysis, which configures that the information received corresponds to a *marketing* strategy, i.e., that it is linked to pro-

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paganda elements to affect the consumption not only of things but of emotions. In the relationship between the media and politics, this exploitation of emotion is evidenced, by selling to the common of society an idea of patriotism or the idea that one must defend oneself against an enemy that puts national values at risk (Nussbaum, 2019).

The Role of Digital Propaganda as a Means of the Psychopolitical

For Noam Chomsky, this corresponds to a propaganda model and, while this model was designed in the 1980s, his view of media performance is not different today, of course, one must bear in mind the changes that have occurred with the digitization of the media. Thus, Chomsky (1995) consolidates an analysis oriented to the characteristics of the propaganda model, where he expresses that, although advertising is not the purpose of the media, it is considered a relevant fact, since the role of journalists will be to show themselves according to the directions of the owners of the media or the government, given the relationship that arises on this topic.

In addition, Chomsky and Ramonet (2002) consider that "the first modern propaganda operation carried out by a government happened under Woodrow Wilson," (p. 6), where a commission was created that was supposed to convince people of the need for America to join World War I. This commission was called the Committee on Public Information (CPI), and it sought to present the Germans as the enemies to be defeated. News events were created in which atrocious acts were invented to portray the Germans as monsters. In this way, the power of the media is in creating narratives such as *fake news,* which obfuscate reality (Villa *et al.*, 2020, p. 41).

For this reason, the *agenda setting*, where digital media dictate which topics are addressed or discussed (Busquet and Medina, 2013, p. 80), can be linked to the orientation of responding to a propaganda intention mediated by the influence that can be generated between groups of power and *mass media*. Thus, the media, being run by companies or by the Government, choose which news they show and which they do not (Chomsky, 1995, p. 19). However, it must be clear that the role of the media is not generalized, since there are media in which their information does not respond to the guidelines of the government agenda. Therefore, based on a documentary review, it is possible to identify whether the actions of the media correspond to the propaganda model or not.

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The five main characteristics that determine the propagandistic role of information are presented and analyzed:

> (1) The size, concentration of ownership, wealth of the owner, and orientation of the profits of dominant media companies; (2) publicity as the main source of media revenue; (3) the media's dependence on information provided by the Government, companies and "experts", information otherwise funded and approved by these major suppliers and other power actors; (4) various "countermeasures" and corrective measures as a method of disciplining the media; and (5) "anti-communism" as a national religion and control mechanism. These elements interact and reinforce each other (Chomsky, 1995, p. 23).

1st. It is evident how since the beginning of the implementation of the media as a massive information system, this is involved in the conditions of the market, where the owners of the media, being entrepreneurs or bankers, based their operation focused on the profits that could generate the appropriation of the media. There, interest groups appear, investing resources for their operation with the objective of market profitability (Chomsky, 1995, p. 31).

Thus, a transition began, where the print media sought to become part of broadcasting or television. Following the development of new technologies, this same process took place in the need for media such as television and analog radio to be transferred to digital media, where it must be taken into account that from the beginning of the operation of the *mass media*, they were linked to the Government, under its concession and authorization (Chomsky, 1995, p. 39). For this reason, the *mass media*, being managed by business groups and generating some dependence on their link with the political class, are limited in the information they generate or publish, since this must correspond to the interests of the power groups.

2nd. The main feature is that advertising becomes the source from which information companies can generate profits. Thus, it is important to mention the pressure that Governments can exert, as they become actors that finance the media. Currently, in Colombia, law 2063 was approved in 2020, in which the Government allocates public money for the economic revival of the media, in addition to the money they receive for the advertising of the State. In this case, there is a risk of self-censorship due to the conflict of interest raised in accordance with the express complaints from the Foundation for Press Freedom (FLIP) (Franco, 2021, para. 13).

Now, another conflict arises in the case of television, since those who show themselves contrary to the guidelines of the Government or

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groups of power may not receive the support of companies, since: "Large companies that advertise on television will rarely sponsor programs that address serious criticism of business activities, such as the problem of environmental degradation" (Chomsky, 1995, p. 48), with which, the broadcast content becomes sensationalist when seeking to generate programs that look to attract the attention of large audiences and, from there, can offer advertisers that their advertising will reach a greater number of people and will persuade the preferences and attitudes of the recipient (Cazorla *et al*., 2022, p. 87).

3rd. The symbiosis between the different sources of information and the media, derived from the high level of power, results from the exchange of various interests (Chomsky, 1995, p. 49). The media, being nourished by information, focus their attention on places where news is constantly generated and this happens with government institutions, in addition to large companies that also have the power to generate constant information. One of the significant differences is that anyone today can generate information with digital media, thereby losing the hegemony of news in the role that focused on government and business. In Colombia, this was evident in the context of the national strike of 2021, with the case of alternative media, where the information presented did not always correspond to that generated through the oligopolies of communication (Romero and Martínez, 2021, p. 18).

4th. The pressure exerted by the Government on the media and civil society to ensure that the information generated is in accordance with what the political leaders want the people to know and discuss. Thus, "the Government is one of the largest producers of these critical responses, routinely attacking, threatening and 'correcting' the media, and attempting to curb any deviation from the established line" (Chomsky, 1995, p. 68).

Following the analysis of what happened in the context of the Colombian national strike, digital media were persecuted because the information transmitted was generally linked to violence by agents of the State. As an example, the attack on a correspondent from Colombia Informa,[4] that occurred on May 26, 2021, while covering a citizen mobilization in Bogotá. Similarly, FLIP documented 152 attacks on digital media (Romero and Martínez, 2021). This was intended to distort what was published on social networks.

5th. It creates a need to focus attention on finding someone to point to. This is exemplified in the creation of an enemy or narratives in the service of a story, in order to instruct citizens in the self-interest of the storyteller (Chomsky, 1995, p. 74). From these narratives to achieve profit,

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i.e., to justify military spending or the action of the Government in its foreign policy and this is framed in a policy where terror was how public opinion was sought to be biased.

Today, the practice of looking for whom to name as responsible for the state's ills has diversified. Now labeled migrants or corruption, there is a trend towards xenophobia that is related to an authoritarian neoliberal stance and, therefore, the fight against these issues is raised (Saidel, 2021, p. 270). Faced with this reality, digital media are used to create an emotionalization process in individuals, however, the power of *mass media* is used without distinction of political ideology, where it is evident that published contents are broadcast with hidden interests (Cornejo, 2022, p. 78).

The emergence of social networks on the political scene would give rise to the same thing that happened at the end of the 1980s, when one had a positive view of technological advances: "The emergence of cable and satellite communications [...] has weakened the power of the oligopoly of the communications network and retains potential to strengthen access for local groups" (Chomsky, 1995, p. 354). It was seen in these advances that the population had a way of countering the unidirectional information of the hegemonic media, however, these media are also subject to the market economy, where advertising is necessary to ensure its functioning, leaning towards the same as always (Chomsky and Ramonet, 2002, p. 31), only now, the public of interest is segmented through *big data*, algorithms and digital social networks with content for immediate consumption (González, 2019, p. 274).

Thus, propaganda appears as an element in which emotions will be used as a means to achieve direction to people. In both traditional and digital *mass media*, emotions are the order of the day, since, with the use of social networks and the Internet, emotion is used as the means by which consumers are invited. These emotions are part of the *marketing* model and, specifically, political *marketing* in electoral processes (Chomsky and Ramonet, 2002, p. 46).

Consequently, emotionality will be exploited by companies that benefit from personal data, which are offered in the market for a political leader, a party or a company to buy and use them for propaganda purposes, seeking to influence the decisions of individuals and gestating a change in political communication towards emotions and desires, which cloud reason and favor emotional opinion and fanaticism (Lomeli, 2019, p. 352).

For this reason, one fact to be considered is the veracity of the information received. For Chomsky (1995), the way in which the media are articulated to make an information be taken as true is the familiarity that the

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media develop with a subject, the attraction to the story (p. 77). In the present, it is no longer the means, but the people who exercise this function. This happens now with information going viral, where being linked to personal tastes is not verified, but is delayed in an instant and uncritical way, not only the news, but the large amount of information that becomes a trend through viral processes that underpins post-truth (Lomelí, 2019, p. 356).

Therefore, in the role that social networks occupy in the political evolution, there are consequences such as the inclination of perception and opinion for a specific candidate and his subsequent election (González, 2019, p. 275). This information modifies their behavior and has a direct impact on the decisions that the individual makes, without being aware that subtly their action has been directed through the psychoplitical control carried out by the digital *mass media*, which, appealing to emotions, obtain the answers already preconceived in the action of the citizen (Cazorla *et al*., 2022, p. 88).

With the emergence of new digital platforms and the incorporation of multiple social networks on behalf of independent media, a plurality of media was generated, which Chomsky believed necessary, media in which the diversity was truly reflected (Romero and Martínez, 2021, p. 20) and interculturality of the population, as well as the recognition of the other (Botero Urquijo *et al*., 2023; Oses Gil *et al*., 2022, p. 11). However, with algorithms, this plurality of information is reduced to individual tastes, which contributes to generate a bias of the information given that the data received only give more force to personal, subjective, emotional positions, with little or no objectivity and that favor the permanence or creation of sectarian groups (Cazorla *et al*., 2022, p. 89).

As in the recent past "political truths are centered on the attack and defamation of a supposed responsible or enemy, which is built with manipulated data and, above all, images and audio that seem irrefutable thanks to their plausibility" (Lomeli, 2019, p. 359), the use of fear, hope or indignation to mobilize citizens has been present with the intention of manipulating, favoring a warlord or collective and convincing in electoral campaigns (D'Adamo *et al*., 2021, p. 204).

Considering that one of the most significant characteristics of the propaganda model is that the media obtain its profits from advertising and the segmented use of the data collected in the processing of *big data* (González, 2019, p. 270), it is necessary to defend itself not only from the manipulation of the media, but to promote a self-defense of algorithmic AI, to search for information in other media that show other positions and thus open the spectrum of the world that faces itself. It is sought

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that data that are used as timely information for decision making are not biased and limited.

Understanding that "people are not certain if our selection is based on our own decision, or if it has been conditioned by the personalized information developed by an algorithm" (Vidal and Olivares, 2021, p. 150), attention must be paid to the fact that the hegemonic media are faced with the population moving increasingly to inform themselves via social networks, so the Reuters Institute presents *online* sources as the most consumed, in contrast to traditional media (Garcia, 2021, para. 12). This shows the vulnerability to which the population is subjected to being under the influence of the emotionalization of social networks and focused advertising, thus promoting psychopolitics (Lomelí, 2019, p. 360), where, "emotions are a fundamental part in the conscious or unconscious decision-making process, since it is from them that we can define the universe of stimuli that surrounds us" (D'Adamo *et al.*, 2021, p. 210).

Thus, the autonomy of man is compromised, emotions are used in electoral processes where individuals are determined by the influence of external factors that have a direct impact on the psyche and in decision-making. Thus, the role that social networks play is to offer immediate gratification and that causes cognitive perception and emotional affiliation in the political sphere (Cazorla *et al.*, 2022, p. 83), leading decisions to correspond to a propaganda model with which psychoplitical control is exercised.

For Han (2014) there is a need for a depsychologization, which aims to prevent the neoliberal system, through psychopolitics and *big data*, from guiding man, so that allows the individual to come out of submission by becoming aware that the freedom he believes he has is illusory. From this, psychology is destroyed for the human being to build himself, the individual is invited to allow himself leisure, where unconscious acts become conscious and routine is not normalized; the importance of stopping and analyzing the information received is manifested, since man, at present, is not allowed silence, is constantly surrounded by a bustle that affects his mind and is generated by the excess of communication and content on social networks.

In addition, philosophy, presented as an idiotism makes possible the creation of new thoughts, where being an idiot is related to the idea in which the individual is not tied to what the system proposes; idiotism is shown as a new way of being, where people act and think differently. Thus, the philosophical attitude understands that thought is given from a narrative and not from a calculation, because it allows the subject to act in a different way than the current society does, does not forget negativ-

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ity, does not fit into the excess of positivity, it allows the encounter with the strange. Hence, the individual who philosophizes will be seen as "the crazy", insofar as individuals are not allowed to isolate themselves from what the neoliberal system offers and think of themselves differently.

This representation of the idiot is also related to the image of the heretic. When understanding heresy as a choice that breaks with the doctrine presented by the digital, it is detached from the excess of information and the need to publish and comment; then, it is related to silence and stillness, where only something is expressed when it really must be said. In this way, philosophy grants an art of living that moves in silence, stillness and thinking about what is really considered to be communicated.

So a call is made to immanence, which is represented in the figure of children. They explore, they do not care about the future, they do not plan their lives. The idea of immanence is related to the contemplation of the here, the now and the sublime. From there the emotional-mental balance in the world of performance is sought, in the same way, if life is understood as an event, it is possible to encounter the strange, with what arises without being planned, so life is detached from the calculated and schematic (Han, 2023).

On the other hand, it is necessary to overcome individualism, for which Byung-Chul Han (2017), when returning to Handke's position (2006), speaks of fundamental fatigue, which unites, relates to language and gives confidence in the world, to the extent that it enables the decrease of the self. It is not related to exhaustion and gives a moment of peace and tranquility to a society that forces us to always be producing or learning. The point is not to speak of a weariness of the self, but of a weariness of the us, in such a way that individualism is eliminated to make a call to the collectivity and the community. In the same sense, rites are presented as those that make it possible to break with a narcissistic stance, insofar rituals unite men and generate a community (Han, 2020).

Conclusions

It is evident that in contemporary politics, after the expansion of neoliberalism as an economic system, a free market policy was developed that was directed towards the individual himself, thus causing the establishment of the idea that individuals should conceive themselves as entrepreneurs of themselves. Thus, human beings are called and obliged to be in a constant preparation to face the changes demanded in a labor market

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and with the appearance of social networks, these become the showcases where man advertises himself; therefore, neoliberalism as an economic model has the capacity to transform subjectivities.

On the other hand, it establishes the need for a critical citizenship that has a more active role, given that with the implementation of neoliberal policies, democracy may be at risk of being co-opted under the influence of business groups, leaders or political parties, to the extent that, through technological developments that transformed analog media into digital media, these groups can guide people to think, feel and act in a certain way. The media can contribute to direct citizen participation or contribute to population control.

Likewise, psychopolitics is identified as one of those new forms of political organization, insofar as neoliberalism is no longer supported in biopolitics, since current capitalism focuses its attention on the psyche of the people and this is achieved through the development of a consumer capitalism that arouses emotions. After the idea of personal or professional success —reflected in social networks— comes psychopolitical control through the use of *big data* that, being designed as a tool of analysis and profiling, accesses the desires and needs of the subjects.

In this way, the new tool of politics is *big data*. From the information gathered by using social networks and browsing the web, a digital profile is created where people's tastes and preferences are known. This element is used by governments and political parties to generate targeted advertising, which serves for electoral campaigns, as in the case of Cambridge Analytica, where the ability to modify the behavior, emotions and decisions of people through the use of algorithms and AI was manifested.

Finally, mass-oriented media possess the intrusive power to influence decision-making, emotions, and subject actions. Likewise, the relationship between politics and *mass media* is linked to power groups, where the owners of the media—who are usually entrepreneurs or large corporations, as well as the state—seek to defend their own interests, by justifying their actions through the narrative produced by the information offered in the media broadcast.

In this way, it affects the mind of the subjects, generating more impact on the social environment and reality. Moreover, the relationship between *mass media* and politics corresponds to a propaganda model, where the economic profits of the media are mostly due to advertising. On the other hand, a narrative is constructed about whom to blame the evils of the State, thus generating an emotionalization process in the subjects.

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Thus, with the advent of digital media and the linking of politics with social networks, a *marketing* model is created around emotions, so that the information received responds to individual interests and can modify behavior and directly affects the ability to decide. The population is in a state of vulnerability, since these are the means by which the highest percentage of people are informed. In this way, a psycho-political control is generated, directly affecting the autonomy in the deliberation of the subjects, since the thoughts, the positions and the forms of political organization are configured to a great extent by the use of the different communication tools to which the individuals are exposed.

Notes

1 British company offering data acquisition, predictive analytics, audience perspective and digital advertising services. It worked from 2013 to 2018: https://cambridgeanalytica.org would later become Emerdata https://www.emerdata.org
2 The first is a Spanish company that creates profiles of people using the data they share on social networks, so that later this data is used by the companies that buy it (https://xeerpa.com). The other is a San Francisco-based company that offers data management for *marketing* purposes (https://www.acxiom.com).
3 Instant messaging platform created in 2013, provides cloud data hosting and allows audio and video streaming (https://web.telegram.org).
4 Communication agency established in 2010. From a popular point of view, it is evident the political and social materiality of Colombia (https://www.colombiainforma.info).

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Higher education and integral development in Mexico

La educación superior y el desarrollo integral en México

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Abstract

Mexico's school enrolment in the 2021-2022 school year corresponds to 5.07 million students (5.5 % in higher technical and normal levels; 86.2 % in bachelor's degrees; 7.2 % in specialties and master's degrees; 1.1 % in doctorates), representing 4 % of the total national population. The article is structured based on the deductive method and with a quantitative archetype; its objective is to determine the correlation between the higher education student population and economic growth and human development. It is hypothesized that higher education will contribute significantly to the achievement of these objectives, in the first instance to try to achieve economic growth, and then to gain access to economic, social, sustainable and human development. The hypothesis was confirmed that in Mexico during the period from 2010 to 2022, the highest number of higher education students can explain 82.6 % of the variations experienced in the increase of the Gross Domestic Product (GDP) or economic growth. It was considered that the highest levels of education in the country (doctorate and master's degrees) would have a decisive influence on the increase in GDP (economic growth) and a better position in the Human Development Index (HDI), but it turned out that the most influential variable in the estimated linear regressions is enrolment at the bachelor's degree.

Keywords

Economic growth, education, higher education, human development, regression analysis, postgraduate.

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Resumen

La matrícula escolar de México en el ciclo escolar 2021-2022 corresponde a 5,07 millones de alumnos (5,5 % en nivel técnico superior y normal, 86,2 % en licenciatura, 7,2 % en especialidad y maestría, y 1,1 % en doctorado), representando el 4 % de la población total nacional. El artículo se estructura con base en el método deductivo y con un arquetipo cuantitativo, teniendo como objetivo conocer el estado de correlación existente entre el universo estudiantil de educación superior con el crecimiento económico y el desarrollo humano. Se parte de la hipótesis que la educación superior contribuirá significativamente al logro de estos objetivos, en primera instancia, para tratar de alcanzar el crecimiento económico, y después, para lograr tener acceso al desarrollo económico, social, sustentable y humano. Se confirmó la hipótesis de que, en México, durante el período de 2010 a 2022, el mayor número de alumnado de nivel superior puede explicar el 82,6 % de las variaciones experimentadas en el aumento del Producto Interno Bruto (PIB) o crecimiento económico. Se consideraba que los más altos niveles de estudios en el país (doctorado y maestría) influirían de forma determinante en el incremento del PIB (crecimiento económico) y en una mejor posición del Índice de Desarrollo Humano (IDH), pero resultó que la variable más influyente en las regresiones lineales estimadas es la matrícula de nivel licenciatura.

Palabras clave

Análisis de regresión, crecimiento económico, educación, desarrollo humano, enseñanza superior, posgrado.

Introduction

With the new paradigms of sustainable and human development, education presents as one of the three blocks required to measure the Human Development Index (HDI). Education is not only a right that should encompass the entire population, but is considered a human right in recent approaches. In this regard, Rodríguez Acosta (2018) expresses: "Education helps human beings to be autonomous, to have a better quality of life, to make decisions, to be supportive. Not only does one have the right to access education, but to access quality education" (p. 161).

The objective of the article is to make the theoretical-conceptual approach that allows to know the correlation level of higher education with economic growth and with the stage of integral development (economic, social, sustainable and human). The idea is to answer the research question: Is the higher enrollment of higher education in correspondence with the level of economic growth and development achieved in Mexico?

It is assumed that education contributes to achieve a higher level of economic growth and achieve a substantial improvement in stages of comprehensive development, particularly education at the higher level. The importance of higher education in the country is evidenced by the fact that more than five million students are enrolled in the last school year, representing at least 4 % of the total national population.

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For some years, efforts have been made to deepen the issues of economic growth and development, and over time, efforts have been made to analyze development in a more comprehensive way, addressing it from the social, sustainable and human spheres. Likewise, it has been thought that education (especially the higher level) can contribute significantly to achieve better stages of economic growth and integral development, so this time the correlation between higher education and economic growth and the level of integral development in Mexico is addressed. The concept of education is analyzed in relation to economic and integral growth and development, as well as the most recent aggregated information of higher education in the nation.

