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SOPHIA

Complex thinking and the sciences of complexity in education

El pensamiento complejo y las ciencias de la complejidad en la educación

SUMARY

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Editorial

With great satisfaction *Sophia: collection of Philosophy of Education* is pleased to present the publication number 29; in this opportunity the core of reflection revolves around complex thinking and the sciences of complexity in education.

With the purpose of contextualizing the reflections present in the pages of this volume and realizing a retrospective view of the processes experienced by the human being of recent times, we found that since the second part of the twentieth century, we have been experiencing a series of disillusionments and epistemological, scientific and technological fractures that have generated a multiplicity of thoughts, conceptions, attitudes, actions and reactions that have led to the emergence of:

> New cultural, epistemological, and philosophical movements that question and put modern rationality in crisis; … Various attempts to vindicate theory over practice; the need to reconceptualize and re-construct the reality of communication, of the life of the subject and of society is outlined...;... new ways of thinking, new forms of interaction are promoted... (Aguilar, 2010, p. 149).

Aspects that result from scientific and technological progress and that together have generated a complex society that requires a revaluation of integrative, qualitative and holistic approaches that seek to understand that knowledge is not linearly produced and that it is necessary to rethink the sense, the nature, construction and meaning of it.

The aforementioned aspects make the presence of complex thinking possible and, in whose approach, it is feasible to question the following, among other things: What is the point of distinguishing complexity as science, method and worldview? Would it be correct to segment complexity into three strands? What is the point of distinguishing complex thinking in the broad sense and in the "strict" sense? How important is the idea of self-organization for the construction of a complex method of thinking? How does it relate to the contributions of cybernetics, systems theory and information theory? In what sense can education from complex thinking contribute to the development of an ecological culture?

These are some of the questions that will be addressed in the pages of this issue and that, from the content presented in the following ten

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articles, attempts to provide a series of categorical tools that foster understanding and new questions about the different sectors and scenarios of reality. The articles are divided into two sections:

In the first section, there are five documents whose topics are directly linked to the central theme of the call for this issue. In the second section, there are five writings referring to specific actions, specific contexts, applications and experiences linked to the practicality of a segment of the central theme, of the philosophy of education and of philosophy in general. A brief presentation of the essential elements of each of the manuscripts that make up this issue is provided below. Thus, the first section is represented by documents such as:

Morphogenesis and complex thinking, submitted by José Luis Guzón Nestar from Spain, Eduardo Cañete Islas from Chile and Milan Marinovic Pino from Spain. This manuscript examines teaching-learning methods involving complex creative processes, appealing to mediated and self-regulated experiences through the use of morphologies such as fractals, systems, pattern modelling, growth, fragmentation, and diachronic and scalar transformation, depending on levels of procedural complexity. The authors aim to review the category of complexity and define principles and procedural levels, which act as meta-models derived from complex thinking, from the MOSIG model and from the current parametric design in relation to teaching, especially the creative processes.

Convergences and differences between complex thinking and the ecology of knowledge, written by Rodrigo Severo Arce Rojas of Peru. This review paper analyzes the concomitances and divergences between complex thinking and the ecology of knowledge with the purpose of exploring possibilities for complementarity and examining synergies in the framework of a critical epistemology that allows the understanding of the reality. The author presents a characterization of complex thought from its main exponents such as Edgar Morin, Boaventura de Sousa Santos and others. The review concludes that both complex thinking and ecology of knowledge have similarities in sharing principles of organized systems, dialogicity, recursivity, and retroactivity; in addition to being explicit in terms of overcoming the subject-object distinction to move to a subject-subject relationship. The author of this paper argues that the two proposals constitute alternatives to hegemonic scientific thought giving value to cognitive pluralism and cognitive justice; both proposals stand as transformative alternatives to social reality.

The integrator character of the Morin's thought in university formation, prepared by Freddy Varona Domínguez of Cuba. This study covers two areas: the complex thinking of Edgar Morin and university educa-

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tion. The author proposes to argue the integrative character of Morin's thought and criticize the actions that reduce the integrative character of university education; he considers that the distinctive feature of academic education is that "is realized from the conscience of the person involved and the attention to this affectivity during the formative process".

Teaching Professional Identity: Conjoining Complex Thinking and the Educational Field, written by Juan Pablo Albadan Vargas from Colombia. This article presents a series of reflections on the alienation of the educational spectrum, from initial training systems of university professors with respect to the enveloping social tissues, subjective dynamics, and the discarding of correlations, relationships and demands linked to the social fabric for which teachers are trained. The center of reflection is to unveil complex components associated with these systems from the configuration of elements, dimensions and curricular structures for their modernization and reconfiguration.

The education under the sign of complexity, made by Darwin Joaqui Robles of Colombia and Dorys Noemy Ortiz Farm of Ecuador. This article explains that complexity involves the adoption of a new view of the world, of oneself and of the relationships between the various levels involved; considers that one of the fundamental problems is the disarticulation between a discourse that declares complexity as an essential construct and a schematic and reductionist practice that generates an incoherent context for learning. The authors intend to introduce a number of elements to achieve a holistic understanding that responds to the new challenges that life and the ecosystem pose at the present time. The writers describe the principles of complex thought and then propose an education under what they call the "sign of complexity".

Below, the relevant aspects of each of the documents that form part of the second section of the journal's structure are briefly explained. This section contains the following manuscripts:

Reconfiguration of youth's religiosity in contemporary society and its relation to complex thought, written by Dolores Vélez Jiménez and Juan Mendoza Hernández from Mexico. The article analyzes the problems and difficulties that the process of secularization brings with it in the life of the young of the present time. The authors argue that secularization has become the method for contemplating and accepting religion; they intend to describe the macrosociological factors involved in the dynamics and relations between young people and religiosity. The authors conclude that the reconfiguration of religiosity leads the young person to a responsibility for himself in a massive and anonymous society that commits him/her to be transformative and projects him into the future through the application of the referents of complex thought.

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The High school student movement in Chile an approach from complexity, constructed by René Antonio Varas González; Marcela Eliana Betancourt Sáez and Héctor Marcelo Rodríguez Mancilla from Chile. This article analyzes the high school student movement in Chile from a transdisciplinary approach as a complex phenomenon insufficiently investigated and reflected on by the social sciences and humanities. The central problem of this document is the crisis of the institutions of liberal democracy, and more specifically, the relationship between the concepts of citizenship and complexity, for the interpretation of the high school student movement.

Didactic strategies for the development of competences and complex thinking in university students, submitted by Dulio Oseda Gago; Ruth Katherine Mendivel Geronimo and Miriam Angoma Astucuri from Peru. The manuscript has as its starting point the logical framework of competence development and complex thinking in the world university system. The authors intend to demonstrate the effects of the application of didactic strategies for the development of competencies and complex thinking in students of a public university in Lima. The didactic strategies used by the researchers were the problem-based learning strategy, the collaborative learning strategy, and the strategy of embedded information and communication technologies.

Philosophical dialogue as adventure and experience that heals, by Andrés Escobar Vásquez and César Augusto Ramírez Giraldo of Colombia. This manuscript aims to analyze the vital contribution of philosophical dialogue to the understanding of problems of human existence. The authors see in philosophical dialogue an opportunity for the transformation of existence and as a healing experience of the evils that afflict postmodern man.

Reflections and perspectives on the evaluation of mathematics learning in Mexican higher education, structured by Maritza Librada Cáceres Mesa of Mexico; Javier Moreno Tapia of Mexico and Jorge Luis León González of Cuba. This article presents an analysis of the evaluation practices of apprenticeships in mathematics subjects in higher secondary education. The authors see the evaluation of learning as a challenge for teachers and to achieve meaningful learning in the student; they intend to revitalize the formative dimension of evaluation in order to transform their practices in the light of contemporary curricular requirements. Researchers emphasize the need to promote a culture of evaluation that ensures the development of a systematic, rigorous, critical, reflective, and academic decision-making process.

With the intention of advancing some guidelines for new reflections on the diversity of approaches and fields of action that complexity has, it is

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established that the segmentation of complexity is presented as something *purely apparent* but is oriented towards the understanding that the whole and the part, the simple and the complex, the dynamic and the static, the finite and the infinite, order and chaos, the clear and the confused, they are complementary, interrelated, mutually supportive and necessary.

In the current context, complexity is a real challenge for all areas of human action, the new scenarios require different ways of teaching and learning according to the requirements of society, which call for a rethinking of education systems and the incorporation of new methods, techniques and strategies that allow the overcoming of old paradigms so that the subject develops skills and abilities to undertake the paths of understanding, the interpretation and transformation of the complex reality in which we find ourselves immersed.

In the educational field, the educational institution should be responsible for providing the tools to understand that life is situated between the corporeal and the spiritual, it is something that becomes complex, internalized, dynamic and permanently self-organizing. The educational institution should be responsible for facilitating the conceptual and methodological means and instruments that enable the transition from simple to complex thinking with a view to re-constructing, constructing and reconstructing in a way that surpasses the additive vision of the traditional forms of action based on the fixation, in the near, in the obvious, on the mechanical and linear causality of the established to take other directions; In this sense, the educational institution will be in charge of providing the necessary elements for the subject to develop the elementary competences that allow him to develop in a complex society, with emergent and complex problems characteristic of the current time.

Let us continue to build transformative thoughts of different worlds and realities.

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Articles / *Artículos*

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Morphogenesis and complex thinking

Morfogénesis y pensamiento complejo

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Abstract

The present article reviews teaching-learning methods in the architecture career (involving complex creative processes), appealing to mediated and self-regulated experiences through the use of morphologies such as fractals, iterated systems, pattern modeling, growth, fragmentation and diachronic and scalar transformation, according to levels of procedural complexity. This supposes an open framework of assimilation from the planes of spatial, material, functional, aesthetic and habitability expression within a projectual continuum, governed by the principle of pure forms, foundationally dictated by modern architecture. This determines a new and constant encounter with the morphological-architectural object, which admits various solutions, variations, and even inflections of the same problem, according to similar or changing requirements and conditions. Given the above, it is derived as an objective, to review, initially, what we have to understand as complexity, to then define certain principles and procedural levels, which act as meta-models, which derive from the so-called Complex Thought, as well as from the MOSIG Model, and current parametric design in relation to teaching, especially creative processes. In a third part, a reference material of some teaching experiences based on this type of model must be offered.

Keywords

Mental models, modular growing and fragmentation process, parametric design, MOSIG, auto-regulation.