This article is based on the use of the deductive method, understood as the reasoning process that recognizes the emission of judgments from arguments that clarify or explain certain aspects of reality. A paradigm is used that allows the disaggregated treatment of complex phenomena, which become indicators that can be analyzed, based on observation, measurement and estimation (Dolores *et al.*, 2022, p. 160). In quantitative terms, a simple linear regression exercise is performed, with 13 annual data on the educational enrollment of higher education in Mexico (2010-2022) as an independent variable, extracting information from the General Directorate of Planning, Programming and Educational Statistics (DGPPyEE), attached to the Ministry of Public Education (SEP), so that no experimental study is carried out (none of the variables has been manipulated).

The work basically consists of three parts: the first discusses the concepts of economic growth and development (economic, social, sustainable and human), related to the importance of higher education for its achievement; the second part presents information of the last thirteen years regarding enrollment and levels of higher education in Mexico (bachelor's, specialty-master's and doctorate); the third part presents the simple regression and some econometric indicators between higher education and economic growth (measured through GDP).

The concept and definition of economic growth and comprehensive development

In many social environments and circles, education is associated with a document or degree, ignoring that the universal purpose of the educational process is in the first instance the transformation and social training

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achieved by students. The acquisition of knowledge leads to the personal improvement of people, and to an important degree it can generate wealth for the family, the community and for society in general (Muñoz and Salas, 2011 in Medina, 2019, p. 5).

The 2030 Agenda (UN, 2015) sets out the objectives that it seeks to achieve in order to obtain sustainable development. Among them, objective no. 4 aims to achieve quality education, mentioning the importance of education to access new stages of development, including:

- To leave poverty aside requires moving up, through social and economic mobility.
- It promotes the reduction of social inequalities and gender equality.
- It empowers people, through the strengthening of a healthy and sustainable life.
- It fosters tolerance among individuals and promotes the creation of social and peaceful life.

After the Second World War, the discussion of the concept of economic development was emphasized and, with it, different doctrines of economic thought have debated about its definitions and concepts, where it has been shown that the term development contains a heterogeneous meaning in certain historical moments (Villalobos, 2022b, p. 198). To the extent that different political and social nuclei come to power, the economic policies provide notions about their conception of development, which is intimately linked to their ideological considerations.

For Brunet and Böcker (2007 in Martínez and Amador, 2010, p. 86), with the ideas of the English economist John M. Keynes, the foundations of the theory of economic development are established at the end of the Second World War, and since then five schools of economic thought that proposed theories for its explanation are presented:

- Development economics
- Accelerated accumulation systems
- Socialist (Soviet) structure of industrialization
- Structuralist approach of ECLAC (Economic Commission for Latin America and the Caribbean)
- Dependency theories (Latin American)

It is important to note that, for some decades, especially in the early twentieth century, the terms "economic growth" and "development" were

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often used as synonyms, even though conceptually they differ (Villalobos, 1986, p. 172). Even since the mid-nineteenth century, economic growth and development are closely related, especially in the case of industrialization, which entails economic growth derived from increased production (Martínez and Amador, 2010, pp. 84-85).

To talk about development, at present, it is necessary to define five fundamental concepts that, in my opinion, are taking place successively: economic growth, economic development, social development, sustainable development and human development (Villalobos, 2022a, pp. 78-98).

A brief definition of economic growth indicates a sustained rise in output per person, which is higher than the proportion that increases population mass, which is generally based on achieving higher productivity through technology. Benjamín Retchkiman (in Villalobos, 2020, p. 67) assumes efficiency, technological progress and proper management of productive factors to achieve economic growth. Technological progress, which is undoubtedly linked to the educational aspect.

Within the traditional theories of economic growth, the three variables that determine it (natural capital, human capital and organization) have been highlighted, where human capital is inextricably linked to the process or degree of education achieved. So the fundamental human capital is investment in education, which in turn should lead to improved labor productivity.

Another factor was added to the three-factor neoclassical theory that determine economic growth (land, labor, and capital). Theodore Schultz and Gary Becker would call it "human capital", understood according to Martínez and Amador (2010) as "the productive capacity of an individual that is favored by a number of aspects among which education stands out" (p. 88). The first works of human capital were based mainly on the study of the years of schooling attained by the workers and their work experience.

It is worth mentioning that Schultz established that human capital, determined by its qualitative components (skills, knowledge, attributes and skills for work), together with the expense to optimize those skills, increases worker productivity. Later, Becker added education and investment to training as contributions to human capital theory (Pérez and Castillo, 2016, p. 654). Becker mentions two types of skills acquired by workers: specific and general, the first suitable for the production processes of a company, while the second are viewed transversely, since they can be transferred to other companies or organizations.

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Meanwhile, Giménez (2003 in Sandoval and Hernández, 2018, p. 140-141) distinguishes two kinds of human capital: innate human capital, which includes the possibility of change based on modifying nutritional and health aspects; acquired human capital, which is built with the preparation and formal and informal education of the worker, as well as with his accumulated experience through years of work. Formal education comprises all levels of schooling completed, where an official certificate of studies is obtained; while informal instruction covers knowledge acquired outside schools, corresponding to subsequent training and self-learning.

Economic development is achieved when it is preceded by economic growth, which leads to better living standards and conditions for the population, with a better distribution of national income standing out, as well as when there is access to better food and housing. Sandoval and Hernández (2018) state: "The traditional approach identifies economic development with economic growth or increase in gross domestic product (GDP), it is argued that a necessary condition for development is the growth of the economy" (p. 145).

Regardless of the political status of countries, achieving national economic development has been the priority objective for all countries. As pointed out, several approaches and theories have been proposed to explain how to achieve economic development, among the most important in economic matters are: classics, Keynesians, Marxists, neoliberals (neoclassics) or monetarists, structuralists and ecologists.

Sharing what some authors point out, it is undeniable that economic development has a strong relationship with technological innovation in the industrial production apparatus, which is limited to the educational process of a region or country, as maintained by institutions such as the World Bank and authors such as Ávila and Domínguez (2019, p. 120).

Technological innovation or knowledge society plays a strategic role in global economic competition, which is why high investments are given in the educational system (research, technology and innovation), to enable access to better stages of economic development. Márquez Jiménez (2017) states: "As long as countries, organizations or individuals fail to meet these requirements, they risk being excluded from the knowledge society and, with it, from globalized economic competition" (p. 5).

Economic development becomes social development when better indicators of education, health, public security and social security are available. For Midgley (1995 in Juarez *et al.*, 2019, p. 63), social development is understood as a process that promotes the well-being of individu-

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als and communities, which is achieved with an efficient combination of economic development, leading to improvements in social order contexts.

After achieving economic growth and economic and social development, the next stage is considered as sustainable development, which comes when it is possible to satisfy inadequacies or requirements that affect the present of societies, without endangering or depleting the resources of the future. Sustainable development is intimately related to the care and protection of the environment, so it is a proposal that integrates economic, social and ecological dimensions, in search of the construction of a comprehensive vision of development.

So important is education in achieving development that goal no. 4 for sustainable development of the 2030 Agenda aims to "ensure inclusive, equitable and quality education and promote lifelong learning opportunities for all" (UN, 2015). Some revealing data on the lack of education worldwide are released by the UN (2015), where it is noted that:

- In 2018, an estimated 260 million children were out of school, equivalent to one-fifth of children of that age.
- Enrollment at the primary level is covered by 91 % in developing countries, but the remaining 9 % means that 57 million children do not attend primary schools.
- Globally, half of children and adolescents have failed to achieve basic standards of literacy and math skills. Also 617 million young people do not have minimum learning in arithmetic and literacy.

Goal no. 4 includes ten goals to be able to fulfill its main purpose. Goal 4.7 sets out an expectation that "all students acquire the knowledge and skills necessary to promote sustainable development" (UN, 2015).

Another concept that has recently been put forward is sustainable social development (SDD), which includes both tangible and intangible aspects. Among the former is drinking water in homes, healthy food, medicines and decent housing; within the latter is education, employment, social equity and application of justice (Vallance *et al.*, 2011 in Juarez *et al.*, 2019, p. 65).

Finally, after achieving economic growth and development in the economic, social and sustainable spheres, the next step is human development, which consists in the transformation of placing the individual as the central axis of public policies, thus allowing to meet their primary needs individually. The main driver of the concept of human development is Amartya Sen, who goes beyond ideas of achieving economic growth and development, placing personal freedoms as goals of human

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development. This would mean improving conditions and capabilities seeking to achieve a full and dignified life, in coexistence with a democratic and equitable society (Márquez Jiménez, 2017, p. 13).

The skills approach, first addressed by Sen and subsequently by Nussbaum, is the accumulation of real opportunities enjoyed by an individual to secure and promote his or her fundamental rights, seeking to empower individuals to achieve a life of dignity and fulfillment. Here it should be considered that education (especially civics) tends to achieve digital capacities focused on achieving an integral, democratic coexistence and above all that promotes human development (Gozalvez and Cortijo, 2023, pp. 44 and 54).

Amartya Sen's contributions served as a basis for the UN in 1990 to begin the elaboration of the HDI in different countries and regions of the world. In addition, was awarded the Nobel Prize in Economics in 1998. According to Pérez and Castillo (2016, p. 658), Sen redefines the concept of development, contrasting it with its traditional or strict approaches, and presents it as the improvement in the quality of life of people, based on the enjoyment of real freedoms, emphasizing that these depend on socioeconomic institutions (education and health care) and policies (participation in debates and public scrutiny).

Education will become important in comprehensive development, when it is delivered with quality and relevance. Farro (2001, p. 49 en Blancas, 2018, p. 116) indicates that when talking about educational quality, implicitly, we talk about competitiveness, since it along with social responsibility, can contribute to generate or stimulate economic growth, which can allow to achieve greater stages of integral and human development.

Human development is concretized and synthesized with the HDI, whose function is to measure the advances of the standard of living of a locality (municipality or province) or country. The HDI has three components: a long healthy life, knowledge, and a decent standard of living. On the contrary, the Multidimensional Poverty Index (MPI) measures the occurrence of deprivation and the degree of poverty intensity. While the HDI measures average achievement, the HPI captures people's unmet needs through three components: education, health, and standard of living.

A concept intimately linked to poverty and marginalization is that of social inclusion, which, for Cecchini (2020), is complex and multidimensional and can be addressed from different visions (economic, social, educational, labor and productive). The author adds: "ECLAC considers that inclusion, in general, means an improvement process of living condi-

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tions, economic, social, political conditions and the full participation of the population in society and development" (p. 112).

In the current times and more since 2020, with the arrival of the COVID-19 pandemic, the lack of access to social networks and online applications implies social exclusion. For this reason, families in situations of poverty have to make an extra economic effort to have Internet services that allow them to have a connection to the network, to communicate with their schools or to live with their friends, having to sacrifice other essential satisfiers (clothing, food, travel), to have equipment and access to commercial or educational networks of the Internet.

The absence or ineffectiveness of public education policies may have the effect that not all social sectors have equal opportunities for accessing education. There may be inadequate infrastructure or lack of academic quality, presenting implications for not reaching the stages of development that the country requires.

In this work we understand the importance of continuous and constant education throughout the existence of people, especially that corresponding to technical and higher levels. Lifelong learning presents as a fundamental tool to transform the quality of life in a personal way, but it also involves changes that lead to improvements in society in general, and should ultimately lead to higher levels of economic growth and comprehensive development in all its areas.

The whole world and our country require trained and educated individuals to interact in local or global markets, where they highlight critical and constructive thoughts that are able to influence the contribution of the stages of economic and cultural development, in a sustainable way for the regions where they participate. Even so, in Latin America and especially in our country, there are accumulated lags for decades in the educational system, highlighting features such as elitism and lack of public budget to support it, in addition to the inadequate use of resources that have been allocated to the school sector.

Just as the concept of development is considered to be polysemic and its definition is based on who holds economic and political power, educational systems are being transformed from these areas. Hence, our role is to create the conditions for school processes to become inclusive and allow the active intervention of vulnerable groups in society. It seeks to regularize and standardize educational contexts, creating common elements for most of students to achieve an equitable enjoyment of knowledge, technology, and science (Martínez Díaz, 2020, p. 53).

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The educational investment made with public resources results in the beneficiary students to improve their economic conditions and, in addition, would benefit the local economy of the region or country where they are located, by increasing the productivity of work and the speed of application of technological innovations, highlighting those processes in peripheral or dependent regions. According to the neoclassical view of economics, the educational service generates social benefits and positive externalities for the society.

In a direct observation, Barro and Lee (2010 in Sandoval and Hernández, 2018, p. 153) worked with adult education indicators from 146 countries, spanning 1950 to 2010, and with five-year intervals. They point out that inhabitants in developed nations had an average of eleven years of schooling, compared to seven years in the least developed or poor countries, which indicates about at least four years of difference between rich and poor countries, when it comes to adult education.

Education, according to the philosopher Immanuel Kant, should not respond to particular interests, but to their own interests of individual improvement and conversion into better people, in such a way that better stages of development for society and humanity in general are achieved, marking that self-interest is limited and human interest is infinite (Obando Ibarra, 2018, p. 38). Within Kantian philosophy, the educational process is immersed in moral actions, but it is emerging as an essential point to achieve the development of humanity. In this sense, Ortiz Soriano (2023) states that "in the field of education that is the basis of the development of people in particular, and of humanity in general" (p. 160).

Education, in its relation to development, should not only focus on instruction and acquisition of competences, but ultimately focus on achieving human development as a space of freedoms of the individual. Critically, Obando Ibarra (2018) points out that an insane environment has been created, where some segment of the student population only wants to achieve high educational levels, not to be optimal professionals, "but to compete, to earn more, to ascend socially" (p. 37).

The new paradigm of education must foster a movement that has consequences on people's lives. In this sense, the role of higher education institutions is indispensable for the training of people who have to assume social leadership, so the Agenda 2030 (UN, 2015) to achieve sustainable development reaffirms the role of the university to create a culture of social responsibility and a determining role for achieving development (De la Rosa *et al*., 2019, p. 181).

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As for Pegalajar *et al*. (2022, p. 423), programs for obtaining university degrees should incorporate programs based on sustainability subjects and active learning methodologies, which stimulate the educational system based on values and the development of critical thinking attitudes observed by students. Likewise, Juárez *et al*. (2019, p. 61) indicate that education implicit in sustainable development (ESD) requires the application of active or participatory methodologies of learning and teaching that motivate students, providing autonomy. Such behaviors can achieve sustainable development benefits by promoting future scenarios and social acceptance of decisions, as highlighted by the world's leading educational institution, UNESCO.

Education in a current vision must correspond to a key element in generating economic, social, sustainable and human development. In this sense, education and development are linked, inferring that education is the engine of change and the driver that will allow generating an increase in the quality of life of individuals and society in general.

Only with an articulated and continuous education between the different educational levels, where quality prevails, will be able to prepare the human resources that must face the productive processes and the permanent advancement of technologies; therefore, university preparation and training is considered as an act that leads to educational justice that must implement development in the countries (Ovalle, 2019, p. 30).

Rather than education serving to benefit the privileged and presenting an exclusively instrumental value, it must become an engine for achieving human development, being able to promote equality and social justice, which ultimately result in improving the distribution of wealth (Martínez and Amador, 2010, p. 84). In this regard, Blancas Torres (2018, p. 120) notes that education has a significant influence on social change, which entails the transformation of the population and a better living standard for all people.

As mentioned above, education allows individuals and society to be closer to improving their quality of life, for that reason education is a link that generates highly positive impact in the chain of achieving integral and human development. On the contrary, the lack or absence of education results in opposing poles between development and marginalization (poverty).

The quality of education implies becoming suitable for economic growth and integral development, when the members of the school community are linked to this process and can understand the multiple areas that determine them; so that the challenge is to be able to build a compre-

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hensive educational system that favors the progress of the human being, at the same time that an integral human development is achieved (Joaqui and Ortiz, 2020, p. 158).

These times require students to have full knowledge of the use of new communication technologies (ICT) and to be immersed in active learning methodologies. Therefore, education systems have the challenge of preparing them and reducing intergenerational gaps, for which Echeverría Samanes and Martínez Clares (2018, p. 4 in Martínez Díaz, 2020) state: "Education is the most powerful weapon which can be used to respond to the inescapable need to update and improve the skills of increasing numbers of people and also throughout their lives" (p. 58).

Joaqui and Ortiz (2020) make it clear that the main interest of education and learning should not be to maximize economic output, so their main function is to try to contribute to social and human development, adding: "the aim is to carry out a more balanced process, an economic growth for the benefit of society, but better yet, to increase social capital for the good of all humanity" (p. 160)

In this sense, Rodríguez *et al.* (2019, p. 89) state that commercial activity is sustained based on the principle of instrumental, sordid and speculative rationality, so that, in philosophical terms, business and education must be intertwined with social approval and economic growth. The authors says that collective organization must prevail in the educational system, rather than the advancement of individual competencies.

Finally, it is important to emphasize that the next sections will address the part corresponding to the Mexican nation, where reference will be made to the normative part and some data will be made explicit that allow us to locate the importance of higher education level in Mexico.

Enrollment at the higher educational level in Mexico

It should be recalled that in 1948 the Universal Declaration of Human Rights (UDHR) was pronounced and in article 26.1 (UN, 2022, pp. 5-6) indicates that everyone enjoys the right to education, which should be provided free of charge in elementary and primary settings. In addition, efforts should be made to ensure that technical and vocational education is widely available to the population, with equal access, depending on the merits or qualifications obtained. Article 26.2 (UN, 2022, p. 6) states that education shall aim at the full development of the individual and the

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strengthening of strict compliance with human rights, which shall allow always enjoy freedom.

As Mexico is a signatory to the UDHR, the human rights aspect is linked to education. About it, no. 3 of the Political Constitution of the United Mexican States (CPEUM) refers: "The State shall provide and guarantee initial, preschool, primary, secondary, and higher education [...] The State shall be responsible for the management of education, which, in addition to being compulsory, shall be universal, inclusive, public, free and secular" (paras. 1-2).

The General Law of Education (LGE, 2021) has this numeral of the CPEUM. In the last paragraph of Article 7, the LGE (2021) states that education provided by individuals will require authorization by the State, granting recognition of official validity of studies (RVOE), according to what CPEUM states (No. 3, fraction VI). According to fraction I of the number. 35 (LGE, 2021), the education provided in Mexico, through the national education system, will be of three types: basic (initial-preschool, primary and secondary), upper secondary (baccalaureate and professional baccalaureate) and higher.

Higher education is the latest outline of the educational services envisaged by the CPEUM (art. 3), stating: "It is the service that is provided at its various levels, after the upper average rate. It is composed of the bachelor's, specialty, master's and doctorate" (LGE, 2021, art. 47). It also mentions that it is composed of normal and higher technical education at all levels.

Mexican higher education faces many challenges, among which, Sánchez Mendiola (Pelletier *et al.*, 2022, p. 45) points out: diverse national coverage; versatile quality; regulatory problems; limited financial support; recognition of teachers; large digital gap increased by the COVID-19 contingency. Additionally, it mentions that Mexico, being an emergency economy, presents problems for the use of non-school modalities (online), highlighting the following:

- Unfortunate categorization of online learning, which is seen as of lower quality in parallel to face-to-*face* education.
- Preeminence of face-to-face instruction in universities.
- Diverse reach in online or mixed learning capabilities.
- Insufficient technology and educational infrastructure.

Mendiola said that Mexico had a large and complex educational system at the higher level. It states that there are about 6,000 higher education institutions (40.5 % public and 59.5 % private), with 5 million stu-

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dents enrolled (52.5 % women and 47.5 % men), with more than 400,000 instructors, most of them attached to public universities, finding that out of every 100 students who enter basic education, 36 students enroll in higher education and only 26 obtain a degree (Pelletier *et al.*, 2022, p. 45).

Some data for Mexico for the upper level in the 2022-2023 school year are highlighted, based on the data provided by the DGPPyEE, dependent on the SEP (2022):

- There were 5,192,618 pupils enrolled, of which 53.7 % were women and 46.3 % men. The Statista Research Department estimated the Mexican population as of July 29, 2022 at 128.9 million (4 % of the national population pursuing higher education). Attended in 8789 schools and counting with 490 309 teachers.
- Mexico City has 17.1 % of the students at the higher level, the State of Mexico has 10.9 %, Puebla has 6.8 %, Nuevo León has 5.9 % and Jalisco has 5.8 %. These five states account for 46.5 % of national high school students.
- 63.2 % of higher education students are enrolled in a public university and 36.8 % in private universities. This means that slightly more than one student in three studies in private higher education institutions.
- 70.4 % of the students at the higher level are enrolled in formal education and 29.6 % in non-formal education (*online*).
- From the higher level: 5.7% of the upper and normal technical course; 85.9 % of the bachelor's degree; and 8.4% of the postgraduate degree, of this, 73 726 students are enrolled in a specialty (16.8% of the postgraduate course and 1.4 % of the total of the higher level), 304 153 study a master's degree (69.4 % of the postgraduate course and 5.9 % of the total) and 60086 students are in doctorate (13.7% of the postgraduate course and 1.2% of the total).