Resumen

En el presente artículo se examinan los métodos de enseñanza-aprendizaje en la carrera de arquitectura (que entrañan procesos creativos complejos), apelando a experiencias mediadas y autorreguladas mediante el uso de morfologías como los fractales, los sistemas iterados, la modelización de patrones, el crecimiento, la fragmentación y la transformación diacrónica y escalar, según los niveles de complejidad procesal. Esto supone un marco abierto de asimilación desde los planos de expresión espacial, material, funcional, estético y de habitabilidad dentro de un continuo proyectual, regido por el principio de las formas puras, dictado fundamentalmente por la arquitectura moderna. Esto determina un nuevo y constante encuentro con el objeto morfológico-arquitectónico, que admite varias soluciones, variaciones e incluso inflexiones del mismo problema, de acuerdo a requerimientos y condiciones similares o cambiantes. Por todo lo anterior, se deriva como objetivo, revisar, inicialmente, lo que debemos entender como complejidad, para luego definir ciertos principios y niveles procedimentales, que actúan como meta-modelos, que se derivan del llamado Pensamiento Complejo, así como del Modelo MOSIG, y del diseño paramétrico actual en relación con la enseñanza, especialmente los procesos creativos. En una tercera parte, se debe ofrecer un material de referencia de algunas experiencias de enseñanza basadas en este tipo de modelo.

Palabras clave

Modelos mentales, crecimiento modular y proceso de fragmentación, diseño paramétrico, MOSIG, autorregulación.

1. Introduction

The expression "Complexity Theory" first appeared more than twenty years ago, in an article published in Scientific American (1978), but the birth of a "complex thought" occurred much earlier, at the end of the forties. Cybernetics scholars (Wiener, Weaver, Ashby, von Foerster) and information

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theory (von Neumann, Shannon, Marcus, Simon) were the first to address complexity. Over the years, thinkers of all disciplines have been adding to them. In 1984, while in the Old World the birth of the new epistemology was ratified by a series of international conferences ("Science and the practice of complexity" in Montpellier, "The challenge of complexity" in Milan. America would immediately become the most important international center for complex studies, particularly the Santa Fe Institute. Currently, as Doyne Farmer and Sidorowich (1987) point out, the theory of complexity is still very fragmented and resembles the theory of thermodynamics in the first half of the 19th century, when scientists began to have an idea of the basic concepts, but not all the issues had been outlined and there was no consensus in the scientific community.

The theory of complexity can be defined as the interdisciplinary study of complex adaptive systems and the emerging phenomena associated with them. Since we are talking about complex systems, it may seem obvious that complexity is an objective and intrinsic property of certain systems. In fact, according to leading theorists, the complexity of a system is not so much a property of that system, but a property of the currently available scientific representation of the system, that is, of the system model, or more precisely, since it is always the observer of the system who builds a model, a property of the system which consists, according to Le Mogne (1999) in: (a) the observer who builds the model and (b) the model itself.

Adopting this perspective is a bold step, because it means abandoning the objectivism of classical science, that is, the conception of being as a set of manageable and measurable objects, subject to the theoretical and practical domain of the human subject, and from a relational point of view towards being. From this new point of view, according to Gell-Mann (1995) a complex system is understood as a system whose current available model, built by the observer of the system, is complex. It is evident that complexity, thus understood, acquires a purely historical dimension: the models change with time and what is represented today as a complex may not be tomorrow, or vice versa. But how to evaluate the complexity of a model? The scientific model of a system is a not redundant description of the system in question; and the complexity is the length of this description. In summary, one can define the complexity of a system as the minimum length of a scientific description of it, obviously made by a human observer (Gell-Mann, 1995).

There are some features common to all complex systems, which can be synthesized in the following points:

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- Many more or less complex components: in general, the more complex the (sub) component systems, the more complex the system as a whole; in the more complex systems, the subsystems (i.e., the components) are also highly complex; components can be hardware (molecules, physical processors, cells, individuals) or software (virtual processing units).
- Interactions between components: the components interact when passing information (in the form of energy, material or digital information); the number of connections and the presence of recursive substructures and feedback circuits (the so-called rings) increase the complexity of the system, but the information exchanged by the components cannot be too numerous (otherwise the system becomes chaotic), nor too scarce (the system crystallizes).
- Absence of a pyramid hierarchy: if only one component governs the behavior of the whole, the system cannot be complex; in fact, its description can easily be reduced to that of the main subsystem.

This article aims to focus the issue of complexity in the study of gradients and processes of scalar fragmentation in the formation of modular fabrics and landscapes. The philosophy and history of science unite to see how to face this challenge in an interdisciplinary or transdisciplinary way, always from the perspective of Complex Thought (Morin, 2008).

Transformational modeling

In the study of form, two elements of contemporary thought stand out, which constantly recur in the aesthetic debate:

a) According to authors such as Martín López (1970) and Marinovic and Limone (1995), the distinction and possible integration, between diachronic and synchronous representation models within patterns, that according to Marinovic, Glaria and Marinovic (2017) are susceptible to a more or less wide variety of transformations. These approaches were presented by authors such as Piaget (1969), from the structuralism of the sixties, for whom the notion of transformational structure constitutes the axis of cognitive development, as adaptive dimension, therefore, in its last decades, should be devoted to the dynamic-functional dimension of the structure, where the diachronic structuralist analysis is insufficient, as a mere identification and characterization of periods, sub-periods and stages, and should rather be approached from its deepest scope. For all these periods, taken as a whole, would constitute a successive balancing

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process, that is; when achieving a dynamic equilibrium, where the previous structure is integrated in a new system in formation until reaching a new more stable equilibrium and with a wider field or new stadium (Piaget, 1969; Labra, Labra, Quezada, Cañete, Basaure & Mora, 2000). It is therefore essential to point out, following Labra (1995), that although:

> Each stage is characterized by the appearance of original structures, whose overall constitution distinguishes it from the previous structures, each period also stands out for having a series of momentary characteristics, which are modified by the subsequent development according to the needs of a better balance (p. 4).

This evolutionary continuity of cognitive structures then requires an analytical continuity, which explains the change of structures. At this point in the Piagetian explanation, we refer to Inhelder, García and Voneche (1981) to understand the complementarity of structural analysis with a functional approach and analysis:

> It is clear that such a structural analysis has its complement: a model that accounts for change. In fact, Piaget is not limited to the framework of a structural analysis of equilibrium states; its focus is mainly on the transition from one form of equilibrium to the next, that is, on the mechanisms of overcoming old structures by the construction of new structures (p. 11).

It can be said that these approaches have been the reference on which the problem of the phenomenal emergency has been installed from connectionism. These notions extend even to the concepts of scale, not only spatial, but temporal, because an object in scalar transformation can be described in different ways according to the scale with which it is observed or modeled. Therefore, the notion of scale becomes a bridge to the phenomenal field, generated from the notion of dynamic operation and structure or in balance.

Underlying the elements mentioned above, is the problem of temporality, expressed in concepts such as evolution and historicism (Prigogine & Stengers, 1992; Marinovic, 1995; Guzón, 2002), in relation to the problem of knowledge and the historical context, are also relevant on the aesthetic plane, from different confluences in relation to the models associated with the study of space and physical time, from changing dynamics emerging from the so-called dissimilar structures in constant transformation, but which, according to Prigogine and Stengers (1992) and Guzón (2002) present a surprising meta-stability. As these authors pointed out, with regard to their work The *New Covenant* (1979):

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> There we exposed the reversal of the classical paradigm that identified Entropy's growth with evolution towards disorder. We described the constructive role of irreversible phenomena and self-organizing phenomena that take place far from equilibrium (p. 10).

This meta-stability of the dynamics and processes far from equilibrium would point, according to this author, to the fact that time is finally irreversible, and therefore leads us to re-evaluate the notion of a phenomenal-existential time that points out: towards the need to overcome the negation of irreversible time, a negation which is the legacy bequeathed by classical physics to relativity and mechanics (p. 12).

b) Thus, on the one hand, at present, there seems to be a relative consensus that the phenomenology of the present body, following authors such as Francisco Varela and Evan Thompson (2000) regarding the phenomenon called as emergence, observed and described in connectionist models in neural networks, and that allows, according to authors such as Flores and Soto (2007) in Ibáñez & Cosmelli (2007), to approach the understanding of consciousness processes. In this context, the notion of mental image plays a rather modulating role within the models of functionalist cognitive currents and cognitive psychology in relation to the problem of intentionality. A nosological debate derived from the notion of essence, associated with the attribute of timelessness and mnomological universality, is thus installed and reinforced, in contrast to the material and historical temporality inherent in the existential debate. As a consequence, the notion of transformation and generative interaction of knowledge and cultural practices derived from it, especially in contexts of globalization and assimilation of new technologies to everyday life, appears as relevant and contingent (López, 1970). Moreover, this has revitalized neuro-phenomenological postures in function of action (enaction, in terms of Varela, 1999) and emergence in the world of the various types, degrees and ways of making conscious the activity of the subject, in its experiential flow. In this framework, the approaches of phenomenology, consciousness, virtuality of experience, semiosis and morphogenesis, appear as clear elements of what we could call principles (generative and active mediators) of individuation between the universal and particular categories proper to the debate between structure and function (and between essence and existence).

(c) Finally, reference should be made to various approaches, which, partly derived from the decontructivist positions, initially articulated as critical of functionalist and structuralist systems, as globalizing systems, will revitalize the theme of the linguistic-cybernetic models of the 60s