Table 1 shows the enrollment of students from 2010 to 2022, together with GDP, noting that the years correspond to the previous immediate school year (for example, the year 2022 corresponds to the 2021-2022 cycle). School cycles for the SEP run from September to August.

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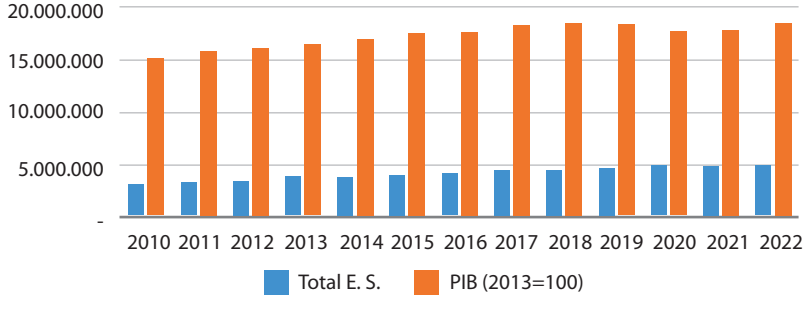
Table 1
GDP/enrollment in higher education in Mexico 2010-2022

Year	GDP* (2013 = 100)	Total E.S.	Bachelor	Graduate	U. government	Private U.S.	Schoolgirl	Not schooled
2010	15,147,830	3,107,713	2,878,417	229.296	2,060,189	1,047,524	2,847,376	260.337
2011	15,744,973	3,322,046	3.071.043	251.003	2,223,184	1.098,862	2,981,313	340.733
2012	16,212,911	3,550,920	3,274,653	276.267	2,368,463	1,182,457	3,161,195	389.725
2013	16,405,770	3,732,653	3,449,401	283.252	2,504,599	1,228,054	3,300,348	432.305
2014	16,964,883	3,882,625	3.588,041	294.584	2,486,980	1.395.645	3.419.391	463.234
2015	17,428,156	4,032,992	3,718,995	313.997	2,716,519	1.316.473	3.515.404	517.58
2016	17,595,775	4,244,401	3,915,971	328.430	2,843,429	1,400,972	3,648,945	595.456
2017	18,307,213	4,430,248	4,096,139	334.109	2,943,428	1,486,820	3,762,679	667.569
2018	18,545,018	4.561.792	4,209,860	351.932	2,954,468	1,607,324	3.864.995	696,797
2019	18,430,382	4,705,400	4,344,133	361.	3,039,167	1,666,233	3,943,544	761,856
2020	17,701,916	4,931,200	4,546,586	384.614	3,147,394	1.783.806	4,061,644	869.556
2021	17,904,768	4,983,206	4,579,894	403.312	3,231,266	1,751,940	4,030,616	952,590
2022	18,560,365	5,069,111	4,647,443	421.668	3,252,074	1.817.037	4,004,680	1.064.431

* Quarterly GDP in millions of pesos at 2013 prices.

Source: Own elaboration from SEP (2022) and INEGI (2022).

Figure 1
Students of higher education and GDP in Mexico
(millions of students and pesos)



Source: own elaboration.

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Before starting with the analysis, the GDP presented in Table 1 has discounted the inflationary indexes based on the year 2013. From 2010 to 2018, we can see real growth of 22.4% over eight years, which gives an average annual real growth of 2.8 %. In 2019, a slight fall in GDP of 0.6 % (less than 1 %) was observed, having a great collapse of 4 % in 2020 (in nominal terms the fall was greater than 8 %), which is explained by the economic contraction caused by the COVID-19 pandemic.

In 2022, it was possible to recover the GDP losses in Mexico, which occurred in the last three years (2019 to 2021), resuming the national production or demand recorded in 2018, although it should be noted that the national population increased in three years. In 2010, *per capita* GDP (GDP/Population) was estimated at 126 176 pesos per year at 2013 prices, growing until 2018 *per capita* GDP to 141 240 pesos, observing a real increase of 11.9% in eight years, giving an average of 1.5% per year in the period. GDP fell significantly in 2020 due to the COVID-19 contingency and despite the fact that in 2022 GDP managed to reach the monetary amount of 2018. The real *per capita* GDP is 140 833 pesos, having a fall in real terms of 0.3 % from 2018 to 2022.

According to Table 1, it went from 3.1 million high school students in 2010 to almost 5.1 million by 2022. This shows a 63.1 per cent growth in the country's higher enrollment, equivalent to an annual growth of 4.8 % from 2010 to 2022. Graduate enrollment grew by 83.9 % over the period.

The relative share of higher technical, normal and undergraduate studies in the total tertiary level was 92.6 % in 2010, rising to 91.7 % in 2022. In contrast, postgraduate studies in 2010 accounted for 7.4 % of the total higher education level, while in 2022 it accounted for 8.3 %. In the period 2010-2022 (thirteen years), it can be seen that undergraduate students grew by 61.5 %, specialty-master by 77.9 % and doctoral 136 %, observing a greater dynamism in the highest degree of studies recognized in Mexico: the doctorate.

Out of the total number of students at the national higher level, in 2010, public universities accounted for 66.3 %, while private universities accounted for 33.7 %. By 2022, public schools accounted for 64.2 % of students and private schools for 35.8 %, with a decrease of two percentage points for public institutions and the same for private institutions.

Regarding the type of education in 2010 (formal and non-formal), 91.6 % of them were in higher education (traditional), while 8.4 % were in non-formal education (online or mixed). By 2022, trends are changing significantly, with 79 % pursuing traditional studies (formal education) and

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21 p% non-formal education. In 2010, there were 260,337 students enrolled in non-formal education, while in 2022 there were 1,064,431 students, quadrupling the number in thirteen years, of which 63.8 % were students from private universities and 36.2 % from public schools. Most of these percentages can be explained by the contingency originated with COVID-19, due to the collapse recorded in the economic activity of the country.

Distance higher education (non-formal education), in the 2021-2022 school year, concentrated in the following states: Mexico City 28.5 % of students, Mexico State 10.5 %, Puebla 7.9 % and Veracruz 6 %, absorbing these four states 52.6 % of high school students in non-formal education.

To conclude this section, the 16 Mexican universities that have the highest number of students in the 2021-2022 school year will be presented, with their corresponding participation in the total number of high school students in the country and their public or private support:

- National Autonomous University of Mexico (UNAM): 257 747 (5.1 %). Public.
- National Polytechnic Institute (IPN): 140 806 (2.8 %). Public.
- University of Guadalajara (UDG): 140 348 (2.8 %). Public.
- Universidad Autónoma de Nuevo León (UANL): 136 423 (2.7%). Public.
- Open and Distant University of Mexico (UNADM): 110 650 (2.2 %). Public.
- Benemérita Universidad Autónoma de Puebla (BUAP): 95 224 (1.9 %). Public.
- Technological University of Mexico (UNITEC): 89 327 (1.8 %) Private.
- Universidad del Valle de México (UVM): 82 316 (1.6 %). Private.
- Autonomous University of Sinaloa (UAS): 71 556 (1.4 %). Public.
- Autonomous University of the State of Mexico (UAEMEX): 69 794 (1.4 %). Public.
- Autonomous University of Baja California (UABC): 67 944 (1.3%). Public.
- Universidad Veracruzana (UV): 66 679 (1.3 %). Public.
- Metropolitan Autonomous University (UAM): 57 249 (1.1 %). Public.
- Monterrey Institute of Technology and Higher Studies (ITESM): 57,216 (1.1 %). Private.

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- Universidad Michoacana de San Nicolás de Hidalgo (UMSNH): 40 635 (0.8 %) Public.
- Higher Education and Research (Millennium TEC): 39 474 (0.8%). Private.

The 16 universities listed consist of 1,523,388 students enrolled in the 2021-2022 school year, representing 30.1 % of the total number of students at the higher level in Mexico. This means that 3 out of every 10 students of the higher level of our country are enrolled in one of the 16 universities listed.

The following section will address the relationship between high school enrollment and economic growth and development in its different areas achieved in Mexico.

Higher Education and its Relationship with Economic Growth in Mexico

One of the attributes of knowledge is that it can be demonstrated and measured with statistical indicators. One of the most commonly used elements is correlation tests, which involve the association of variables that present a predictable behavior (Dolores *et al*., 2022, pp. 160-161), hence its importance to try to plan activities or to explain a particular phenomenon.

This section addresses the role of higher education in the process of economic growth in Mexico. It has been argued for some decades that education is a driving force for economic growth. To test this hypothesis, an econometric analysis of simple linear regression is performed, where GDP is the dependent variable and the enrollment of students of higher education (includes bachelor's and postgraduate) is the independent or explanatory variable.

In the econometric study, five fundamental tests were performed: correlation coefficient, F test (Fisher), Durbin-Watson coefficient (DW), Student's T test and P test (probability). The estimates presented are run in Excel, using its tool "Data Analysis", where the DW was calculated by the author, since the referred program does not present it.

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Table 2
Regression analysis between higher education and economic growth (GDP) in Mexico

Remarks	13		Coefficients	Statistical T	Probability
R^2 Coefficient	0.840	Interception	10 646.07	12.0362	0.00000
R^2 adjusted	0.826	Students E. S.	0.00159	7.6101	0.00001
F	57.91	Critical value F	0.00001	DW	0.834

Source: Own elaboration.

These data allow us to perform the following econometric analysis of the calculated regression from 2010 to 2022:

1. *Coefficient of R^2 determination*: the changes in the dependent variable (GDP) can be explained or move in the same direction as the movements observed in the independent variable (enrollment of students of higher studies), which can explain 82.6 % of the variation experienced, so that other variables not considered in the regression explain 17.4 %. In this way, the hypothesis is affirmed that, the greater the increase in higher education enrollment, a higher stage of economic growth reached.
2. *F-test*: the calculated value of F = 57.91, while in the tables for this statistic a minimum value of 3.14 is requested for 13 data, and with an independent variable the amount exceeds without any problem, then it can be affirmed that the estimated simple linear regression can be fully accepted with a high statistical significance degree, i.e., with a confidence level of 99 % (or 1 % of significance). Additionally, this indicator is reinforced with the critical value of F = 0.00001, when that parameter should not exceed 0.05, set in the statistical tables, and the closer to zero that parameter better for regression. This confirms the significance of the independent variable (higher education enrollment) in the amounts observed in the dependent variable (GDP).
3. *DW coefficient*: This is a determinant test to validate the linear regression model in general terms, since when presenting autocorrelation (positive or negative) it would annul all the statistical parameters obtained. In the data thrown with the DW coefficient = 0.83, values of tables are taken and mark as lower limit 0.74 and an upper limit of 1.04, for 13 data with an independent variable, so we appreciate that the parameter is within

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the allowed range and no autocorrelation, neither positive nor negative in the equation.

4. *Statistical T*: the tables for this test indicate that the value of the variable be greater than 2.65 (with 13 data or degrees of freedom and with significance of 0 01), when T = 7.61, surpassing without any problem the value of tables, confirming the hypothesis that the greater increase of the enrollment of higher education (independent variable) similar movements are observed and in the same sense of GDP (dependent variable).
5. *P-test*: with this coefficient we reinforce the explanation of the significance of the independent variable in the values found in the dependent variable, the closer to zero is better if it exceeds the amount of 0.05, it is said that it would not present explanation impact. In the regression P = 0.00001, much less than the advised, which confirms that increases in higher education enrollment in Mexico can produce increases in GDP.

Two more simple linear relations were experimented, putting the enrollment of higher level students in Mexico as an independent variable and as independent variables: the GDP *per capita* of Mexico and the HDI for Mexico. This last variable, trying to relate it with integral development. But these data yielded no expected explanation, presenting the estimated regression models with negligible values in both cases, both with amounts and with growth rates.

It was also intended to show that with greater postgraduate studies (specialty-master's and doctorate), as an independent variable, it could be specified the changes experienced in the amounts of GDP, which would serve as a dependent variable over the last twelve years, yielding the following results:

- *Postgraduate*: adjusted determination coefficient of 76.2 %, with significant parameters. A positive autocorrelation was found with DW = 0.63, when the table asks us to place the indicator between 0.74 and 1.04, thus losing the validity of the regression.
- *Specialty-mastery*: adjusted determination coefficient of 76.4 %, with relevant parameters, and positive autocorrelation with DW = 0.64.
- *Doctorate*: adjusted determination coefficient of 74.2 %, with significant parameters, but same as in previous years with positive autocorrelation: DW = 0.61.

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In the last year, changes in GDP (dependent variable) were related to those recorded in higher education enrollment only at the bachelor's degree level (independent variable), obtaining results very similar to the previous linear regression. Therefore, such data will no longer be reported.

Conclusions

The objective of this work was to analyze the relationship of higher education level with economic growth and with the stages reached of development in its different fields (economic, social, sustainable and human). The question raised was: is the higher enrollment of higher education in correspondence with the levels of economic growth and integral development achieved in Mexico?

Economic growth is the permanent increase of the national product or wealth, based on the increase of productivity, where the educational level plays a fundamental role to achieve its improvement. Once economic growth is achieved, economic development is accompanied by a better distribution of income, optimizing the population's food and housing levels. Social development is achieved when there is economic development, along with increases in the attributes of community existence, which are achieved with elevated public safety, education, health and social security. Sustainable development is obtained when there is social development, along with not compromising the resources of future generations and caring for the environment. Human development involves talking about the combination of economic, social and environmental aspects, which are reflected in achieving a life of dignity and fulfillment, based on human freedoms.

In the 2021-2022 academic year, Mexico enrolled 5.07 million students, representing 4.0 % of the total national population; at the technical level, 5.5 % of the total were enrolled; at the undergraduate level, 86.2 % were enrolled; in specialty and master's degree, 7.2 %; and in doctoral studies, 1.1 %. In another classification: 4 million are enrolled in public universities (64.2 %) and 1.82 million in private universities (35.8 %). Of the total number of students enrolled at the higher level, 79 % are enrolled in traditional mode (schooling) and 21 % in non-schooling mode, which correspond to 1.06 million students, falling in 63.8 % to private universities and 36.2 % to public universities.

This work started from the hypothesis that higher education contributes to achieve economic growth and better stages of integral devel-

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opment in the nation (economic, social, sustainable and human). It was possible to verify the hypothesis that the higher the enrollment or number of students of higher level in Mexico from 2010 to 2022, a higher stage of economic growth reached, explaining this correlation with 82.6 % variation between the independent variable (higher education) in relation to the dependent variable (GDP). Thus, other variables could explain 17.4 % of the changes experienced in economic growth (GDP).

It was intended to show that the horizon of human development, measured with the HDI, can likewise be explained by the higher coverage of higher education in the country *(independent variable) from 2010 to 2022, but with these data no expected explanation was obtained.* Similarly, the increase in GDP *per capita* could not be explained by the country's higher education students.

At a higher level of the degree of studies in Mexico, experiencing the levels of higher studies as independent variables (doctorate and master respectively), acceptable levels of explanation would be reached, but autocorrelation was presented in the estimated linear regressions, which caused loss of confidence of the resulting statistical parameters.

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Pedagogical practice of critical thinking from cultural psychology

Práctica pedagógica del pensamiento crítico desde la psicología cultural

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Abstract

Critical thinking is an essential competence in current educational approaches; however, it has been the subject of diverse definitions, requiring a comprehension from its epistemology, theorization, and praxis. The objective of this research was to analyze notions about critical thinking and pedagogical practices in a group of Latin American teachers. The qualitative-critical paradigm was used through the hermeneutic method. The selection of participants was carried out through theoretical saturation sampling, obtaining a group of eight teachers to whom in-depth non-directive interviews were applied. In the analysis of results, 5 categories emerged: 1) Notions about critical thinking, in which the tendency towards a cognitive and rational emphasis is evident; 2) Didactic praxis, expressing greater mastery of linguistic content subjects as appropriate to promote critical thinking; 3) Self-assessment and need for greater reflection and training on teaching praxis in the area, 4) Curriculum and educational policies, in which inconsistencies between curricula and classroom practice are exposed, and 5) Critical thinking and performance academic, which exposes a non-linear relationship between both concepts. It is concluded that it is essential to avoid determinisms based on skills that express critical thinking and instead promote complex approaches that allow including cultural, social and ethical experiences also inherent to the process.

Keywords

Critical thinking, pedagogical practice, reasoning, determinism, language, culture.

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Resumen

El pensamiento crítico es una competencia fundamental en los actuales enfoques educativos, sin embargo, ha sido objeto de definiciones diversas, exigiendo un abordaje desde su epistemología, teorización y praxis. Esta investigación tuvo como objetivo analizar las nociones sobre el pensamiento crítico y las prácticas pedagógicas aplicadas en el aula por docentes latinoamericanos. Se acudió al paradigma cualitativo-crítico a través del método hermenéutico. La selección de participantes se realizó mediante el muestreo por saturación teórica, obteniéndose un grupo de ocho docentes a quienes se aplicaron entrevistas no directivas a profundidad. En el análisis de resultados emergieron cinco categorías: 1) nociones sobre pensamiento crítico, en las cuales se evidencia la tendencia a un énfasis cognitivo y racional; 2) praxis didáctica, expresando mayor dominio de las asignaturas de contenido lingüístico como adecuadas para promover el pensamiento crítico; 3) autoevaluación y necesidad de mayor reflexión y capacitación sobre la praxis docente en el área; 4) currículo y políticas educativas, en la cual se exponen incongruencias entre los currículos y la práctica de aula; 5) pensamiento crítico y rendimiento académico, que expone una relación no lineal entre ambos conceptos. Se concluye que es fundamental evitar los determinismos basados en habilidades que expresan el pensamiento crítico y en su lugar promover aproximaciones complejas que permitan incluir experiencias culturales, sociales y éticas que son también inherentes al proceso.

Palabras clave

Pensamiento crítico, práctica pedagógica, razonamiento, determinismo, lenguaje, cultura.

Introduction

The new educational trends propose the development of critical thinking in the classroom. This interest is related to the identification of current needs linked to sustainable development and democratic citizenship (Diez *et al.*, 2021; Noula, 2018), which require skills and abilities to act in the face of complex social and cultural dynamics, as well as solving everyday problems using technology. For this reason, educational policies around the world are increasingly oriented to foster critical thinking as a competence that includes skills that allow the active and effective application of academic knowledge in real contexts, giving as much importance to argumentative and participatory aspects as to cognitive processes acquired through learning (García, 2018).

However, the training of critical students is not a recent need in education. Although since 2000 there has been interest to empirically address this process through scientific research (Cebotarev, 2003), critical epistemology and pedagogy have been used in Latin American school for several decades, raised as transformative processes that emerge from the awareness of reality itself in front of structural elements, such as social class, power or domination (Freire, 2009; Giroux, 2001), in the end, with a political sense. Such knowledge has been decisive to consider critical thinking from a historical, cultural and ethical perspective. On the other hand, critical pedagogy considers not only a student active in the trans-

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formation process of his own knowledge, but also a teacher prepared to generate challenges and questions that motivate the student to look at reality in unconventional ways. However, this implication of the teacher in a transformative critical practice is a matter that seems to be dismissed in the recent dominant approaches of educational policies and also in classroom work.

Considering the above, three fundamental questions have been taken into account to enunciate the research problem: how do Latin American teachers conceive and define critical thinking? How do they promote it inside the classroom? Do definitions of critical thinking that teachers have determine the specific ways of dynamizing work in the classroom?

Although the idea is not to make an analysis of the contributions of Latin American critical pedagogy, the research aims to know the current conceptions, definitions or notions of Latin American teachers on critical thinking and its development in the classroom facing the current educational demands, in order to reflect on the gaps or needs that may be present, in addition to continuing to pay in the research field to enrich the concept. For this reason, the objective of this research was to analyze the notions of critical thinking possessed by Latin American teachers and the pedagogical practices applied in the classroom for its development in students.

In this context, it is interesting to know how critical thinking is defined from the teaching practice in Latin America, which are the dominant approaches and strategies for its dynamization in the classroom, considering that it is not possible to assume the new educational trends towards a paradigm shift oriented to the promotion of critical competences if there is not previously a reflective teaching exercise from the epistemological, theoretical and procedural, which consciously encompasses the complexity of a process that integrates bidirectionally the student and teacher. It is necessary to consider that classroom practice requires a dialogic and innovative attitude that clearly promotes discussion and argumentation based on experiences as well as academic knowledge. Hence the relevance of this research and the need to deepen in these topics.

Then, three dominant trends that explain critical thinking are reviewed in the following section, the first two related to qualitative approach, and the third to the positivist-quantitative approach. This review presents specific versions of critical thinking and its applications in teaching practice.

Subsequently, to fulfill the objective of this research, the qualitative method used is described, which is aligned with the sociocritical paradigm (Denzin and Lincoln, 2012), through interviews with eight teach-

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ers of primary and secondary education institutions in different Latin American countries, considering the need to address their personal conceptions and pedagogical experiences around the development of critical thinking in their students. This approach allowed recovering and understanding the meaning of the teachers' stories, through the reflexive, culturally situated and transformative interpretation. Finally, the results achieved (following the process of qualitative categorization) and the discussion of these results in the light of the theoretical and empirical elements considered are stated.

Trends in the study of critical thinking

As pointed out, it is possible to specify through the consultation of the literature that, in current understandings about critical thinking, educational work has been underestimated based on ethics, questioning and transforming; instead, the approaches are oriented to the objectification and identification of observable and measurable categories in the classroom. According to the above, in the literature review carried out for this research, three major trends that guide current studies on critical thinking were identified, which have effects in Latin American pedagogical practice.

First, constructivism, which is undoubtedly a dominant trend today, which conceives critical thinking as a superior cognitive ability, oriented towards the search for tangible results that can have an impact on academic performance (Cubides *et al*., 2017, Ossa-Cornejo *et al*., 2017; Oliertas and Sanmartí, 2009; Campos, 2007). In this trend, reading and writing have been considered as the process that objectifies critical thinking, as a skill that enables and evidences conceptual structures acquired on the basis of the dynamic interrelation between reader, text and context (Solé and Castells, 2004). From this perspective, critical thinking is constructed when the reader stands in front of the information offered by the text, transcending literal language through the formulation of inferences and the elaboration of new meanings (Cassany, 2017), either through critical reading or writing, for example, essays or research. In summary, the constructivist line supports the concept of critical thinking as language, omitting the diversity of other knowledge experiences.

Secondly, there is another epistemological and theoretical line that considers critical thinking as an integrative process in which the acquired learning in the educational context, articulated with the experiences of personal, citizen or work life, participate and dialog (Ross and Gautreaux,

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2018; Saiz and Fernández, 2012; López Aymes 2012). This process has a social and cultural sense, in addition to the one learned at school, since it emerges from the problematization of experiences applied to daily life thanks to the development of research and creative skills. Therefore, it crosses the different areas of knowledge whenever a problematizing and dialogic environment is established in teaching. From this approach there is an understanding of critical thinking as a competence that develops through problematizing situations in areas such as mathematics (Cornejo-Morales and Alsina, 2020), history (Moreno-Vera, 2018; Grez, 2018), the arts (Poce, 2021) or the natural sciences (Blanco *et al*., 2017), on which there should be focus on the different educational stages and even at the university level. This approach relates with the perspectives of critical thinking established from a complex and ecological-cultural understanding, in addition to the evident legacy of critical pedagogy.

A third line is positivist-quantitative approach, which is determined by the measurable properties of critical thinking. This line tries to consider this construct as a variable that is expressed in students' responses to validated and established dimensions in a specific instrument (Manassero-Mas and Vázquez-Alonso, 2020; Saiz and Fernández, 2012), which is usually theoretically supported by a direct relationship between critical thinking skills and scientific reasoning (Palma *et al*., 2021). The quantitative trend of critical thinking, although less powerful in classroom teaching, finds methodological usefulness in educational research, as well as in quality evaluations that govern educational policies in most countries of the world, as is the case of international PISA tests. In these tests, critical thinking is measured from three dimensions:

- *Knowledge and understanding*, assessed through tests that inquire about the resolution of problems and dilemmas.
- *Skills*, including analytical and critical thinking, through cognitive instruments.
- *Attitudes*, which are evaluated by a context questionnaire, and includes components such as openness to other cultures, respect for otherness, global awareness and responsibility (OECD, 2018).

It is worth mentioning that this perspective defines the criteria for designing and implementing educational policies in favor of the quality of education in most Latin American countries. However, quantitative standards have also made evident the inconsistencies between international evaluation processes, educational policies on critical thinking in the countries of the region, and finally, the performance in classroom practice.

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Current Challenges in Teaching Critical Thinking

It has been found that the expectations to develop critical students in Latin American classrooms are still far from being met (Rodríguez, 2018). It has been exposed not only difficulties in the standardization of educational policies in the educational institutions in *Latin America, but also the need for teachers to have clear curricular and didactic lines that allow materializing critical thinking in education (Castillo, 2020; Niño-Arteaga, 2019), considering the diversity and inequality that characterize the students.* This leads to the first challenge that must be taken into account, since one of the difficulties reported in the literature and which may be linked to the detection of low performance levels associated with critical thinking, is that teachers should make decisions about the strategies to develop these competences (Cruz *et al*., 2019; Noula, 2018), since they have been given autonomy in the design, planning and development of activities aimed at achieving these objectives.

In this sense, the teacher faces not only to generate strategies in didactic practice to promote critical thinking but must generate a personal process of selection and adaptation of the epistemological and theoretical principles that he considers relevant to establish the conceptions of critical thinking that support classroom practice, which requires a pedagogical training (Avendaño, 2016) — which is not always fulfilled—. As pointed out, the three epistemological tendencies on critical thinking that have been previously identified can lead to specific forms of pedagogical approach and it is necessary that the teacher knows them to choose the most appropriate options.

The second challenge has to do with the preference of teachers for traditional and memoristic teaching methods in the different contents, hindering critical practice in the classroom (Noula, 2018), hence, although there are good intentions, often the teaching strategies implemented are not relevant and effective for problematizing (Gámez, 2012). Here it is necessary to reconsider the proposal of Freire (2009) who points out that the school should invite to an education based on dialog and reflection, or Bruner (2006), from constructivism who emphasizes the construction of meanings, since it allows to familiarize with new information and to question the normative, which is essential in the formation of critical thinkers.

When education promotes the repetition of content, it limits the possibilities of the student to establish connections and associations between the known, the learned and the experiences, as well as it hinders the possibility of questioning, diverging and generating alternatives to the challenges. For this reason, repetition and memorization reduce students'

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abilities to face social demands, since it forms them in basic instrumental skills, but it does not provide opportunities to transcend an unequal and dependent productive model. This is clearly linked to the conditions of inequality that characterize the Latin American region and are closely related to educational quality, since inequality in access to teaching resources provides fewer opportunities for students from urban and rural areas to access innovative pedagogical models that promote critical competences (Huanca-Arohuanca and Canaza-Choque, 2019).

This leads to the third challenge, since the teaching of critical thinking must be culturally situated, considering the processes of each group and the understandings that individuals build about the cultural environment. It should be emphasized that critical thinking is not only a linguistic expression but is linked to the solution and understanding of the daily life problems, which are not only instrumental, but also social. So, establishing standardized systems for the development of critical thinking, and even more, making them quantifiable, limits the possibility of expressing the different possible forms and strategies in the construction of concepts that are elaborated from personal experiences, in interrelation with the challenges and options provided by teachers and peers. In this sense, it is essential to follow the contributions of historical-cultural psychology (Bruner, 2006; Vygotsky, 1995), and to consider that critical thinking is built thanks to the exchange of meanings between the individual and his culture. It is necessary that the teacher, in addition to providing the contents established in the educational curriculum, be able to situate them in the realities of the group, so that the student can incorporate them, rework them and return them critically through the experiences.

Methodology

The objective of this research was to analyze the notions of critical thinking and pedagogical practices applied in the classroom by Latin American teachers. To achieve this objective, a qualitative approach was considered to the experiences of basic education teachers in several Latin American countries.

As mentioned, qualitative research follows a methodological design in which the experience built between the researcher and the participant is privileged through the stories obtained in the interviews (Charmaz, 2006). Therefore, interaction is essential to make these stories sufficiently explicit to achieve the greatest argumentative and, finally, interpretative richness.

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The research was carried out in the context of a virtual training course at an internationally professional training institute, in which 31 teachers from Peru, Mexico, Costa Rica, Ecuador, Colombia, Panama, Paraguay and Chile were enrolled, working at different educational levels. For selecting the participants, it was established as inclusion criteria that teachers were active in practice at the primary or secondary levels of education in their respective countries. University professors were excluded.

Once the inclusion and exclusion criteria were defined, a group of 18 teachers who met the pre-established requirements was obtained. Then, the sample of participants was chosen through the procedure of theoretical saturation proposed in grounded theory (Strauss and Corbin, 2002). This sampling procedure combines the progressive selection of participants, the collection of stories and the analytical process of the collected information, allowing the researcher to progressively expand the range of respondents, while defining emerging categories, until they have been theoretically saturated. When applying the theoretical saturation, a definitive sample of eight (8) teachers as key participants was obtained, whose characterization is as follows:

Table 1
Sample Participants Settings

Participant	Country	Age	Level of education	Service Time
Teacher 1	Peru	52	Bachelor of Primary Education Specialization in Pedagogical Evaluation	16 years
Teacher 2	Peru	62	Bachelor of Social Sciences Master in Education	38 years
Teacher 3	Mexico	30	Bachelor of Social Sciences	2 years
Teacher 4	Colombia	53	Bachelor of Primary Education Master in Technology	13 years
Teacher 5	Peru	42	Bachelor of Modern Languages Master in Education	14 years
Teacher 6	Colombia	52	Bachelor in Spanish Specialist in Colombian Literature	25 years
Teacher 7	Ecuador	40	Bachelor of Social Sciences	12 years
Teacher 8	Peru	43	Bachelor of Primary Education Master in Natural Sciences	12 years

Source: own elaboration

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The study was conducted virtually during September and October 2021, during the development of the training course mentioned above. In order to count with the participation of the teachers, each potential participant was requested, individually by mail, to collaborate in the research. Upon obtaining the affirmative answer, informed consent was sent and a day and time was agreed for an interview meeting via the Zoom platform. The interviews lasted between 60 and 90 minutes, following an open unstructured guide, which was developed previously. It considered the following topics:

- Definitions and theorizing on critical thinking.
- Strategies and didactics used in the classroom.
- Spaces and contexts of application of critical thinking by students.
- Relationships with academic performance.
- Critical thinking in the implementation of the curriculum.

Non-directive orientation prevailed in the development of the interviews, allowing the participants to develop their arguments freely and without limiting the information according to the preconceptions of the researcher. The sessions were recorded with the informed consent of the participants. The textual corpus from each interview was analyzed independently to comply with the theoretical sampling procedure and establish the saturation point that implied the completion of the data collection.

In the theoretical saturation process, which guided the methodological process, open coding and organization in central categories starts from the first interview, therefore, the partial analysis of each interview opens the way to the next, in a dynamic and concatenated process that combines inductive and deductive reasoning. Once the saturation point of the information collection was obtained, the definitive emerging categories were established and the interpretative process was given way to give meaning to the textual corpus, according to the objectives and the reading of empirical references that guided the research.

Results and discussion

Notions about critical thinking

This category integrates the notions and knowledge that teachers have about critical thinking, taking into account that the definitions of this process are essential in the orientation of educational praxis.

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It can be said that teachers do not have a notion of homogeneous critical thinking, which shows the polysemic nature of the concept and is possibly linked to ambiguities in the application of strategies in the classroom. This situation has been identified by Gámez (2012) and will be analyzed in a next category. However, all the definitions presented by the eight teachers interviewed express that critical thinking is a cognitive and rational ability. They use expressions such as "ability to analyze", "inference and self-regulation", "problem-solving" and "argumentative ability". This notion is evidenced in definitions such as:

> Cognitive ability that brings together interpretation, analysis, evaluation, inference, explanation and self-regulation, allowing to discern and establish a position from the arguments (Teacher 1).

> It is a cognitive process that leads to the development of skills such as reflection, analysis, synthesis, contrasting contents for decision making and problem solving (Teacher 2).

It should be noted that all the notions provided are established on the basis of the discursive and argumentative character of critical thinking, which places the trend in a rational and constructivist approach based on language. Some characteristics that are pointed out in these notions are:

- Endorsing or undermining the credibility of a situation with strong and convincing arguments.
- Generate own opinions and positions with knowledge criteria.
- Understanding the context.
- Evaluate the reasoning from bases considered as true.

As expressed in the responses of two teachers, an approach to these understandings can be evidenced:

> It is important to use the knowledge and the ability to observe, analyze and interpret a situation and to endorse or discredit it with convincing arguments (Teacher 4).

> Critical thinking consists in analyzing and evaluating the consistency of reasoning [...] especially those statements that society accepts as true in the context of everyday life (Teacher 6).

The notion of critical thinking fundamentally oriented to a rational-cognitive basis is also the predominant orientation in the literature review carried out for this research, a finding also highlighted by Lorencová *et al.* (2019) In addition, it is evident that these notions of teachers link critical

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thinking with argumentative and linguistic competences (Ospina-Carmona *et al.*, 2022; Cassany, 2017; Cubides *et al.*, 2017), enabling an objective record of the processes and their subsequent evaluation, a trend that also predominates in the approaches consulted in the literature.

On the other hand, a notion of critical thinking emerged from the speeches of two teachers as an integrative process in which different spheres of the person's life participate:

> It integrates capabilities that allow to solve the various situations of daily life, having the opportunity to interpret, deepen, reflect (Teacher 7).

An integrative perspective is suggested by Ross and Gautreaux, (2018), who focus the practical applications of critical thinking and propose to overcome the excessive emphasis on the rational and cognitive that has been established to understand the process.

It is important to note that in the notions presented by teachers, there is little emphasis on experiences, emotions and socializations as important promoters of critical thinking (Guzmán, 2014). These are processes that also enable the individual to generate criteria of understanding and choice based on his or her own worldview. Therefore, it is necessary to strengthen a notion of critical thinking linked to social, ecological, ethical and cultural problems, which allow a positioning against the current dilemmas and diversity of society. In this way, practice in the classroom is not limited to objectifying and reducing critical thinking to specific skills and linguistic or argumentative indicators, without providing them with the problematizing content necessary to understand their context of reference.

Didactic praxis

One of the conceptions reflected in the discourses of the interviewed teachers is to associate the didactic practice for the development of critical thinking with subjects of linguistic mastery, particularly Spanish and social studies. Only two teachers suggested that critical thinking can be encouraged in all subjects of the curriculum:

> [...]critical thinking can be developed in any area or subject. The idea is to look for activities and strategies that lead to reasoning, draw conclusions, obtain their own information (Teacher 3).

Teacher 8 contributes that, from his perspective, mathematics, computer science and natural sciences promote critical thinking, since they develop logical reasoning and appropriate decision-making, thus linking didactic practice with their area of competence, which is the natural sciences.

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> Personally, I believe that critical thinking should strengthen the criteria and autonomy regarding decision-making in each moment and place, that the student should choose ways of thinking and acting (Teacher 8).

Certainly, the proposals of Cornejo-Morales and Alsina (2020) and Blanco *et al*. (2017) focus on the importance of developing critical thinking through the generation of relationships between abstract concepts and everyday experiences, in the learning of mathematics and natural sciences, so that the contents are related with the reality lived, or through paradoxes (Mora-Ramírez, 2023). However, the prevailing trend in the interviewed teachers links didactic praxis with the linguistic-based subjects, confirming that according to their conceptions, classroom work should guide the formation of argumentative skills rather than the development of integral skills to act in diverse and problematizing contexts, not to mention other competences that are also inherent to critical thinking, such as autonomy and ethics in decisions (Rodríguez *et al*., 2018).

These results allow us to consider the importance that teacher education and training incorporate critical thinking as a transversal axis to all subjects in educational curricula, as it is intended in the conception of global competences (Molina-Patlán *et al*., 2016). Most importantly, these conceptions materialize in classroom practice through appropriate strategies.

When inquiring into the preferred strategies used by the interviewed teachers to develop critical thinking in the classroom, the following were collected:

- Encourage discussions on current issues (teacher 1,4, 7).
- Encourage the use of the question to himself and others (teacher 5).
- Present motivating activities to get the interest of the group (teacher 2, 6).
- Develop skills in problem solving, deduction and induction (teacher 3, 8).
- Encourage collaborative work (teacher 3).
- Stimulate adequate oral expression (teacher 4, 6).
- Create inventions and artifacts in science and technology (teacher 4, 8).
- Relate the work in classes with experiences (teacher 7, 8).

As seen, the strategies are diverse, which is a sign of the ability to innovate to achieve the stated goal. Indeed, Lorencová *et al*. (2019) found that there is a wide body of knowledge about effective didactic strategies to promote critical thinking, which are available in the scientific acquis.

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However, it is important to note that it is not only required to pay in the field of strategies without having an epistemology and methodology that allows consolidating true critical education.

The discourses of the interviewed teachers do not express clear objectives or didactic procedures that allow determining which specific competences are intended to develop through these strategies. This leads us to think that the procedure is privileged over the end. At this time, it is interesting to consider the proposal of Ross and Gautreaux (2018), who argue that didactic praxis to promote critical thinking should not be limited to developing isolated skills, but complex processes. Therefore, it must be crossed by dialectics instead of formal logic. The latter is the dominant perspective in the notions of the interviewed teachers, as expressed in the previous categories. In other words, while it is essential to innovate and create spaces that foster opportunities to think critically, these must be accompanied by a pedagogical style that problematizes and promotes complexity as an ability to integrate the parts of the whole, instead of simplification and determinism.

Training and practice self-assessment

Another category emerges that allows interpreting the assessments made by teachers about their own practice in the classroom to develop critical thinking in students, taking into account that critical competence should be among the competencies that integrate the professional profile of teachers (Zelaieta and Ortiz, 2018). From the interpretation of the speeches of the interviewed teachers, a common consideration about the lack of professional preparation is evident, coupled with the lack of clear curricular guidelines to face effectively this pedagogical task. Teacher 1 considers that not all teachers promote critical thinking in the classroom:

> Honestly, they are very few, since, to train critical students, they must be highly investigative, informed teachers who can put into perspective the information that is received, trying to maintain an open mind (Teacher 1).

Teacher 5 agrees, pointing out that it is essential that there is more training on the relevant teaching strategies to carry out the task. This situation has been identified by Cruz *et al.* (2019), by observing failures in the professional training of teachers on pedagogical strategies to promote critical thinking and the delegation of a wide responsibility to make decisions regarding this task in the classroom, without the necessary curricular guidelines.

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On a more self-evaluation level, teacher 8 points out that it is necessary for teachers to carry out a reflective process of their own practice. Precisely, in this level is located teacher 3, who observes the need to create suitable spaces and dispense with the knowledge promoted through memorization:

> I have tried to make learning less memorizing by using one that is more dynamic, creative, stimulating and conscious, giving relevance to children's abilities and interests. More focus and functionality need to be given to skills development [...]. I think that there are no well-established guidelines, nor adequate preparation by the teacher (Teacher 3).

It has been pointed out that the role of the teacher should not be limited to reproducing cognitive skills and competences but promote the transformative action that underlies critical thinking through the questioning and empowerment necessary for a true citizen and democratic exercise (Noula, 2018), this being a fundamental requirement in today's diverse and multicultural societies. A teacher who is limited to reproducing contents and strategies in the classroom does not fulfill the required function, therefore the reflective process in the teacher, as a starting point in the own critical and pedagogical reflection, acquires a fundamental value.

According to what can be extracted from this category, it is understood that it is a personal choice of the teacher to use certain approaches, methods and didactic guidelines. This allows us to affirm that, on the one hand, there is not adequate training of teachers on this process, but also and not least, the educational curriculum is not entirely clear when defining lines of action to develop critical reflection.

Curriculum and educational policies

The teachers participating in the study belong to different countries of Latin America, in which the common denominator is that educational policies consider critical thinking as a competence to promote from the initial education, in line with what is established by international organizations in the field of education. This is established by the Ministries of Education of Peru (Núñez-Lira *et al.*, 2021), Colombia (Madrid, 2018), Mexico (Flores *et al.*, 2019) and Ecuador (Toscanini-*etal.*, 2016), to mention only those represented in this research. In this sense, this category considers the discourses of teachers regarding critical thinking as a dimension that is addressed in recent educational policies and in the curricula of each country.

Teacher 5 indicates that the function of incorporating critical thinking as a focus of educational policies is:

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> To structure a more reflective thought in children and young people improving their life expectancy, breaking with the paradigms and mental schemes imposed by the social, cultural and political environments in which they are immersed (Teacher 5).

However, there is also the idea that the function of critical thinking in the curriculum is to achieve a better performance in national and international tests, as stated by teacher 2, fulfilling the indications of multilateral organizations in education, even if the results for Latin America in this area are below what is expected, as stated by Rodríguez (2018). This researcher has found differences between international educational policies and strategies for critical reflection in the classroom.