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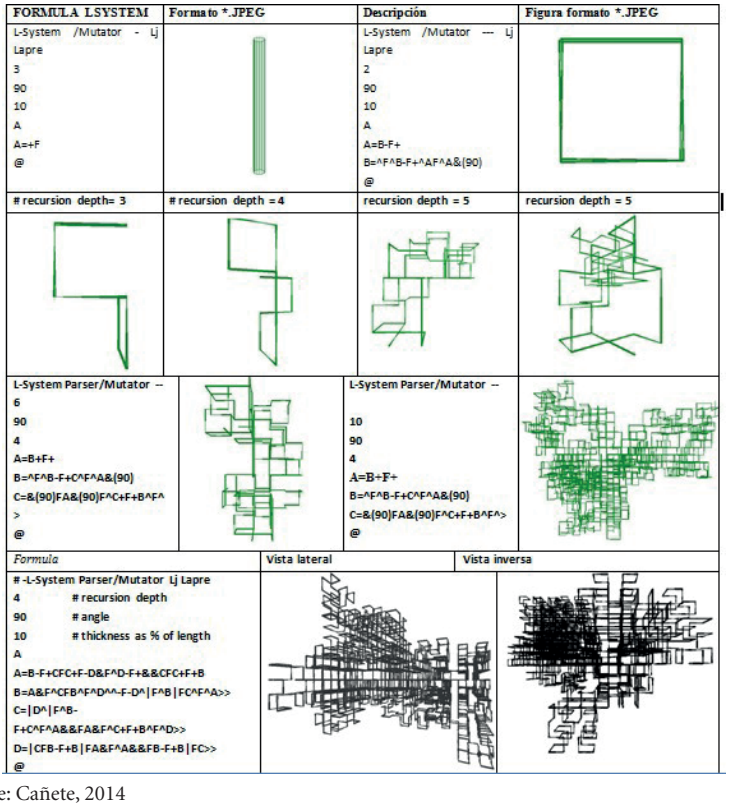
and 70s but from a post-modern perspective and, in many ways, quickly prefigure the hypermodernity (Baudrillard) that authors like Koolhas (2000) are going to develop in their famous book 'Mutations'. Rather, the impact of the deconstructivist postures allows us to explore and open the field of creative reflection towards notions such as portions, as pieces, fragments and partial or incomplete narratives, which could eventually be parts of larger chains, but that in their re-combinatoric and generative potential of alternating alterities, scenarios and proto-realities play a fundamental role. These reflections quickly offer a framework for what will be called generative design, and today called parametric design, where the algorithmic-operational notion, now articulated in operational metalanguages that privilege deformations, amplifications, and scale jumps, of diagrammatic-landscape type, which allow to configure, highly reversible and combinable, dynamic and changing networks and patterns.

Figure 1
Formal growth models of the iterated function language (L-Systems)



Source: Cañete, 2014

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It is clear that the development of the so-called morphogenesis is linked to this development framework.

Some key elements in this morphological framework of analysis will be reviewed below.

Aesthetics and morphogenesis

It is interesting to note that in art, especially in painting (so-called dynamic cubism, futurism, modern art, abstract painting, materism, abstract expressionism, minimalism, virtual or graphic computational art, kinetic art, etc., among so many others), have in different positions in this regard, not only from the principles and features that are postulated as eternal and immutable attributables to the aesthetic, but from conceptions where the properties of divergence, evolution, deterioration, transience, boom, degradation, fall stand out, in other words, transformation and mutability of knowledge and aesthetic enjoyment in plastic praxis.

In this scenario, an axis of debate of particular importance has been generated with the emergence and consolidation of models and geometries such as chaos theories, fractals, n-dimensional folds, neural networks, and so many others, usually associated with the so-called Theories and Models of Complexity (Morin, 1980; Oyarzún, 2000, Cañete, 2014) that has been relatively absent from the front line debate, highlighting several authors who have emphasized the importance of art and aesthetic understanding in culture and knowledge (Jay, 2003; Oyarzún, 2000).

In this context, from our points of view, we offer some elements of reflection on the problem of the fragment and the pattern as a framework of relative scopic confluence, in the words of Martin Jay (2003) in the post-modern epoch one entwines polarities usually associated with one or the other pole of debate (essential/existential; temporal/timeless; mnomological/contextual) and based on a kind of creative act that defines part of contemporary thought, by confronting, on the one hand, the minimal expressive elements of abstract painting (the point and the line as pointed out by Kandinsky) with the image and understanding of the inexhaustible and diverse natural world, still unexplored by the scientific mind (what Oyarzún (2000), has called synapses of the impossible) and which will be addressed below.

The study of irregular shapes and the formation of models

From the point of contemporary morphological modeling, the impact of the so-called Theories of Complexity (expressed in new geometries such

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as fractals) has revitalized the study of morphologies and morphological transformations at scale, generating a wide field of exploration that is generically referred to as the study of irregular forms. As noted by leading mathematician Benoît Mandelbrot (2000):

> Euclidean geometry is incapable of discovering the shape of the cloud, a mountain, a coast or a tree, because neither the clouds are spherical, nor the mountains conical, nor the coasts circular, nor the trunk of a tree cylindrical, nor a beam travels in a straight line. I believe that many forms of nature are so irregular and fragmented that nature not only presents a greater degree of complexity, but it reveals itself to us completely different (p. 9).

Consequently, this presents a challenge for the study of forms, which is:

> … the morphology of the amorphous. In response to this challenge, I conceived and developed a new geometry of nature and began to apply it to a number of fields. It allows us to describe many of the irregular and fragmented forms that surround us, giving rise to coherent theories, identifying a series of forms that I call fractals. Some fractal ensembles [have] such crazy shapes that neither in the sciences nor in the arts have I found words that describe them well (Mandelbrot, 2000, p.10).

A starting point then arises, in the progressive dissolution of boundaries in the operations between science and art, especially in the field of virtual modeling, where, as Oyarzún (2002) points out: the epistemological difference between the search strategies in science and in art is by no means irreconcilable (p. 65), and they are part of what we today even understand as our 'escopic regime' (Jay, 2007) which makes plausible the coincidence between what is seen and what the epoch considers normal to see, that escape to normality, to opinion, or to the taste of the epoch. This opening and dialogue between science and art takes place in the field of the study of morphologies, which brings us back to the approach of Kandinsky himself at the beginning of the 20th century, in relation to the importance he saw in the study of natural irregular morphologies for art, establishing a parallelism and ambit of confluences between science and art. As Kandinsky (1993) put it:

> The application of the line in nature is rich and profuse. Only a researcher, a scientist could carry out a study on this important topic. Especially valuable for the artist would be to realize to what extent the independent realm of nature applies the basic elements: which elements appear, what properties they possess and how they are combined. The

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> laws of composition of nature are offered to the artist, not to be imitated, since nature has its own purposes, but to be confronted with those of art (pp. 110-111).

Consequently, this notion of transformational structures, in which form or object at different scales are important, but also in different moments and times, out to think space and time united through form and its trans-formations. Thus, taking this broad, dynamic and still emerging field, it is possible to indicate various moments in its historical evolution, where the artistic development is configured as theoretical, from which certain parallels between principles can be articulated, artistic and scientific approaches. In this counterpoint stands out both minimalist and abstract pictorial expressions typical of modern art (pe. Kandinsky, Moholy-Nagy or Klee) as well as mathematical and morphologies such as fractals, iterated systems or theories of chaos (Lyndenmayer, 2000; Prigogine, 1999; Mandelbrot, 2000). In this affinity and confluence, it is possible to affirm that from the beginning of the twentieth century until today, a field of study of the so-called irregular morphologies has been configured, which has gone through various stages (see chart 1). A case study of these irregular forms, must be cases as the formation of landscapes, textures or major morphological conglomerates (with scalar properties) but that preserves an essential organization, as well as being moments of continuous complex transformation and interaction.

From the module in transformation to the conformation of textures and landscape

The study of forms has always required certain metaphors to guide their understanding and assimilation. Prominent roles have been assumed by the images of glass (Marchnt Fiz, 2008) or of the growing tree as the axis of botanical transformations in the modeling of iterated patterns (Lindenmeyer & Przemyslaw, 2000), or recently the image of the fragment in transformation in the so-called, fracture modelling (Cañete, 2014). As Bohm (1976) rightly points out regarding the role of the image as an underlying metaphor guiding an investigation:

> The proper role of metaphysics is that of metaphor that provides an immediate perceptive understanding of the global order and structure of our thoughts. It is, for this reason, a poetry class. Perhaps some stubborn individuals would object to the intrusion of such poetry. But, just as Moliere spoke of the man "who made prose throughout his life without knowing it", so the man of practical spirit "makes poetry

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> throughout his life without knowing it". The point I want to make here is that all of us will begin to think more clearly when in a frank and open way we admit that a great deal of extreme common sense and positive science is really a kind of poetry, which is indispensable for our overall functioning (pp. 244-245).

On the other hand, these images also tend to pose enigmas, as Aristotle has reminded us for so many centuries in his famous *Poetics*, especially with regard to how far and how to carry out the final consequences and inferences of such a metaphorization. In this case, one can focus on the interest in the metaphor of fragmentation as a mechanism associated with the study and modeling of transformation processes, which, especially in the light of another modern image, of "straight and pure lines", typical of much of modern art initially, such as cubism, Bauhaus, minimalism, abstractionism, materism, or various post-cubist forms of expressionist type and hybridization, among so many others, which have decisively influenced the development of contemporary art.

In the first place, as a background, it should be pointed out that, primarily, we have to study the so-called "textures", typical of the modern movement, especially of currents such as the Bauhaus, where this was initially approached as a property of the surfaces of the materials, whose purpose for the artist is only given to the extent of the possibilities that its use allows him through a functional biotechnique. Thus, initially the texture is assimilated as a mere ornamental quality associated with the use and functional sense of the working material. The importance of biotechnical use was understood to be associated with functional use, emphasizing in instances such as camouflage, ornamental colors or the assembly of layers in artisanal fabrications in order to avoid warping or torsions in wood or other material (Cañete, 2016b).

It is worth mentioning that despite the importance that the Bauhaus, in particular (and formalisms and constructivism in general), assign to the study of compositional and constructive processes, it has not been developed, in the texture, a mechanism that generates surfaces, planes, and spaces, as in the present it is conceived and studied, in addition to the previous properties. Possibly, the effort to avoid the problem of ornamentation, only allowed them to value it (the texture) in its functional properties in the design, such as camouflage. It seems that the exhaustion of structuralism, its dissolution in post-modernity, as well as the persistence of phenomenology in various fields, among other isms, is what configures a transversal field, where we can assess the fragmented or at least "in transformation", as a sharp and constitutive sphere of

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knowledge. In this new scenario, the linguistic-generative properties of textures have given way to other strategies, such as:

The tension and dynamic balance of Irregular Gestalt Perceptual Configurations.