In accordance with the above, the argument that stands out in this category in most of the interviewed teachers (five teachers) are the inconsistencies between the educational policies emanated by the ministries of Education in their respective countries and the materialization of strategies for the development of critical thinking. Teacher 3 indicates that he has doubts about the interest of educational policy institutions in the development of critical thinking in schools, since developing this competence is also related to a more autonomous youth and less susceptible to manipulation. In this regard, he states:

> I am not so sure of this kind of interest in educational policies to develop conscious and reflective thoughts, nor that one wants to break with mental schemes [...]. If we have young people who think, who analyze, who look for the background of situations, their true intention, who reason, evaluate and recognize with the truth the deception, they are less likely to be manipulated, acquiring autonomy (Teacher 3).

Professor 4 agrees with this position stating that:

> The State demands critical thinking, but its policies tend reduce the knowledge in the person, because in that way the person is easier to be manipulated (Teacher 4).

On the other hand, teacher 7 explains that there is a disarticulation between what his country's educational policies regarding critical thinking point to and the reality in the classroom:

> Strategies to develop critical thinking have been proposed in my country in the educational policies, but when analyzing reality is something that is still far from properly developed [...] there is still a lot missing in the way to start interpreting fully critical thinking in the classroom so that students analyze and question about their reality (Teacher 5).

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As interpreted, there is a tendency among the interviewed teachers to question the effectiveness of educational policies on critical thinking in their application to the classroom, which can also be explained in the situations of inequality and access to educational quality, that many of these teachers find in their daily practice and that require them in many cases to meet urgent needs for schooling. Secondly, it is interpreted -respecting the differences in the policies of each nation- that the guidelines have not been adequately materialized in a clear curriculum, conceptually and methodologically, as Castillo (2020), Niño-Arteaga (2019) and Rodríguez (2018) find in their studies in Latin American countries.

Critical thinking and academic performance

Although it is generally considered that critical thinking has a positive impact on academic performance, there is no quantitative evidence to support a direct and significant relationship between both variables, as stated by Enríquez *et al.* (2021) and Barca-Lozano *et al.* (2013), who find that the statistical correlation between critical thinking and academic success is weak. Ren *et al.* (2020) point out that while there is a predictive relationship between critical thinking and academic performance, it is not necessarily reflected in higher numerical scores. Therefore, it can be stated that the relationship between critical thinking and academic performance has not yet been established quantitatively (Pineda and Cerrón, 2015), being the conceptual heterogeneity inherent to the concept, one of the elements that hinders this process.

However, qualitatively, there is documented information on better school performance of students who are more reflective and critical (Niu *et al.*, 2013). This topic is also debatable, since often students who possess critical competencies also tend to have higher levels of self-efficacy, which puts us back in the realm of a comprehensive understanding of this process and not as a sum of skills that can be evaluated independently.

One category that emerges from the interviews with teachers refers to their conceptions regarding the relationship between critical thinking and academic performance and, in general, learning in the classroom. As seen, academic performance is often associated with a numerical assessment and, in this sense, most of the interviewees (seven teachers) consider that students with good critical thinking skills also obtain better grades.

It is interesting to highlight the argument of teacher 7, who introduces a moral assessment in this relationship, indicating that the critical capabilities that the student possesses allow him to discern the positive

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consequences, a good academic performance, leading them to be more interested in their grades:

> Since they know the consequences, especially personal and academic, of not studying a certain subject and obviously the benefits of having good grades (Teacher 7).

It also points out, as an argument, that students with critical competencies have a greater awareness of what they do and say, which leads to having security and ease for learning and academic performance. In this regard, Suárez and González (2021), consider that critical thinking also refers to a metacognitive component -known as moral judgment- in ethical decision-making, a matter that is fundamental to understand the implications of this process.

On the other hand, teacher 5 shows disagreements with establishing a linear interdependence between critical thinking and academic performance. It points out that although there is some relationship, academic performance in students with high critical competencies is not necessarily better than that of students with lower skills and holds it as follows:

> In most cases there is a balance between academic performance and critical thinking, but in other cases there are students who analyze, question and question social situations but their academic performance is regular. In other cases, critical capacity is not related to a true understanding of the content taught in classes and this is demonstrated in evaluations (Teacher 5).

According to what is expressed by teacher 5 and as already pointed out at the beginning of this category, the research reflects that there is no consistent relationship between numerical academic performance and critical thinking, although it can be considered that the application of metacognitive skills, moral judgment and autonomy expressed in students with such competence tends to improve performances in the classroom.

Conclusions

The research aimed to analyze the notions of critical thinking and pedagogical practices applied in the classroom by Latin American teachers. To present these conclusions, we will provide answers to the three problematic questions raised at the beginning.

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How do teachers conceive and define critical thinking?

The notions of critical thinking expressed by the interviewed teachers show a cognitive, rational and objective emphasis on language, this being the prevailing trend in the scientific literature consulted and in most teacher training programs. Clearly, teacher training in the constructivist approach has allowed to lay the ground for these conceptualizations, however, it is necessary to avoid excessive determinisms in the possible definitions, since this has led to understand the process as a sum of skills that can be promoted solely from the discursive, and therefore, the consideration that only students able to argue about a topic, show evidence of being critical students.

Likewise, some teachers reduce these definitions to scientific rationality based on mathematical logic without considering other forms of expression, which implies a simplification of the notion of critical thinking and, therefore, neglects the possibility of deepening in integral conceptions that incorporate to teaching practice the development of competences based on cultural and ethnic domains, socialization and collaboration capabilities, creative and innovative processes, among others, without neglecting the ethics that also underlies critical reflection. This integral perspective is oriented to a true action from experience and from dialog, instead of the assessed and unilateral argumentation that prevails in Latin American classrooms.

Do the definitions of critical thinking that teachers have determine specific ways of dynamizing work in the classroom?

A greater epistemological reflection on critical thinking and its practical importance in the educational system becomes evident, because the notions or conceptions guide the pedagogical practice. This implies more effort of theoretical and epistemological training and teacher training from higher education centers, in addition to a permanent self-evaluation process on the practice. It is worth noting that it has been the teachers interviewed who have noticed these needs and expressed their concern about the ways of developing these competences in the classroom, which highlights gaps that need to be considered, as the need to take back the fundamental principles of critical pedagogy.

Indeed, critical reflection can only be developed within an educational culture designed for that purpose, in which everyday situations are problematized and the ability to reflect on them is promoted in the student, so that learning is generated from experiences directed towards

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the active understanding of the world around him. Therefore, this is not a learning that reiterates information content in which teachers frequently insist, possibly based on the need for more critical training, but a set of knowledge built from a complex, problematizing, transforming and flexible knowledge principle.

How do teachers promote critical thinking inside classrooms?

The strategy that could be evidenced with more emphasis in the speeches of the interviewed teachers was to associate the didactic practice only with linguistic subjects, particularly Spanish and social studies, leaving out the possibilities of establishing active relations with the different areas of knowledge, as well as contributing to the determinism and division of learning competences in specific areas. In this sense, it is necessary to pay and devote more effort to highlight the relationships between the natural sciences and the pure sciences with the formation of critical thinking, especially focused on the applications of areas of formal and abstract thinking to the real and concrete problems of societies. A fundamental challenge.

Teachers consider that students with good critical thinking skills also obtain better grades, however, it seems that this trend is being discussed within teacher training, since different conditions are alleged in which critical thinking is not necessarily associated with high academic performance. One of the results that has been interesting for this research is the consideration of ethics and moral judgment as a value that crosses the relationship between critical thinking and academic performance, expressed in the autonomy of the student to discern the advantages and positive consequences of good school performance and commitment to his own learning.

Inevitably, the teaching practice is attached to the curriculum and educational policies of each country, however, the interviewed teachers highlight the inconsistencies between these frameworks and the development of critical thinking in the classroom, considering the lack of clear guidelines, as well as little training in convenient and viable strategies for it. It may be proposed that educational curricula do not go beyond establishing guidelines and expected lines of fulfillment, however, it is up to the teachers the decision and autonomy as to their action for the promotion of critical thinking. Therefore, this research emphasizes the importance of critical teacher training and principles of pedagogical praxis that are being forgotten.

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1. Información general

«Sophia» es una publicación científica de la Universidad Politécnica Salesiana de Ecuador, editada desde junio de 2006 de forma ininterrumpida, con periodicidad fija semestral, especializada en Filosofía de la Educación y sus líneas interdisciplinares como Epistemología, Deontología, Estética, Estudios Críticos, Hermenéutica, Axiología, Ontología, Antropología Filosófica, Sociología, Analítica Filosófica... vinculadas al ámbito de la educación.

Es una revista científica arbitrada, que utiliza el sistema de evaluación externa por expertos (*peer-review*), bajo metodología de pares ciegos (*doble-blind review*), conforme a las normas de publicación de la American Psychological Association (APA). El cumplimiento de este sistema permite garantizar a los autores un proceso de revisión objetivo, imparcial y transparente, lo que facilita a la publicación su inclusión en bases de datos, repositorios e indexaciones internacionales de referencia.

«Sophia» se encuentra indexada en **(SCOPUS)** Emerging Sources Citation Index **(ESCI)** de Web of Science; en Scientific Electronic Library Online **(SciELO)**; en el Sistema de Información Científica **(REDALYC)**; en el directorio y catálogo selectivo del Sistema Regional de Información en Línea para Revistas Científicas de América Latina, el Caribe, España y Portugal **(LATINDEX)**, en la Matríz de Información para el Análisis de Revistas **(MIAR)**, en Clasificación Integrada de Revistas Científicas **(C.I.R.C)**, en Academic Resource Index **(Research Bible)**, en la Red Iberoamericana de Innovación y Conocimiento Científico **(REDIB)**, en el Portal de difusión de la producción científica **(Dialnet)**; en Bibliografía Latinoamericana en Revistas de Investigación Científica y Social **(BIBLAT)**; en el Directorio de Revistas de Acceso Abierto **DOAJ** y en repositorios, bibliotecas y catálogos especializados de Iberoamérica.

La revista se edita en doble versión: impresa (ISSN: 1390-3861) y electrónica (e-ISSN: 1390-8626), en español y en inglés, siendo identificado además cada trabajo con un DOI (Digital Object Identifier System).

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2. Alcance y política

2.1. Temática

Contribuciones originales en materia de Filosofía de la Educación, así como áreas afines: Epistemología, Deontología, Estética, Estudios Críticos, Hermenéutica, Axiología, Ontología, Antropología Filosófica, Sociología, Analítica Filosófica,... y todas aquellas disciplinas conexas interdisciplinarmente con una reflexión filosófica sobre la educación.

2.2. Aportaciones

«Sophia» edita estudios críticos, informes, propuestas, así como selectas revisiones de la literatura (*state-of-the-art*) en relación con la Filosofía de la Educación, aceptando asimismo trabajos de investigación empírica, redactados en español y en inglés.

Las aportaciones en la revista pueden ser:

- **Revisiones:** 10.000 a 11.000 palabras de texto, incluidas tablas y referencias. Se valorará especialmente las referencias justificadas, actuales y selectivas de alrededor de unas 70 obras.
- **Investigaciones:** 8.000 a 9.500 palabras de texto, incluyendo título, resúmenes, descriptores, tablas y referencias.
- **Informes, estudios y propuestas:** 8.000 a 9.500 palabras de texto, incluyendo título, resúmenes, tablas y referencias.

2.3. Características del contenido

Todos los trabajos presentados para la publicación en «Sophia» deberán cumplir con las características propias de una investigación científica:

- Ser originales, inéditos y relevantes
- Abordar temáticas que respondan a problemáticas y necesidades actuales
- Aportar para el desarrollo del conocimiento científico en el campo de la Filosofía de la Educación y sus áreas afines
- Utilizar un lenguaje adecuado, claro, preciso y comprensible
- No haber sido publicados en ningún medio ni estar en proceso de arbitraje o publicación.

Dependiendo de la relevancia y pertinencia del artículo, se considerarán como contribuciones especiales y ocasionalmente se publicarán:

- Trabajos que superen la extensión manifestada
- Trabajos que no se correspondan con el tema objeto de la reflexión prevista para el número respectivo

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2.4 Periodicidad

«Sophia» tiene periodicidad semestral (20 artículos por año), publicada en los meses de enero y julio; y cuenta por número con dos secciones de cinco artículos cada una, la primera referida a un tema **Monográfico** preparado con antelación y con editores temáticos; la segunda, una sección de **Misceláneas**, compuesta por aportaciones variadas dentro de la temática de la publicación.

3. Presentación, estructura y envío de los manuscritos

Los trabajos se presentarán en tipo de letra Arial 12, interlineado simple, justificado completo y sin tabuladores ni espacios en blanco entre párrafos. Se separarán con un espacio en blanco los grandes bloques (título, autores, resúmenes, descriptores, créditos y epígrafes). La página debe tener 2 centímetros en todos sus márgenes.

Los trabajos deben presentarse en documento de Microsoft Word (.doc o .docx), siendo necesario que el archivo esté anonimizado en Propiedades de Archivo, de forma que no aparezca la identificación de autor/es.

Los manuscritos deben ser enviados única y exclusivamente a través del OJS (Open Journal System), en el cual todos los autores deben darse de alta previamente. No se aceptan originales enviados a través de correo electrónico u otra interfaz.

3.1. Estructura del manuscrito

Para aquellos trabajos que se traten de investigaciones de carácter empírico, los manuscritos seguirán la estructura IMRDC, siendo opcionales los epígrafes de Notas y Apoyos. Aquellos trabajos que por el contrario se traten de informes, estudios, propuestas y revisiones sistemáticas podrán ser más flexibles en sus epígrafes, especialmente en Material y métodos; Análisis y resultados; Discusión y conclusiones. En todas las tipologías de trabajos son obligatorias las Referencias.

a. Investigaciones empíricas

Su objetivo es contribuir al progreso del conocimiento mediante información original, sigue la estructura IMRDC: Introducción (objetivos, literatura previa), Materiales y métodos; Análisis y Resultados; Discusión, integración y conclusiones. Siguiendo los criterios planteados por la Unesco, es este tipo de textos científicos se llaman también como: "memorias originales"

La estructura recomendada, especialmente en trabajos que incluyen investigaciones empíricas, es la siguiente:

1) Título (español) / Title (inglés): Conciso pero informativo, en castellano en primera línea y en inglés en segunda. Se aceptan como máximo 85 caracteres con espacio. El título no solo es responsabilidad de los autores, pudiéndose proponer cambios por parte del Consejo Editorial.

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2) Datos de Identificación: Nombres y apellidos completos de cada uno de los autores, organizados por orden de prelación. Se aceptarán como máximo 3 autores por original, aunque pudieren existir excepciones justificadas por el tema, su complejidad y extensión. Junto a los nombres deberá incluirse, el nombre de la institución en la que trabaja así como la ciudad, el país, el correo electrónico y número completo de ORCID de cada autor aspectos que deberán constar de modo obligatorio en la Carta de Presentación, además deberán ser cargados en el sistema OJS de la revista, en la sección Metadatos y/o en un documento word adjunto al archivo que contiene el trabajo que se propone para la evaluación.

3) Resumen (español) / Abstract (inglés): Tendrá como extensión mínima de 210 y máxima de 220 palabras en español; y de 200 y máximo de 210 palabras en inglés. El resumen describirá de forma concisa y en este orden: 1) Justificación del tema; 2) Objetivos; 3) Metodología y muestra; 4) Principales resultados; 5) Principales conclusiones. Ha de estar escrito de manera impersonal "El presente trabajo analiza...". En el caso del abstract no se admitirá el empleo de traductores automáticos por su pésima calidad.

4) Descriptores (español) / Keywords (inglés): Se deben exponer máximo 6 términos por cada versión idiomática relacionados directamente con el tema del trabajo. Será valorado positivamente el uso de las palabras claves expuestas en el Thesaurus de la UNESCO y en el de la propia revista localizado en el siguiente enlace: https://sophia.ups.edu.ec/tesauro_sophia.php

5) Introducción y estado de la cuestión: Debe incluir el planteamiento del problema, el contexto de la problemática, la justificación, fundamentos y propósito del estudio, utilizando citas bibliográficas, así como la literatura más significativa y actual del tema a escala nacional e internacional.

6) Material y métodos: Debe ser redactado de forma que el lector pueda comprender con facilidad el desarrollo de la investigación. En su caso, describirá la metodología, la muestra y la forma de muestreo, así como se hará referencia al tipo de análisis estadístico empleado. Si se trata de una metodología original, es necesario exponer las razones que han conducido a su empleo y describir sus posibles limitaciones.

7) Análisis y resultados: Se procurará resaltar las observaciones más importantes, describiéndose, sin hacer juicios de valor, el material y métodos empleados. Aparecerán en una secuencia lógica en el texto y las tablas y figuras imprescindibles evitando la duplicidad de datos.

8) Discusión y conclusiones: Resumirá los hallazgos más importantes, relacionando las propias observaciones con estudios de interés, señalando aportaciones y limitaciones, sin redundar datos ya comentados en otros apartados. Asimismo, el apartado de discusión y conclusiones debe incluir las deducciones y líneas para futuras investigaciones.

9) Apoyos y agradecimientos (opcionales): El Council Science Editors recomienda a los autor/es especificar la fuente de financiación de la investigación. Se considerarán prioritarios los trabajos con aval de proyectos competiti-

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vos nacionales e internacionales. En todo caso, para la valoración científica del manuscrito, este debe ir anonimizado con XXXX solo para su evaluación inicial, a fin de no identificar autores y equipos de investigación, que deben ser explicitados en la Carta de Presentación y posteriormente en el manuscrito final.

10) Las notas (opcionales) irán, solo en caso necesario, al final del artículo (antes de las referencias). Deben anotarse manualmente, ya que el sistema de notas al pie o al final de Word no es reconocido por los sistemas de maquetación. Los números de notas se colocan en superíndice, tanto en el texto como en la nota final. No se permiten notas que recojan citas bibliográficas simples (sin comentarios), pues éstas deben ir en las referencias.

11) Referencias: Las citas bibliográficas deben reseñarse en forma de referencias al texto. Bajo ningún caso deben incluirse referencias no citadas en el texto. Su número debe ser suficiente para contextualizar el marco teórico con criterios de actualidad e importancia. Se presentarán alfabéticamente por el primer apellido del autor.

b. Revisiones

Las revisiones de literatura se basan en el análisis de las principales publicaciones sobre un tema determinado; su objetivo es definir el estado actual del problema y evaluar las investigaciones realizadas. Su estructura responde a las fases del tema/problema, aportes de investigadores o equipos, cambios en la teoría o las corrientes teóricas principales; problemas sin resolver; tendencias actuales y futuras (Giordanino, 2011). De acuerdo con la UNESCO, este tipo de trabajos se conocen también como: "estudios recapitulativos"

1) Título (español) / Title (inglés): El título del artículo deberá ser breve, interesante, claro, preciso y atractivo para despertar el interés del lector. Conciso pero informativo, en castellano en la primera línea y en inglés en la segunda línea. Se aceptan como máximo 85 caracteres con espacio. El título no solo es responsabilidad de los autores, también los Miembros del Consejo Editorial puede proponer cambios al título del documento.

2) Datos de Identificación: Nombres y apellidos completos de cada uno de los autores, organizados por orden de prelación. Se aceptarán como máximo 3 autores por original, aunque pudieren existir excepciones justificadas por el tema, su complejidad y extensión. Junto a los nombres deberá incluirse, el nombre de la institución en la que trabaja así como la ciudad, el país, el correo electrónico y número completo de ORCID de cada autor aspectos que deberán constar de modo obligatorio en la Carta de Presentación, además deberán ser cargados en el sistema OJS de la revista, en la sección Metadatos y/o en un documento word adjunto al archivo que contiene el trabajo que se propone para la evaluación.

3) Resumen (español) / Abstract (inglés): Tendrá como extensión mínima de 210 y máxima de 220 palabras en español; y de 200 y máximo de 210 palabras en inglés. El resumen describirá de forma concisa y en este orden: 1)

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Justificación del tema; 2) Objetivos; 3) Metodología; 4) Principales resultados; 5) Principales conclusiones. Ha de estar escrito de manera impersonal "El presente trabajo analiza...". En el caso del abstract no se admitirá el empleo de traductores automáticos por su pésima calidad.

4) Descriptores (español) / Keywords (inglés): Se deben exponer máximo 6 términos por cada versión idiomática relacionados directamente con el tema del trabajo. Será valorado positivamente el uso de las palabras claves expuestas en el Thesaurus de la UNESCO y en el de la propia revista.

5) Introducción: Deberá incluir una presentación breve del tema, la formulación del propósito u objetivo del estudio, el contexto de la problemática y la formulación del problema que se propone enfrentar, la presentación de la idea a defender, la justificación que explica la importancia, la actualidad y la pertinencia del estudio; el marco metodológico utilizado, y finalmente, una breve descripción de la estructura del documento. En la justificación es necesario utilizar citas bibliográficas así como la literatura más significativa y actual del tema a escala nacional e internacional.