- The morphological transformations associated with a Pattern Language, associated with the study of Iterate Systems (Lindenmayer, 2007) where the metaphorical image of growth predominates, on the one hand, and the image of fragmentation on the other.
- Strategies of Emerging Interactionism as in the works of Prigogine (1992), Maturana (2000), Verela (2000), Thompson or Kauffman (2002).
- The scalar qualities of Complex Geometric Transformation Processes (Mandelbrot, 2000). In this field, the attempts to shape and articulate holist metaphors will stand out, where the properties of scalar similarity or scalar differentiation, within the same system, stand out

Figure 2
Comparative table of morphological properties
in regular and irregular geometries

Regular Forms	Irregular forms
Regular closed forms	Open shapes, conurbated or fragmented
Euclid Geometry, Polyhedrons (regular and semi-regular)	Textures, gradients, fractals, landscapes, nodes and graphs, fragmented shapes, ect.
Symmetry, focusing on closing and balancing processes	Asymmetry, centered around equilibrium tension and rupture processes
Unique and defined centers	Multiple centers, centroids, and not fully defined
Generated by linear equations	Generated by non-linear equations
Without scalar properties	With scalar properties
Associated with finished and defined forms	Associated with incomplete shapes and in transformation process

Source: Own elaboration

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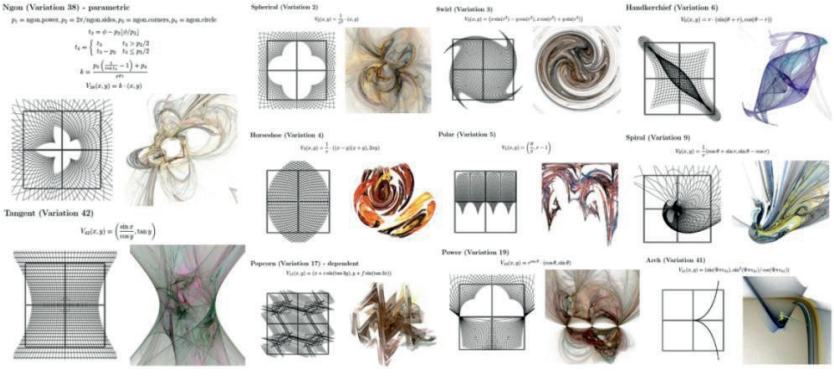
Morphology and digital modeling based on algorithms

In the current scenario, many of the new modes of plastic and aesthetic expression appear to be associated not only with the use of graphisms and morphologies, but also with the mixture and interdisciplinary polymic integration, that are progressively integrated and assimilated from the possibilities offered by contemporary digital design. In this way, together with the development of computing and the consequent acceleration in data processing, morphology modeling was enhanced by the cyber-systemic leap allowing to incorporate both positive and negative feedback processes (iteration of functions), such as amplifier mechanisms and deformators of an initial signal or noise. This step was decisive for the conformation of geometries such as fractals and the study of non-linear equations, by incorporating into the algorithmic baggage the notions of language and metalanguage of functions, acting as a modulating mechanism in the morphological design.

Figure 3
Equations reveal different morphologies



Source: Draves and Rachase, 2008

The morphological modeling allows the design of different patterns that are modeled from equations, each acting differentially on the cloud of points. This generates a kind of aesthetic of the formations, and makes the equations a true generative morphological alphabet and language with aesthetic implications, especially when considering their possible combinatorics and dynamism at scale.

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Post-structuralist contemporary perspectives

In the current scenario, even considering post-modern objections and de-constructivist tendencies, it can be said that underlying a mechanism of transitions and flows are the notions of structure (as an organization), function (effects) and energy (dynamism). In this line, authors such as Marinovic (1995) and Vinet, Knox and Marinovic (2013) have formalized in meta-models where, they import transitions between these categories when describing a system more comprehensively, being these, true homeoretic dimensions based on a continuous generative balance between these dimensions and their transitions and emerging transformational interactions. By the way, this general scheme may give rise to a study in which one or other of the triad's poles predominate, minimize or unroll. In this context the balancing and homeoresis are the creative source and genetic morph of the system. It is therefore appropriate to review Marinovic's approach to this in his MOSIG model, which allows us to understand certain inferential relationships, as transitions between plans and design levels.

Precedent to post-structuralism

MOSIG MODEL

According to Vinet, Knock and Marinovic (1995) social systems show the same characteristic aspects of integrity of living systems or self-organized systems. From a simultaneity perspective (Synchronous vision) it is possible to identify three fundamental components in a self-organized system, which answer the questions with what? How? And for what? The answers to these questions generate the Energy, Structure, and Purpose components, respectively. From a succession perspective (a diachronic vision) these three components correspond to the primary functions of preservation, integration and development, respectively.

Thus, the MOSIG model distinguishes three additional perspectives: Relational Vision (system behavior), Vision of Stability (system stability) and Context Vision (system coupling and its environment) (see Figures 1 and 2).

According to Marinovic (2005, 2008), the behavior of a self-organized system can be observed during its coupling with the context (environment, scenario) in which it is immersed. In this way, and as the context gives meaning to the text, during this link the system will behave as a) stable, b) unstable or c) critical of collapse (Fig. 5).