6) Cuerpo o desarrollo del documento: Implica poner en práctica a lo largo de toda la exposición, una actitud crítica que deberá tender hacia la interpelación, a efectos de concitar la atención del tema y el problema tratados. El escritor deberá generar en el lector la capacidad de identificar la intención dialógica de la propuesta y propiciar en él una discusión abierta.

7) Conclusiones: Expone de manera objetiva los resultados y hallazgos; ofrece una visión de las implicaciones del trabajo, las limitaciones, la respuesta tentativa al problema, las relaciones con el objetivo de la investigación y las posibles líneas de continuidad (para cumplir con este objetivo se sugiere no incluir todos los resultados obtenidos en la investigación). Las conclusiones deberán ser debidamente justificadas de acuerdo con la investigación realizada. Las conclusiones podrán estar asociadas con las recomendaciones, evaluaciones, aplicaciones, sugerencias, nuevas relaciones e hipótesis aceptadas o rechazadas.

8) Bibliografía: Es el conjunto de obras utilizadas en la estructuración del texto científico. Deberá incluir únicamente la referencia de los trabajos utilizados en la investigación. Las referencias bibliográficas deberán ordenarse alfabéticamente y ajustarse a las normas internacionales APA, en su sexta edición.

3.2. Normas para las referencias

Publicaciones periódicas

Artículo de revista (un autor): Valdés-Pérez, D. (2016). Incidencia de las técnicas de gestión en la mejora de decisiones administrativas [Impact of Management Techniques on the Improvement of Administrative Decisions]. *Retos, 12*(6), 199-2013. https://doi.org/10.17163/ret.n12.2016.05

Artículo de revista (hasta seis autores): Ospina, M.C., Alvarado, S.V., Fefferman, M., & Llanos, D. (2016). Introducción del dossier temático "Infancias y

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juventudes: violencias, conflictos, memorias y procesos de construcción de paz" [Introduction of the thematic dossier "Infancy and Youth: Violence, Conflicts, Memories and Peace Construction Processes"]. *Universitas, 25*(14), 91-95. https://doi.org/10.17163/uni.n25.%25x

Artículo de revista (más de seis autores): Smith, S.W., Smith, S.L. Pieper, K.M., Yoo, J.H., Ferrys, A.L., Downs, E.,... Bowden, B. (2006). Altruism on American Television: Examining the Amount of, and Context Surronding. Acts of Helping and Sharing. *Journal of Communication, 56*(4), 707-727. https://doi.org/10.1111/j.1460-2466.2006.00316.x

Artículo de revista (sin DOI): Rodríguez, A. (2007). Desde la promoción de salud mental hacia la promoción de salud: La concepción de lo comunitario en la implementación de proyectos sociales. *Alteridad, 2*(1), 28-40. (https://goo.gl/zDb3Me) (2017-01-29).

Libros y capítulos de libro

Libros completos: Cuéllar, J.C., & Moncada-Paredes, M.C. (2014). *El peso de la deuda externa ecuatoriana*. Quito: Abya-Yala.

Capítulos de libro: Zambrano-Quiñones, D. (2015). *El ecoturismo comunitario en Manglaralto y Colonche*. En V.H. Torres (Ed.), Alternativas de Vida: Trece experiencias de desarrollo endógeno en Ecuador (pp. 175-198). Quito: Abya-Yala.

Medios electrónicos

Pérez-Rodríguez, M.A., Ramírez, A., & García-Ruíz, R. (2015). La competencia mediática en educación infantil. Análisis del nivel de desarrollo en España. Universitas Psychologica, 14(2), 619-630. https://doi.org.10.11144/Javeriana.upsy14-2.cmei

Es prescriptivo que todas las citas que cuenten con DOI (Digital Object Identifier System) estén reflejadas en las Referencias (pueden obtenerse en http://goo.gl/gfruh1). Todas las revistas y libros que no tengan DOI deben aparecer con su link (en su versión on-line, en caso de que la tengan, acortada, mediante Bitly: https://bitly.com/ y fecha de consulta en el formato indicado.

Los artículos de revistas deben ser expuestos en idioma inglés, a excepción de aquellos que se encuentren en español e inglés, caso en el que se expondrá en ambos idiomas utilizando corchetes. Todas las direcciones web que se presenten tienen que ser acortadas en el manuscrito, a excepción de los DOI que deben ir en el formato indicado (https://doi.org/XXX).

3.3. Epígrafes, tablas y gráficos

Los epígrafes del cuerpo del artículo se numerarán en arábigo. Irán sin caja completa de mayúsculas, ni subrayados, ni negritas. La numeración ha de

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ser como máximo de tres niveles: 1. / 1.1. / 1.1.1. Al final de cada epígrafe numerado se establecerá un retorno de carro.

Las tablas deben presentarse incluidas en el texto en formato Word según orden de aparición, numeradas en arábigo y subtituladas con la descripción del contenido.

Los gráficos o figuras se ajustarán al número mínimo necesario y se presentarán incorporadas al texto, según su orden de aparición, numeradas en arábigo y subtituladas con la descripción abreviada. Su calidad no debe ser inferior a 300 ppp, pudiendo ser necesario contar con el gráfico en formato TIFF, PNG o JPEG.

4. Proceso de envío

La recepción de artículos es permanente, sin embargo, considerando que la publicación de la Revista Sophia es semestral, el envío de los manuscritos deberá efectuarse al menos un período antes de la fecha estipulada en la Convocatoria correspondiente.

Los manuscritos deberán remitirse a través del sistema OJS (Open Journal System) de la revista, para lo cual es necesario que el autor se registre previamente en el espacio respectivo (ingrese en el siguiente link: http://sophia.ups.edu.ec/index.php/sophia/user/register, complemente el formulario y siga cada uno de los pasos que se sugieren).

Los dos documentos que deben ser enviados son:

1) Carta de presentación o Cover letter (usar modelo oficial), en la que aparecerán:

Tìtulo. En castellano en la primera línea, en letra Arial 14, con negrita y centrado, con un máximo de 85 caracteres con espacio. En inglés en la segunda línea, en letra Arial 14, en cursiva y con negrita.

Nombres y apellidos completos de los autores. Organizados por orden de prelación, se aceptan como máximo 3 autores por original, aunque pudieren existir excepciones justificadas por el tema, su complejidad y extensión. Junto a cada uno de los nombres deberá incluirse, el nombre de la institución en la que trabaja así como la ciudad, el país, el correo electrónico y número de ORCID.

Resumen. Tendrá como extensión mínima 210 y máxima 220 palabras. El resumen describirá de forma concisa y en este orden: 1) Justificación del tema; 2) Objetivos; 3) Metodología; 4) Principales resultados; 5) Principales conclusiones. Ha de estar escrito de manera impersonal "El presente trabajo analiza...".

Abstract. Resumen con todos sus componentes, traducido al inglés y en letra cursiva. No utilizar sistemas de traducción automáticos.

Descriptores. Máximo 6 términos estandarizados preferiblemente de una sola palabra y del Thesaurus de la UNESCO y de la propia revista, separados por coma (,).

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Keywords. Los 6 términos antes referidos traducidos al inglés y separados por coma (,). No utilizar sistemas de traducción automáticos.

Además, se deberá incluir una: **Declaración** (usar modelo denominado: Presentación) en la que se explica que el manuscrito enviado es una aportación original, no enviado ni en proceso de evaluación en otra revista, confirmación de las autorías firmantes, aceptación (si procede) de cambios formales en el manuscrito conforme a las normas y cesión parcial de derechos a la editorial. Este documento deberá ser firmado y consignado a través del sistema OJS, en la sección: **"Ficheros complementarios".**

2) Manuscrito totalmente anonimizado, conforme a las normas referidas en precedencia.

Todos los autores han de darse de alta, con sus créditos, en la plataforma OJS, si bien uno solo de ellos será el responsable de correspondencia. Ningún autor podrá enviar o tener en revisión dos manuscritos de forma simultánea, estimándose una carencia de cuatro números consecutivos (2 años).

5. Intervalo de publicación

(El tamaño y estilo de la letra tal como se encuentra el numeral 4 (Proceso de envío)

El intervalo comprendido entre la recepción y la publicación de un artículo es de 7 meses (210 días).

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Publication guidelines in «Sophia»

ISSN: 1390-3861 / e-ISSN: 1390-8626

1. General Information

«Sophia» is a scientific publication of the *Salesian Polytechnic University of Ecuador,* published since January 2006 in an uninterrupted manner, with a fixed biannual periodicity, specialized in Philosophy of Education and its interdisciplinary lines such as Epistemology, Deontology, Aesthetics, Critical Studies, Hermeneutics, Axiology, Ontology, Philosophical Anthropology, Sociology, Philosophical Analytics, among others, all linked to the field of Education.

It is scientific journal, which uses the peer-review system, under double-blind review methodology, according to the publication standards of the American Psychological Association (APA). Compliance with this system allows authors to guarantee an objective, impartial and transparent review process, which facilitates the publication of their inclusion in reference databases, repositories and international indexing.

«Sophia» is indexed in **(SCOPUS)** Emerging Sources Citation Index **(ESCI)** from Web of Science; in Scientific Electronic Library Online **(SciELO)**; in the Scientific Information System **(REDALYC)**; in the directory and selective catalog of the Regional Online Information System for Scientific Journals of Latin America, the Caribbean, Spain and Portugal **(LATINDEX)**, in the Matrix of Information for the Analysis of Journals **(MIAR)**, in Integrated Classification of Scientific Journals **(C.I.R.C)**, in the Academic Resource Index **(Research Bible)**, in the Ibero-American Network of Innovation and Scientific Knowledge **(REDIB)**, in the Portal for the dissemination of scientific production **(Dialnet)**; in Latin American Bibliography in Journals of Scientific and Social Research **(BIBLAT)**; in the Directory of Open Access Journals **DOAJ** and in repositories, libraries and specialized catalogs of Latin America.

The journal is published in a double version: printed (ISSN: 1390-3861) and digital (e-ISSN: 1390-8626), Spanish and English, each work being identified with a DOI (Digital Object Identifier System).

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2. Scope and policy

2.1. Theme

Original contributions in Philosophy of Education, as well as related areas: Epistemology, Deontology, Aesthetics, Critical Studies, Hermeneutics, Axiology, Ontology, Philosophical Anthropology, Sociology, Philosophical Analytics,... and all interdisciplinary related disciplines with a philosophical reflection on education

2.2. Contributions

«Sophia» publishes critical studies, reports and proposals, as well as selected state-of-the-art literature reviews related to Philosophy of education. Accepting also results of empirical research on Education, written in Spanish and/or English.

The contributions can be:

- **Reviews**: 10,000 to 11,000 words of text, including charts and references. Justified references would be specially valued. (current and selected from among 70 works)
- **Research**: 8,000 to 9,500 words of text, including title, abstracts, descriptors, charts and references.
- **Reports, studies and proposals:** 8,000 to 9,500 words of text, including title, abstracts, charts and references.

2.3. Characteristics of the content

All works presented for publication in «Sophia» must comply with the characteristics of scientific research:

- Be original, unpublished and relevantAddress issues that respond to current problems and needs
- Address issues that respond to current problems and needs
- Contribute to the development of scientific knowledge in the field of Philosophy of Education and its related areas
- Use adequate, clear, precise and comprehensible language
- Not have been published in any medium or in the process of arbitration or publication.

Depending on the relevance of the article, it will be considered as special contributions and will occasionally be published:

- Works that exceed the stated extent
- Works that do not correspond to the subject of the reflection foreseen for the respective issue

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2.4. Periodicity

«Sophia» has a biannual periodicity (20 articles per year), published in January and July and counts by number with two sections of five articles each, the first referring to a **Monographic** topic prepared in advance and with thematic editors and the second, a section of **Miscellaneous**, composed of varied contributions within the theme of the publication.

3. Presentation, Structure and Submission of the Manuscripts

Texts will be presented in Arial 12 font, single line spacing, complete justification and no tabs or blank spaces between paragraphs. Only large blocks (title, authors, summaries, keywords, credits and headings) will be separated with a blank space. The page should be 2 centimeters in all its margins.

Papers must be submitted in a Microsoft Word document (.doc or .docx), requiring that the file be anonymized in File Properties, so that the author/s identification does not appear.

Manuscripts must be submitted only and exclusively through the OJS (Open Journal System), in which all authors must previously register. Originals sent via email or other interfaces are not accepted.

3.1. Structure of the manuscript

For those works that are empirical investigations, the manuscripts will follow the IMRDC structure, being optional the Notes and Supports. Those papers that, on the contrary, deal with reports, studies, proposals and reviews may be more flexible in their epigraphs, particularly in material and methods, analysis, results, discussion and conclusions. In all typologies of works, references are mandatory.

A. Empirical research

Its purpose is to contribute to the progress of knowledge through original information, following the IMRDC structure: Introduction (objectives, previous literature). Materials and methods, Analysis and Results, Discussion, integration and conclusions. Following the criteria set by UNESCO, it is these types of scientific texts are also called as: "original memories"

The recommended structure, especially in works that include empirical research, is the following:

1) Title (Spanish) /Title (English): Concise but informative, in Spanish on the first line and in English on the second. A maximum of 85 characters with spaces are accepted. The title is not only the responsibility of the authors, changes being able to be proposed by the Editorial Board.

2) Identification data: Of each of the authors, organized by priority. A maximum of 3 authors will be accepted per original, although there may be excep-

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tions justified by the topic, its complexity and extent. Next to the names must follow the professional category, work center, email of each author and complete ORCID number. Aspects that must be included in the Cover Letter, must also be uploaded to the OJS system of the journal, in the Metadata section and /or in a word document attached to the file containing the work proposed for the evaluation.

3) Abstract (Spanish) / Abstract (English): It will have a minimum length of 210 and a maximum of 220 words in Spanish; and 200 and maximum 210 words in English. The abstract will describe concisely and in this order: 1) Justification of the topic; 2) Objectives; 3) Methodology; 4) Main results; 5) Main conclusions. It must be impersonally written "This paper analyzes...". In the case of the abstract, the use of automatic translators will not be accepted due to their poor quality.

4) Keywords (Spanish) / Keywords (English): A maximum of 6 keywords must be presented for each language version directly related to the subject of the work. The use of the key words set out in UNESCO's Thesaurus and of the journal itself, located in the following link: https://sophia.ups.edu.ec/tesauro_sophia.php, will be positively valued.

5) Introduction and state of the issue: It should include the problem statement, context of the problem, justification, rationale and purpose of the study, using bibliographical citations, as well as the most significant and current literature on the topic at national and international level..

6) Material and methods: It must be written so that the reader can easily understand the development of the research. If applicable, it will describe the methodology, the sample and the form of sampling, as well as the type of statistical analysis used. If it is an original methodology, it is necessary to explain the reasons that led to its use and to describe its possible limitations.

7) Analysis and results: It will try to highlight the most important observations, describing them, without making value judgments, the material and methods used. They will appear in a logical sequence in the text and the essential charts and figures avoiding the duplication of data.

8) Discussion and conclusions: Summarize the most important findings, relating the observations themselves with relevant studies, indicating contributions and limitations, without adding data already mentioned in other sections. Also, the discussion and conclusions section should include the deductions and lines for future research.

9) Supports and acknowledgments (optional): The Council Science Editors recommends the author (s) to specify the source of funding for the research. Priority will be given to projects supported by national and international competitive projects. In any case, for the scientific evaluation of the manuscript, it should be only anonymized with XXXX for its initial evaluation, in order not to identify authors and research teams, which should be explained in the Cover Letter and later in the final manuscript.

10) The notes (optional) will go, only if necessary, at the end of the article (before the references). They must be manually annotated, since the system of footnotes or the end of Word is not recognized by the layout systems. The

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numbers of notes are placed in superscript, both in the text and in the final note. The numbers of notes are placed in superscript, both in the text and in the final note. No notes are allowed that collect simple bibliographic citations (without comments), as these should go in the references.

11) References: Bibliographical citations should be reviewed in the form of references to the text. Under no circumstances should references not mentioned in the text be included. Their number should be sufficient to contextualize the theoretical framework with current and important criteria. They will be presented alphabetically by the first last name of the author.

B. Reviews

Literature reviews are based on the analysis of major publications on a give-
Literature reviews are based on the analysis of major publications on a given topic; Its objective is to define the current state of the problem and to evaluate the investigations carried out. Its structure responds to the phases of the theme/ problem, contributions of researchers or teams, changes in theory or main theoretical currents; unsolved problems; current and future trends (Giordanino, 2011). According to UNESCO, this type of work is also known as "recapitulative studies"

1) Title (Spanish) /Title (English): Concise but informative, in Spanish on the first line and in English on the second. A maximum of 85 characters with spaces are accepted. The title is not only the responsibility of the authors, changes being able to be proposed by the Editorial Board.

2) Identification data: Of each of the authors, organized by priority. A maximum of 3 authors will be accepted per original, although there may be exceptions justified by the topic, its complexity and extent. Next to the names must follow the professional category, work center, email of each author and complete ORCID number. Aspects that must be included in the Cover Letter, must also be uploaded to the OJS system of the journal, in the Metadata section and /or in a word document attached to the file containing the work proposed for the evaluation.

3) Abstract (Spanish) / Abstract (English): It will have a minimum length of 210 and a maximum of 220 words in Spanish; and 200 and maximum 210 words in English. The abstract will describe concisely and in this order: 1) Justification of the topic; 2) Objectives; 3) Methodology; 4) Main results; 5) Main conclusions. It must be impersonally written "This paper analyzes..." In the case of the abstract, the use of automatic translators will not be accepted due to their poor quality.

4) Keywords (Spanish) / Keywords (English): A maximum of 6 keywords must be presented for each language version directly related to the subject of the work. The use of the key words set out in UNESCO's Thesaurus and of the Journal itself will be positively valued.

5) Introduction: It should include a brief presentation of the topic, the formulation of the purpose or objective of the study, the context of the problem and the formulation of the problem that is proposed, the presentation of the

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idea to be defended, the justification explaining the importance, the relevance of the study; the methodological framework used, and finally, a brief description of the structure of the document. In the justification it is necessary to use bibliographical citations as well as the most significant and current literature on the subject at national and international level.

6) Body or development of the document: It implies putting into practice throughout the text, a critical attitude that should tend towards the interpellation, in order to attract the attention of the topic and the problem treated. The writer must generate in the reader the capacity to identify the dialogical intention of the proposal and to promote an open discussion.

7) Conclusions: Objectively state the results and findings. Offer a vision of the implications of the work, the limitations, the tentative response to the problem, the relations with the objective of the research and the possible lines of continuity (to fulfill this objective it is suggested not to include all the results obtained in the research). The conclusions should be duly justified according to the research carried out. The conclusions may be associated with the recommendations, evaluations, applications, suggestions, new relations and accepted or rejected hypotheses.

8) Bibliography: It is the set of works used in the structuring of the scientific text. It should include only the reference of the works used in the research. Bibliographical references should be ordered alphabetically and conform to the international APA standards, in their sixth edition.

3.2. Guidelines for references

Periodic Publications

Journal article (author): Valdés-Pérez, D. (2016). Valdés-Pérez, D. (2016). Incidencia de las técnicas de gestión en la mejora de decisiones administrativas [Impact of Management Techniques on the Improvement of Administrative Decisions]. Retos, 12(6), 199-2013. https://doi.org/10.17163/ret.n12.2016.05

Journal Article (Up to six authors): Ospina, M.C., Alvarado, S.V., Fefferman, M., & Llanos, D. (2016). Introducción del dossier temático "Infancias y juventudes: violencias, conflictos, memorias y procesos de construcción de paz" [Introduction of the thematic dossier "Infancy and Youth: Violence, Conflicts, Memories and Peace Construction Processes"]. Universitas, 25(14), 91-95. https://doi.org/10.17163/uni.n25.%25x

Journal article (more tan six authors): Smith, S.W., Smith, S.L. Pieper, K.M., Yoo, J.H., Ferrys, A.L., Downs, E.,... Bowden, B. (2006). Altruism on American Television: Examining the Amount of, and Context Surronding. Acts of Helping and Sharing. Journal of Communication, 56(4), 707-727. https://doi.org/10.1111/j.1460-2466.2006.00316.x

Journal article (without DOI): Rodríguez, A. (2007). Desde la promoción de salud mental hacia la promoción de salud: La concepción de lo comunitario en la implementación de proyectos sociales. Alteridad, 2(1), 28-40. (https://goo.gl/zDb3Me) (2017-01-29).

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Books and Book Chapters

Full books: Cuéllar, J.C., & Moncada-Paredes, M.C. (2014). El peso de la deuda externa ecuatoriana. Quito: Abya-Yala.

Chaprter of book: Zambrano-Quiñones, D. (2015). El ecoturismo comunitario en Manglaralto y Colonche. En V.H. Torres (Ed.), Alternativas de Vida: Trece experiencias de desarrollo endógeno en Ecuador (pp. 175-198). Quito: Abya-Yala.

Digital media

Pérez-Rodríguez, M.A., Ramírez, A., & García-Ruíz, R. (2015). La competencia mediática en educación infantil. Análisis del nivel de desarrollo en España. Universitas Psychologica, 14(2), 619-630. https://doi.org.10.11144/Javeriana.upsy14-2.cmei

It is prescriptive that all quotations that have DOI (Digital Object Identifier System) are reflected in the References (can be obtained at http://goo.gl/gfruh1). All journals and books that do not have DOI should appear with their respective link (in their online version, if they have it, shortened by Bitly: https://bitly.com/) and date of consultation in the indicated format.

Journal articles should be presented in English, except for those in Spanish and English, in which case it will be displayed in both languages using brackets. All web addresses submitted must be shortened in the manuscript, except for the DOI that must be in the indicated format (https://doi.org/XXX).

3.3. Epigraphs, Figures and Charts

The epigraphs of the body of the article will be numbered in Arabic. They should go without a full box of capital letters, neither underlined nor bold. The numbering must be a maximum of three levels: 1. / 1.1. / 1.1.1. A carriage return will be established at the end of each numbered epigraph.

The charts must be included in the text in Word format according to order of appearance, numbered in Arabic and subtitled with the description of the content.

The graphics or figures will be adjusted to the minimum number required and will be presented incorporated in the text, according to their order of appearance, numbered in Arabic and subtitled with the abbreviated description. Their quality should not be less than 300 dpi, and it may be necessary to have the graph in TIFF, PNG or JPEG format.

4. Submission Process

The receipt of articles is permanent, however, considering that the publication of the Sophia Journal is bi-annual, the manuscripts must be sent at least one period before the date stipulated in the corresponding Call.

The manuscripts must be sent through the OJS (Open Journal System) system of the journal, for which it is necessary that the author previously registers in

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the respective space (enter in the following link: http://sophia.ups.edu.ec/index.php/sophia/user/register, complete the form and follow each of the suggested steps).

The two documents that must be sent are:

1) Presentation and cover (Use official model), which will appear:

Title. In Spanish in the first line, in letter Arial 14, with bold and centered, with a maximum of 85 characters with space. In English in the second line, in letter Arial 14, in italics and bold.

Full names and surnames of the authors. Organized in order of priority, a maximum of 3 authors are accepted per original, although there may be exceptions justified by the topic, its complexity and extent. Each name must include the name of the institution in which he/she works as well as the city, country, email and ORCID number.

Abstract (Spanish) It will have a minimum length of 210 and a maximum of 220 words. It must include 1) Justification of the topic; 2) Objectives; 3) Methodology; 4) Main results; 5) Main conclusions. It must be impersonally written "The present paper analyzes..."

Abstract. Summary with all its components, translated into English and in cursive. Do not use automatic translation systems.

Keywords (Spanish): 6 standardized terms preferably of a single word and of the UNESCO and the Journal's Thesaurus separated by commas (,).

Keywords. The 6 terms above translated into English and separated by comma (,). Do not use automatic translation systems.

In addition, a statement must be included (using a template called: Presentation) in which it is explained that the submitted manuscript is an original contribution, not sent or being evaluated in another journal, confirmation of the signatory authors, acceptance (if applicable) of formal changes in the manuscript according to the norms and partial transfer of rights to the publisher. This document must be signed and recorded through the OJS system, in the section: "Complementary files".

2) Manuscript totally anonymized, according to the guidelines referred in precedence.

All authors must register with their credits on the OJS platform, although only one of them will be responsible for correspondence. No author can submit or have in review two manuscripts simultaneously, estimating an absence of four consecutive numbers (2 years).

5. Publication interval

The interval between receipt and publication of an article is 7 months (210 days).

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Indicaciones para revisores externos de «Sophia»

El **Consejo de Revisores Externos de «Sophia»** es un órgano colegiado independiente cuyo fin es garantizar la excelencia de esta publicación científica, debido a que la evaluación ciega —basada exclusivamente en la calidad de los contenidos de los manuscritos y realizada por expertos de reconocido prestigio internacional en la materia— es la mejor garantía y, sin duda, el mejor aval para el avance de la ciencia y para preservar en esta cabecera una producción científica original y valiosa.

Para ello, el **Consejo de Revisores Externos** está conformado por diversos académicos y científicos internacionales especialistas en **Filosofía de la Educación**, esenciales para seleccionar los artículos de mayor impacto e interés para la comunidad científica internacional. Esto permite a su vez que todos los artículos seleccionados para publicar en «**Sophia**» cuenten con un aval académico e informes objetivables sobre los originales.

Por supuesto, todas las revisiones en «**Sophia**» emplean el sistema estandarizado internacionalmente de evaluación por pares con «doble ciego» (*doble-blind*) que garantiza el anonimato de los manuscritos y de los revisores de los mismos. Como medida de transparencia, anualmente se hacen públicos en la web oficial de la revista (http://Sophia.ups.edu.ec/) los listados completos de los revisores.

1. Criterios de aceptación/rechazo de evaluación manuscritos

El equipo editorial de «**Sophia**» selecciona del listado de evaluadores del Consejo de Revisores a aquellos que se estiman más cualificado en la temática del manuscrito. Si bien por parte de la publicación se pide la máxima colaboración de los revisores para agilizar las evaluaciones y los informes sobre cada original, la aceptación de la revisión ha de estar vinculada a:

a. **Experticia.** La aceptación conlleva necesariamente la posesión de competencias en la temática concreta del artículo a evaluar.
b. **Disponibilidad**. Revisar un original exige tiempo y conlleva reflexión concienzuda de muchos aspectos.
c. **Conflicto de intereses.** En caso de identificación de la autoría del manuscrito (a pesar de su anonimato), excesiva cercanía académica o familiar a sus autores, pertenencia a la misma Universidad, Departamento, Grupo de Investigación, Red Temática, Proyectos de Investigación, publicaciones conjuntas con los autores... o cualquier otro tipo de conexión o conflicto/cercanía profesional; el revisor debe rechazar la invitación del editor para su revisión.
d. **Compromiso de confidencialidad**. La recepción de un manuscrito para su evaluación exige del Revisor un compromiso expreso de

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confidencialidad, de manera que éste no puede, durante todo el proceso, ser divulgado a un tercero.

En caso que el revisor no pueda llevar a cabo la actividad por algunos de estos motivos u otros justificables, debe notificarlo al editor por la misma vía que ha recibido la invitación, especificando los motivos de rechazo.

2. Criterios generales de evaluación de manuscritos

a) Tema

La temática que se plantea en el original, además de ser valiosa y relevante para la comunidad científica, ha de ser limitada y especializada en tiempo y espacio, sin llegar al excesivo localismo.

b) Redacción

La valoración crítica en el informe de revisión ha de estar redactada de forma objetiva, aportando contenido, citas o referencias de interés para argumentar su juicio.

c) Originalidad

Como criterio de calidad fundamental, un artículo debe ser original, inédito e idóneo. En este sentido, los revisores deben responder a estas tres preguntas en la evaluación:

- ¿Es el artículo suficientemente novedoso e interesante para justificar su publicación?
- ¿Aporta algo al canon del conocimiento?
- ¿Es relevante la pregunta de investigación?

Una búsqueda rápida de literatura utilizando repositorios tales como Web of Knowledge, Scopus y Google Scholar para ver si la investigación ha sido cubierta previamente puede ser de utilidad.

d) Estructura

Los manuscritos que se remiten a «**Sophia**» deben seguir la estructura señalada en las normas de publicación tanto para las investigaciones empíricas como para revisiones de la literatura o estudios específicos. En este sentido, los originales han de contener resumen, introducción, metodología, resultados, discusión y conclusión.

- El título, el resumen y las palabras clave han de describir exactamente el contenido del artículo.

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- La revisión de la literatura debe resumir el estado de la cuestión de las investigaciones más recientes y adecuadas para el trabajo presentado. Se valorará especialmente con criterios de idoneidad y que las referencias sean a trabajos de alto impacto —especialmente en WoS, Scopus, Scielo, etc. Debe incluir además la explicación general del estudio, su objetivo central y el diseño metodológico seguido.
- En caso de investigaciones, en los materiales y métodos, el autor debe precisar cómo se recopilan los datos, el proceso y los instrumentos usados para responder a las hipótesis, el sistema de validación, y toda la información necesaria para replicar el estudio.
- En los resultados se deben especificar claramente los hallazgos en secuencia lógica. Es importante revisar si las tablas o cuadros presentados son necesarios o, caso contrario, redundantes con el contenido del texto.
- En la discusión se deben interpretar los datos obtenidos a la luz de la revisión de la literatura. Los autores deberán incluir aquí si su artículo apoya o contradice las teorías previas. Las conclusiones resumirán los avances que la investigación plantea en el área del conocimiento científico, las futuras líneas de investigación y las principales dificultades o limitaciones para la realización de la investigación.
- Idioma: Se valorará positivamente si el idioma utilizado facilita la lectura y va en favor de la claridad, sencillez, precisión y transparencia del lenguaje científico. El Revisor no debe proceder a corrección, ya sea en español o inglés, sino que informará a los Editores de estos errores gramaticales u ortotipográficos.
- Finalmente, se requiere una profunda revisión de las referencias por si se hubiera omitido alguna obra relevante. Las referencias han de ser precisas, citando en la lógica de la temática a estudiar, sus principales obras así como los documentos que más se asemejen al propio trabajo, así como las últimas investigaciones en el área.

3. Dimensiones relevantes de valoración

Para el caso de artículos de investigaciones empíricas, «**Sophia**» utiliza una matriz de evaluación de cada original que responde a los criterios editoriales y al cumplimiento de la normativa de la publicación. En este sentido los revisores deberán atender a la valoración cuali-cuantitativa de cada uno de los aspectos propuestos en esta matriz con criterios de objetividad, razonamiento, lógica y experticia.

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Para el caso de artículos reflexivos, estudios, revisiones de literatura (estado de la cuestión) u otro tipo de estudio (informes, propuestas, experiencias, entre otras), el Consejo Editorial remitirá a los revisores una matriz distinta, comprendiendo las características propias de estructura de este tipo de originales:

ESTUDIOS, PROPUESTAS, INFORMES Y EXPERIENCIAS	
Ítems valorables	**Puntaje**
01. Pertinencia del título (claridad, precisión y con un máximo de 85 caracteres).	0/5
02. Resumen (En un solo párrafo y sin epígrafes, mínimo/máximo: 210-220 palabras).	0/5
03. Introducción (breve presentación del tema; formulación del problema; idea a defender o hipótesis a demostrar; objetivo; importancia del tema; actualidad; metodología; estructura del documento).	0/5
04. Revisión de la fundamentación bibliográfica (Además de usar bibliografía actual considerar la inclusión de documentos de Sophia).	0/10
05. Estructura y organización del artículo (capacidad argumentativa, coherencia y redacción científica).	0/10
06. Aportaciones originales y análisis contextualizados.	0/5
07. Conclusiones que respondan al tema, al problema y al objetivo planteado.	0/5
0.8. Citaciones y referencias de acuerdo a la normativa y al formato solicitado por la revista (Todo documento y autor que conste en la sección de bibliografía debe constar en el cuerpo del artículo y viceversa).	0/5
Total máximo	50 puntos

INVESTIGACIONES	
Ítems valorables	**Puntaje**
01. Pertinencia del título (claridad, precisión y con un máximo de 85 caracteres)	0/5
02. Resumen (En un solo párrafo y sin epígrafes, mínimo/máximo: 210-220 palabras).	0/5
03. Introducción (breve presentación del tema; formulación del problema; idea a defender o hipótesis a demostrar; objetivo; importancia del tema; actualidad; metodología; estructura del documento).	0/5
04. Revisión de la fundamentación bibliográfica (Además de usar bibliografía actual considerar la inclusión de documentos de Sophia). Rigor metodológico y presentación de instrumentos de investigación.	0/10

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05. Estructura y organización del artículo (capacidad argumentativa, coherencia y redacción científica). Análisis y resultados de investigación con secuencia lógica en el texto. Presentación de tablas y figuras sin duplicidad de datos.	0/10
0.6. Aportaciones originales y análisis contextualizados de los datos.	0/5
0.7. Discusión, conclusiones y avances que respondan al tema, al problema y al objetivo planteado.	0/5
0.8. Citaciones y referencias de acuerdo a la normativa y al formato solicitado por la revista (Todo documento y autor que conste en la sección de bibliografía debe constar en el cuerpo del artículo y viceversa).	0/5
Total máximo	50 puntos

4. Cuestiones éticas

a. Plagio: Aunque la revista utiliza sistemas de detección de plagio, si el revisor sospechare que un original es una copia sustancial de otra obra, ha de informar de inmediato a los Editores citando la obra anterior con tanto detalle cómo le sea posible.
b. Fraude: Si hay sospecha real o remota de que los resultados en un artículo son falsos o fraudulentos, es necesario informar de ellos a los Editores.

5. Evaluación de los originales

Una vez realizada la evaluación cuanti-cualitativa del manuscrito en revisión, el revisor podrá realizar recomendaciones para mejorar la calidad del original. Sin embargo, se atenderá a la calificación del manuscrito de tres maneras:

a. **Rechazo** debido a las deficiencias detectadas, justificadas y razonadas con valoración cualitativa y cuantitativa. El informe ha de ser más extenso si obtiene menos de los 30 de los 50 puntos posibles.
b. **Aceptación sin revisión.**
c. **Aceptación condicionada** y por ende con revisión (mayor o menor). En este último caso, se ha de identificar claramente qué revisión es necesaria, enumerando los comentarios e incluso especificando párrafos y páginas en las que sugieren modificaciones.

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Indications for External Reviewers of «Sophia»

The **Board of External Reviewers of «Sophia»** is an independent collegiate body whose purpose is to guarantee the excellence of this scientific publication, because the blind evaluation - based exclusively on the quality of the contents of the manuscripts and carried out by experts of recognized International prestige in the field - is, without a doubt, the best guarantee for the advancement of science and to preserve in this header an original and valuable scientific production.

To this end, the **Board of External Reviewers** is made up of several scholars and international scientists specialized in **Education**, essential to select the articles of the greatest impact and interest for the international scientific community. This in turn allows that all the articles selected to publish in «**Sophia**» have an academic endorsement and objectifiable reports on the originals.

Of course, all reviews in «**Sophia**» use the internationally standardized system of double-blind peer evaluation that guarantees the anonymity of manuscripts and reviewers. As a measure of transparency, the complete lists of reviewers are published on the official website of the journal (http://Sophia.ups.edu.ec/)

1. Criteria for acceptance/rejection of manuscript evaluation

The editorial team of «**Sophia**» selects those that are considered more qualified in the subject of the manuscript from the list of reviewers of the Board of Reviewers. While the publication requires the maximum collaboration of reviewers to expedite the evaluations and reports on each original, acceptance of the review must be linked to:

a. **Expertise**. Acceptance necessarily entails the possession of competences in the specific theme of the article to be evaluated.
b. **Availability**. Reviewing an original takes time and involves careful reflection on many aspects.
c. **Conflict of interests**. In case of identification of the authorship of the manuscript (despite their anonymity), excessive academic or family closeness to their authors, membership in the same University, Department, Research Group, Thematic Network, Research Projects, joint publications with authors... or any other type of connection or conflict / professional proximity; The reviewer must reject the publisher's invitation for review.
d. **Commitment of confidentiality.** Reception of a manuscript for evaluation requires the Reviewer to express a commitment of confidentiality, so that it cannot be divulged to a third party throughout the process.

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In the event that the reviewer cannot carry out the activity for some of these reasons or other justifiable reasons, he/she must notify the publisher by the same route that he/she has received the invitation, specifying the reasons for rejection.

2. General criteria for the evaluation of manuscripts

a) Topic

In addition to being valuable and relevant to the scientific community, the topic that is presented in the original must be limited and specialized in time and space, without excessive localism.

b) Redaction

The critical assessment in the review report must be objectively written, providing content, quotes or references of interest to support its judgment.

c) Originality

As a fundamental criterion of quality, an article must be original, unpublished and suitable. In this sense, reviewers should answer these three questions in the evaluation:

- Is the article sufficiently novel and interesting to justify publication?
- Does it contribute anything to the knowledge canon?
- Is the research question relevant?

A quick literature search using repositories such as Web of Knowledge, Scopus and Google Scholar to see if the research has been previously covered, may be helpful.

d) Structure

Manuscripts that refer to «Sophia» must follow the IMRDC structure, except those that are literature reviews or specific studies. In this sense, the originals must contain summary, introduction, methodology, results, discussion and conclusion.

- The **title, abstract, and keywords** should accurately describe the content of the article.
- The **review of the literature** should summarize the state of the question of the most recent and adequate research for the presented work. It will be especially evaluated with criteria of suitability and that the references are to works of high impact - especially in WoS,

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Scopus, Scielo, etc. It should also include the general explanation of the study, its central objective and the followed methodological design.

- In case of research, in the **materials and methods**, the author must specify how the data, the process and the instruments used to respond to the hypothesis, the validation system, and all the information necessary to replicate the study are collected.
- **Results** must be clearly specified in logical sequence. It is important to check if the figures or charts presented are necessary or, if not, redundant with the content of the text.
- In the **discussion**, the data obtained should be interpreted in the light of the literature review. Authors should include here if their article supports or contradicts previous theories. The conclusions will summarize the advances that the research presents in the area of scientific knowledge, the future lines of research and the main difficulties or limitations for carrying out the research.
- **Language**: It will be positively assessed if the language used facilitates reading and is in favor of the clarity, simplicity, precision and transparency of the scientific language. The Reviewer should not proceed to correction, either in Spanish or English, but will inform the Editors of these grammatical or orthographical and typographical errors.
- Finally, a thorough **review of the references** is required in case any relevant work has been omitted. The references must be precise, citing within the logic of the subject at study, its main works as well as the documents that most resemble the work itself, as well as the latest research in the area.

3. Relevant valuation dimensions

For the case of empirical research articles**,** «**Sophia**» uses an evaluation matrix of each original that responds to the editorial criteria and to compliance with the publication guidelines. In this sense, the reviewers must attend to the qualitative-quantitative assessment of each of the aspects proposed in this matrix with criteria of objectivity, reasoning, logic and expertise.

If the original is a review of the literature (status of the matter) or other type of study (reports, proposals, experiences, among others), the Editorial Board will send to the reviewers a different matrix, including the characteristics of Structure of this type of originals:

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STUDIES, REPORTS, PROPOSALS AND REVIEW	
Valuable items	**Score**
01. Relevancy of the title (clarity, precision and with a maximum of 85 characters).	0/5
02. They summarize (In an alone paragraph and without epigraphs, minimum / minimal: 210-220 words).	0/5
03. Introduction (brief presentation of the topic; formulation of the problem; it designs to defending or hypothesis to demonstrating; I target; importance of the topic; current importance; methodology; structure of the document).	0/5
04. Review of the bibliographical foundation (Beside using current bibliography to consider the incorporation of Sophia's documents).	0/10
05. Structure and organization of the article (argumentative capabilities, coherence and scientific redaction).	0/10
06. Original contributions and contextualized analyses.	0/5
07. Conclusions that answer to the topic, to the problem and to the raised aim.	0/5
08. Citations and references of agreement to the regulation and to the format requested by the magazine (Any document and author who consists in the section of bibliography must consist in the body of story and vice versa).	0/5
Maximun total	50 points

RESEARCHES	
Valuable items	**Score**
01. Relevancy of the title (clarity, precision and with a maximum of 85 characters).	0/5
02. They summarize (In an alone paragraph and without epigraphs, minimum / minimal: 210-220 words).	0/5
03. Introduction (brief presentation of the topic; formulation of the problem; it designs to defending or hypothesis to demonstrating; I target; importance of the topic; current importance; methodology; structure of the document).	0/5
04. Review of the bibliographical foundation (Beside using current bibliography to consider the incorporation of Sophia's documents). Methodological rigorous and presentation of instruments of investigation.	0/10
05. Structure and organization of the article (argumentative capabilities, coherence and scientific redaction). Analysis and results of investigation with logical sequence in the text. Presentation of tables and figures without duplicity of information.	0/10

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06. Original contributions and contextualized analyses of the information.	0/5
07. Discussion, conclusions and advances that answer to the topic, to the problem and to the raised aim.	0/5
08. Citations and references of agreement to the regulation and to the format requested by the magazine (Any document and author who consists in the section of bibliography must consist in the body of story and vice versa).	0/5
Total	50 points

4. Ethical issues

a. **Plagiarism***:* Although the journal uses plagiarism detection systems, if the reviewer suspects that an original is a substantial copy of another work, he must immediately inform the Editors citing the previous work in as much detail as possible.
b. **Fraud**: If there is real or remote suspicion that the results in an article are false or fraudulent, it is necessary to inform them to the Editors.

5. Evaluation of the originals

After the quantitative-qualitative evaluation of the manuscript under review, the reviewer may make recommendations to improve the quality of the manuscript. However, the manuscript will be graded in three ways:

a. **Rejection** due to detected deficiencies justified and reasoned with quantitative and quantitative assessment. The report should be longer if a score of less than 40 of the 50 possible points is obtained.
b. **Acceptance without review**
c. **Conditional acceptance** and therefore review (greater or lesser). In the latter case, it is necessary to clearly identify which review is necessary, listing the comments and even specifying paragraphs and pages suggesting modifications.

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Protocolo de evaluación de manuscritos para revisores externos

Instrucciones

- El cumplimiento de cada uno de los ítems será valorado de acuerdo al siguiente protocolo.
- La suma total de los ítems determinará la aprobación o rechazo del artículo. El puntaje mínimo para que el artículo sea aprobado será de 44/50.

Datos del artículo		
Fecha envío evaluación:	Fecha devolución evaluación:	Código artículo:
Título del artículo a evaluar:		
SECCIÓN: ESTUDIOS, PROPUESTAS, INFORMES Y REVISIONES		

01.- Pertinencia del título (claridad, precisión y con un máximo de 85 caracteres)	Comentarios obligatorios:
	Valore de 0 a 5
02.- Resumen (En un solo párrafo y sin epígrafes, mínimo/máximo: 210-220 palabras).	Comentarios obligatorios:
	Valore de 0 a 5
03.- Introducción (breve presentación del tema; formulación del problema; idea a defender o hipótesis a demostrar; objetivo; importancia del tema; actualidad; metodología; estructura del documento)	Comentarios obligatorios:
	Valore de 0 a 5
04.- Revisión de la fundamentación bibliográfica (Además de usar bibliografía actual considerar la inclusión de documentos de Sophia)	Comentarios obligatorios:
	Valore de 0 a 10
05.- Estructura y organización del artículo (capacidad argumentativa, coherencia y redacción científica)	Comentarios obligatorios
	Valore de 0 a 10

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06.- Aportaciones originales y análisis contextualizados	Comentarios obligatorios:	
	Valore de 0 a 5	
07.- Conclusiones que respondan al tema, al problema y al objetivo planteado	Comentarios obligatorios:	
	Valore de 0 a 5	
08.- Citaciones y referencias de acuerdo a la normativa y al formato solicitado por la revista (Todo documento y autor que conste en la sección de bibliografía debe constar en el cuerpo del artículo y viceversa)	Comentarios obligatorios:	
	Valore de 0 a 5	
PUNTUACIÓN OBTENIDA	Del total de 50 puntos previsibles, este evaluador otorga:	

OPINIÓN REDACTADA (Más detallada si el trabajo no tiene 44 puntos, para informar al autor/es) Este texto se remite textualmente al/los autor/es de forma anónima	

RECOMENDACIÓN SOBRE SU PUBLICACIÓN EN SOPHIA			
PUBLICABLE	**Resultado**		
	SI	**Sí, con condiciones**	**NO**
01. Ampliamente recomendado			
02. Recomendado sólo si se mejora su calidad atendiendo a la totalidad de las sugerencias realizadas por los revisores			
03. No se recomienda su publicación			
MODIFICACIONES PROPUESTAS (En caso de «Sí, con condiciones»)			

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Protocol of Manuscript Evaluation for External Reviewers

Instructions

- The fulfillment of each one of the articles will be valued in agreement to the following protocol.
- The total sum of the articles will determine the approval or rejection of the article.
- The minimal puntaje in order that the article is approved will be of 44/50.

Article Details		
Date of submission for evaluation:	Date of return of evaluation:	Article code:
Title of the article to be evaluated:		
SECTION: REPORTS, STUDIES, PROPOSALS AND REVIEWS		

01.- Relevancy of the title (clarity, precision and with a maximum of 85 characters)	Mandatory comments:
	Value from 0 to 5
02.- They summarize (In an alone paragraph and without epigraphs, minimum / minimal: 210-220 words).	Mandatory comments:
	Value from 0 to 5
03.- Introduction (brief presentation of the topic; formulation of the problem; it designs to defending or hypothesis to demonstrating; I target; importance of the topic; current importance; methodology; structure of the document)	Mandatory comments:
	Value from 0 to 5
04.- Review of the bibliographical foundation (Beside using current bibliography to consider the incorporation of Sophia's documents).	Mandatory comments:
	Value from 0 to 10

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05.- Structure and organization of the article (argumentative capabilities, coherence and scientific redaction)	Mandatory comments:	
	Value from 0 to 10	
06.- Original contributions and contextualized analyses	Mandatory comments:	
	Value from 0 to 5	
07.- Conclusions that answer to the topic, to the problem and to the raised aim	Mandatory comments:	
	Value from 0 to 5	
08.- Citations and references of agreement to the regulation and to the format requested by the magazine (Any document and author who consists in the section of bibliography must consist in the body of story and vice versa)	Mandatory comments:	
	Value from 0 to 5	
OBTAINED PUNCTUATION	Of the total of 50 predictable points, this assessor grants:	

REDACTED OPINION More detailed if the work does not get 44 points, to inform the autor (s). This text is sent verbatim to the autor (s) amonymously	

RECOMMENDATION ON HIS PUBLICATION IN SOPHIA			
Validation criteria	**Result**		
	Yes	**Yes, with conditions**	**No**
01. Widely recommended			
02. Recommended only if his quality is improved attending to the totality of the suggestions realized by the revisers			
03. His publication is not recommended			
PROPOSED CHANGES (In case of "Yes, with conditions")			

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Chequeo previo al envío del manuscrito

1. CHEQUEO DEL MANUSCRITO, PREVIO AL ENVÍO	
Para facilitar el proceso de evaluación del manuscrito y acelerar el informe de su posible publicación, se aconseja una autorevisión final del manuscrito, comprobando las siguientes cuestiones.	
DOCUMENTO PORTADA (Cover Letter)	
Se incluye título del manuscrito en español (máximo 85 caracteres).	
Se incluye título del manuscrito en inglés (máximo 85 caracteres).	
Las dos versiones del título del manuscrito son concisas, informativas y recogen el mayor número de términos identificativos posibles.	
Se incluye resumen en español, en un solo párrafo y sin epígrafes (mínimo/máximo: 210/220 palabras).	
Se incluye abstract en inglés, en un solo párrafo y sin epígrafes (mínimo/máximo 210-220 palabras).	
Los resúmenes en español e inglés responden ordenadamente a las siguientes cuestiones: justificación del tema, objetivos, metodología del estudio, resultados y conclusiones.	
Se incluyen 6 descriptores (en español e inglés) (sólo palabras simples, no sintagmas o combinaciones de palabras), con los términos más significativos, y a ser posibles estandarizados.	
Los textos en inglés (título, resumen y descriptores) han sido redactados o verificados por un traductor oficial o persona experta en este idioma (Se prohíbe el uso de traductores automáticos).	
Se incluyen todos los datos de identificación de los autores en el orden estipulado en la normativa: datos de identificación y correspondencia, filiaciones profesionales, último grado académico.	
Se ha normalizado el nombre y apellido de los autores.	
Cada autor está identificado con su código ORCID.	
El número máximo de autores es tres, a excepción de aquellos trabajos que justifiquen un número mayor limitado.	
El autor/es ha firmado debidamente la carta de presentación del artículo, en la que consta la cesión parcial de derechos y la declaración de conflicto de intereses.	
MANUSCRITO	

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Se incluye título del manuscrito en español, inglés, resumen, abstract, descriptores y keywords	
Se incluye una introducción que en orden contiene: breve presentación del tema; formulación del problema; idea a defender o hipótesis a demostrar; objetivo; importancia del tema; actualidad; metodología; estructura del documento.	
El trabajo respeta la extensión mínima y máxima permitidas: Sección de Revisiones: 10.000/11.000 palabras de texto (incluidas las referencias). Investigaciones: 8.000/9.500 palabras de texto (incluidas referencias). Informes, Estudios: 8.000/9.500 palabras de texto (incluidas referencias).	
En caso de investigación, el manuscrito responde a la estructura exigida en las normas (IMRDC).	
Si se trata de un informe, estudio o revisión, el manuscrito respeta la estructura mínima exigida en las normas.	
En los trabajos de revisión se incluyen tres citas de tres números anteriores de la Revista Sophia.	
El manuscrito explicita y cita correctamente las fuentes y materiales empleados.	
La metodología descrita, para los trabajos de investigación, es clara y concisa, permitiendo su replicación, en caso necesario, por otros expertos.	
Las conclusiones responden al objetivo y al problema planteados, se apoyan en los resultados obtenidos y se presentan en forma de síntesis.	
Si se han utilizado análisis estadísticos, éstos han sido revisados/contrastados por algún experto.	
Las citas en el texto se ajustan estrictamente a la normativa APA 6, reflejadas en las instrucciones.	
En caso de uso de notas finales, se ha comprobado que éstas son descriptivas y no pueden integrarse en el sistema de citación general. No se aceptan notas a pie de página.	
Se han revisado rigurosamente las referencias finales y se incluyen solo aquéllas que han sido citadas en el texto.	
Las referencias finales se ajustan en estilo y formato a las normas internacionales utilizadas en Sophia.	
El número de referencias está de acuerdo a la fundamentación teórica del estudio realizado	
Se han incluido los DOI en todas las Referencias que lo lleven con el siguiente formato: doi: https://doi.org/XXXXXX	

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Todas las direcciones web de las referencias han sido acortadas con Google Url Shortner	
Si se incluyen figuras y tablas éstas deben aportar información adicional y no repetida en el texto. Su calidad gráfica se ha verificado.	
El número de tablas y/o figuras no sobrepasa las 6.	
En su caso, se declaran los apoyos y/o soportes financieros.	
ASPECTOS FORMALES	
Se ha respetado rigurosamente la normativa en el uso de negritas, mayúsculas, cursivas y subrayados.	
Se ha utilizado letra Arial, tamaño 12.	
Se ha usado un interlineado sencillo (1) y sin tabulaciones.	
Se han numerado los epígrafes en arábigo de forma adecuada y jerárquicamente.	
Se han suprimido los dobles espacios.	
Se han empleado las comillas tipográficas « » (con alt+174 y alt+175 para apertura y cierre).	
Se ha utilizado el diccionario de Word para corrección ortográfica superficial.	
Se ha supervisado el trabajo por personal externo para garantizar la gramática y el estilo.	
PRESENTACIÓN	
Se adjunta carta de presentación indicando originalidad, novedad del trabajo y sección de la revista a la que se dirige, así como, en su caso, consentimiento informado de experimentación.	
La carta de presentación incluye un anexo firmado por todos los autor/es, responsabilizándose de la autoría y cediendo los derechos de autor al editor.	
El manuscrito se sube a la plataforma en formato Word y sin identificación de autores.	
DOCUMENTOS ANEXOS	
Se adjuntan los dos documentos anexos: la carta de presentación y el manuscrito.	
Los documentos complementarios y anexos han sido publicados con Figshare.	

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Checklist prior to sending the manuscript

1. CHECK OF THE MANUSCRIPT, PRIOR TO SENDING	
To facilitate the process of evaluation of the manuscript and to accelerate the report of its possible publication, a final self-review of the manuscript is advised, checking the following questions.	
COVER LETTER	
Title of the manuscript in spanish (maximum 85 characters).	
Title of the manuscript in english (maximum 85 characters).	
The two versions of the title of the manuscript are concise, informative and collect as many identifiable terms as possible.	
The abstract in spanish is included, in a single paragraph and without epigraphs (minimum / maximum: 210/220 words).	
The abstract in english is included, in a single paragraph and without epigraphs (minimum / maximum: 210-220 words).	
Abstracts in spanish and english respond in order to the following issues: justification of the subject, objectives, study methodology, results and conclusions.	
It includes 6 descriptors (in english and spanish) (only simple words, not phrases or combinations of words), with the most significant terms, and if possible standardized.	
The texts in english (title, abstract and descriptors) have been written or verified by an official translator or expert in this language (The use of automatic translators is prohibited).	
All the identification data of the authors are included in the order stipulated in the norms: identification and correspondence data, professional filiations, last academic degree...	
The first and last name of the authors has been normalized.	
Each author is identified with their ORCID code.	
The maximum number of authors is three, with the exception of those works that justify a higher but limited number of authors	
The author(s) have duly signed the letter of presentation of the article, which includes the partial transfer of rights and the declaration of conflict of interest.	
MANUSCRIPT	
It includes title of the manuscript, abstract, and keywords. All in spanish and english.	

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An introduction is included that in order contains: brief presentation of the subject; problem formulation; Idea to defend or hypothesis to prove; objective; Importance of the theme; relevance; methodology; structure of the document.	
The text is within the minimum and maximum extension: In the Review sections: 10,000/11,000 words of text (including references). In the research section: 8,000/9,500 words of text (including references). Reports, Studies: 8,000/9,500 words of text (including references).	
In case of research, the manuscript responds to the structure required in the guidelines (IMRDC).	
In the case of a report, study or review, the manuscript respects the minimum structure required by the guidelines.	
The review work includes three citations from three previous issues of Sophia Journal.	
The manuscript explicitly cites and cites the used sources and materials.	
The methodology described for the research work is clear and concise, allowing its replication, if necessary, by other experts.	
The conclusions follow on objective and problem raised are supported by the results obtained and presented in the form of a synthesis.	
If statistical analyzes have been used, they have been reviewed/contrasted by an expert.	
The citations in the text are strictly in accordance with the APA 6 regulations, reflected in the instructions.	
In case of use of final notes, it has been verified that these are descriptive and cannot be integrated into the general citation system. Footnotes are not acceptable.	
The final references have been rigorously reviewed and only those that have been cited in the text are included.	
The final references conform in style and format to the international standards used in Sophia.	
The number of references is according to the theoretical basis of the study carried out	
DOIs have been included in all References that carry it in the following format: doi: https://doi.org/XXXXXX	
All web addresses of references have been shortened with Google Url Shortner	
If figures and charts are included, they should provide additional and not repeated information in the text. Their graphic quality has been verified.	
The number of charts and / or figures does not exceed 6	
If the case, financial support is declared.	

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ASPECTOS FORMALES	
The rules have been strictly observed in the use of bold, capital letters, italics and underlines.	
Arial font, size 12 has been used.	
A single line spacing (1) has been used without tab.	
The epigraphs have been properly and hierarchically numbered in Arabic.	
Double spaces have been deleted.	
The typographic quotes « » (with alt + 174 and alt + 175 for opening and closing) have been used.	
Word dictionary for surface spelling has been used.	
The text has been supervised by external staff to ensure grammar and style.	
PRESENTATION	
Attached is a cover letter indicating originality, novelty of the work and section of the journal to which it is addressed, and if appropriate, informed consent of experimentation.	
The cover letter includes an attachment signed by all authors, being responsible for the authorship and giving the copyright to the publisher.	
The manuscript is uploaded to the platform in Word format and without authors identification	
ANNEXED DOCUMENTS	
Attached are the two attached documents: the cover letter and the manuscript.	
The accompanying documents and annexes have been published with Figshare.	

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Cover Letter

Sección (Marcar)
Dossier Monográfico ___
Miscelánea ___

Título en español: Arial 14 negrita y centrado.
Máximo 85 caracteres con espacios
Title in English: Arial 14 cursiva. Máximo 85 caracteres con espacios

Nombre autor 1 (estandarizado)
Categoría profesional, Institución, País
Correo electrónico institucional
ORCID

Nombre autor 2 (estandarizado)
Categoría profesional, Institución, País
Correo electrónico institucional
ORCID

Nombre autor 3 (estandarizado)
Categoría profesional, Institución, País
Correo electrónico institucional
ORCID

Resumen

Mínimo 210 y máximo 220 palabras. Debe incluir 1) Justificación del tema; 2) Objetivos; 3) Metodología; 4) Principales resultados; 5) Principales conclusiones. Ha de estar escrito de manera impersonal "El presente trabajo analiza..."

Abstract

Mínimo 200 y máximo 210 palabras cursiva. Debe incluir 1) Justificación del tema; 2) Objetivos; 3) Metodología; 4) Principales resultados; 5) Principales conclusiones. Ha de estar escrito de manera impersonal "El presente trabajo analiza..." No utilizar sistemas de traducción automáticos.

Descriptores

6 términos estandarizados preferiblemente de una sola palabra y del Thesaurus de la UNESCO separados por coma (,).

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Keywords

Los 6 términos referidos en inglés separados por coma (,). No utilizar sistemas de traducción automáticos.

Apoyos y soporte financiero de la investigación (opcional)

Entidad:
País:
Ciudad:
Proyecto subvencionado:
Código de proyecto:

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Cover Letter

Section (Mark)
Monographic Dossier ___
Miscellaneous ___

Title in Spanish: Arial 14 bold and centered.
Maximum 85 characters with spaces
Title in English: Arial 14 cursive. Maximum 805characters with spaces

Name author 1 (standardized)
Professional category, Institution, Country
Institutional email
ORCID

Name author 2 (standardized)
Professional category, Institution, Country
Institutional email
ORCID

Name author 3 (standardized)
Professional category, Institution, Country
Institutional email
ORCID

Abstract (Spanish)

Minimum 210 and maximum 220 words. It must include 1) Justification of the topic; 2) Objectives; 3) Methodology; 4) Main results; 5) Main conclusions. It must be impersonally written "The present paper analyzes..."

Abstract (English)

Minimum 200 and maximum 210 words. It must include 1) Justification of the topic; 2) Objectives; 3) Methodology; 4) Main results; 5) Main conclusions. It must be impersonally written "The present paper analyzes..." Do not use automatic translation systems.

Keywords (Spanish)

6 standardized terms preferably of a single word and of the UNESCO Thesaurus separated by commas (,).

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Keywords

The 6 terms referred to in English separated by commas (,). Do not use automatic translation systems.

Financial Support of Research (optional)

Entity:
Country:
City:
Subsidized project:
Code of the project:

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PRESENTACIÓN
Cover Letter

Sr. Editor de «Sophia»

Leída la normativa de la revista «Sophia» y analizada su cobertura, área temática y enfoque, considero que esta revista es la idónea para la difusión del trabajo que le adjunto, por lo que le ruego sea sometida a la consideración para su publicación. El original lleva por título "_____", cuya autoría corresponde a _____.

El/los autor/es certifican que este trabajo no ha sido publicado, ni está en vías de consideración para su publicación en ninguna otra revista u obra editorial.

El/los autor/es se responsabilizan de su contenido y de haber contribuido a la concepción, diseño y realización del trabajo, análisis e interpretación de datos, y de haber participado en la redacción del texto y sus revisiones, así como en la aprobación de la versión que finalmente se remite en adjunto.

Se aceptan la introducción de cambios en el contenido si hubiere lugar tras la revisión, y de cambios en el estilo del manuscrito por parte de la redacción de «Sophia».

Cesión de derechos y declaración de conflicto de intereses

La Editorial Abya-Yala (editorial matriz de las obras de la Universidad Politécnica Salesiana de Ecuador) conserva los derechos patrimoniales (**copyright**) de las obras publicadas y favorecerá la reutilización de las mismas. Las obras se publican en la edición electrónica de la revista bajo una licencia Creative Commons Reconocimiento / No Comercial-Sin Obra Derivada 3.0 Ecuador: se pueden copiar, usar, difundir, transmitir y exponer públicamente.

El/los autor/es abajo firmante/s transfiere/n parcialmente los derechos de propiedad (**copyright**) del presente trabajo a la editorial Abya-Yala (Ecuador) (RUC: 1790747123001), para las ediciones impresas.

Se declara además haber respetado los principios éticos de investigación y estar libre de cualquier conflicto de intereses.

En ____(ciudad), a los ____ días del mes de _____ de 201_

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Sophia 37
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Publication date of this issue: July 15, 2024.

Sophia 38
The inductive method in the humanities and pedagogy

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Sophia 37
Física, metafísica y educación

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Sophia 38
El método inductivo en las humanidades y en la pedagogía

Descriptores: La actividad científica y reflexión sobre el método de conocimiento; el método inductivo en las ciencias sociales; inducción, experiencia y acción como fundamento de la pedagogía; los métodos de conocimiento y aprendizaje en las humanidades; valor y límites del método experimental en las ciencias humanas; valor y límites del positivismo pedagógico; reflexiones sobre el método científico e implicaciones en los procesos de aprendizaje; aplicaciones del método inductivo en la educación; utilidad del método inductivo para la psicología; propuestas pedagógicas de carácter inductivo en las ciencias humanas.

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