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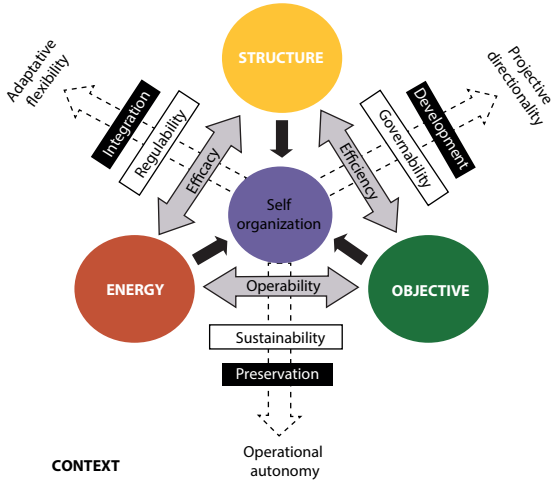
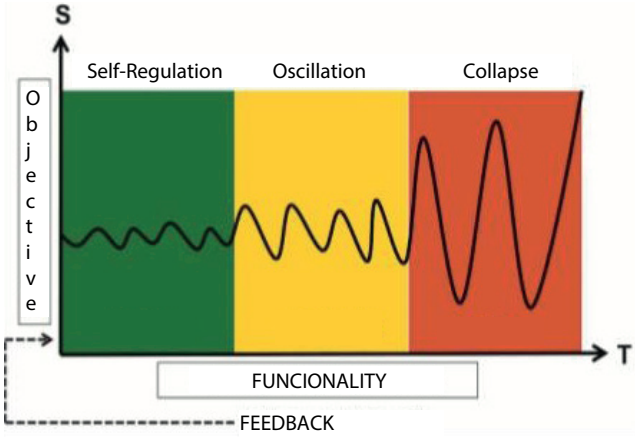
Figure 4
MOSIG model



Source: Marinovic, 1993; 2013

Figure 5
States of stability and instability of a system



Source: Marinovic

From the above, it have been opened, as morphogenetic field of exploration, models that allow to understand the transitions of a system, where some of the variations and systemic dimensions prevail, be it the structure, the function or the energetic state, in the sense of being able to

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understand the phase transitions or the relative and variable weights of each dimension within the dynamics and process through which a system goes, in its adaptation and linkage to the environment. In each of these transitions and states of phase, dynamic and generative balances must be created, which puts the dynamism and creativity at the heart of the debate, both within the social body and in the educational models (Figure 8).

Figure 6
Conceptual-operational levels of the MOSIG model

Hierarchical expressions		CONFIGURES Special	DYNAMIZES Temporal	VISUALIZES Relational	EXPLAINS Stability	MEASURES Adaptability
	Social System	Constitutive Coherence	Axiological Coherence	Operational Coherence	Functional Coherence	Coupling Coherence
	What for?	Objective	Development	Efficiency	Governability	Projective directionality
	How?	Structure	Integration	Efficacy	Regulability	Adaptative flexibility
	With what?	Energy	Preservation	Operability	Sustainability	Operational autonomy
		↓	↓	↓	↓	↓
Views on Systemic Analysis		Synchronic view	Diachronic view	Relational view	Stability view	Context view
Perspectives on Systemic Analysis		Simultaneity	Successions	Behavior	Stability	Coupling

Source: Marinovic, 2008

As can be seen, the MOSISG model not only proposes the alternation, continuity and discontinuity between the planes of order, chance and self-regulation, of utmost importance within a creative process that is affectively integrated to learning, but also poses complementary questions that must be addressed from pedagogy and teaching, related to how each intervention is configured, energized, visualized, explained and measured, which refer to the meaning, purpose, development, efficiency, handling and projection of the work.

In this framework, the possibilities offered by morphological explorations in general, and parametric design, in particular, as a procedural instance, that can be guided and integrated from creative processes, in our case, into the field of teaching-learning of architecture, expressed in the design of spatial, pre-architectural models that allow later integration into higher degrees of elaboration, subject to structural, functional, locational, programmatic, and, finally, project studies, must be addressed.

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Morphological exploration and parametric design

These explorations related to the importance of textures allow a polyphonic-operational integration from at least three fronts. On the one hand, it allows us to rethink the problem of the surrealist or even Duchampian *objet-trouvé* (associated with the study of installations and the so-called dynamic cubism) with regard to the subjective-objective encounter with chance as the source of the aesthetic enigma. On the other hand, this conception must be enriched with the minimalism of abstract painting and computer graphic artists (Atari, 2011). On a third front, it is the encounter and evolution of these historical influences with the virtual morphologies regulated by parametric operations, which generates a similar pattern of morphological exploration of our study (Schumacher, 2008).

This new type of formal operations allows modeling morphologies based on compositional processes such as: a) the scalar discontinuity and continuity of the line, b) the perceptual conformation of active lines and surfaces as an effect of vectorization, c) the transitive conformation and gradation of morphological interiorities and exteriorities, d) the relationships between cut and planar shape and the genesis of the vacuum in the volumetric projection, or e) the relationship of tension and dynamic and transformational balance between generative patterns in the nascent shape. This is detailed in some of the following points.

- The Triad: Linear Order-Complexity-Randomness. The inclusion of irregular forms and relationships has broadened the horizon from which the notion of order was understood, moving from a static and preconceived conception to a changing and generative notion. The linear order is seen as part, just a moment within a continuum, with maximum levels of completeness, delimitation, inclusion, order and symmetry, that coexists with the so-called orders out of balance or by fluctuation, generative and transformational, typical of the Theories of Complexity, where partial and changing scale symmetries predominate, with a range of gradients, textures typical of the scalar variations such as fractals, folds, bifurcations, thomian catastrophes, conurbations and theories of chaos. From this complex order, one passes to the plane of stochastic associations and variations, which tend to the temporal and spatial dispersion of any system, where the discontinuous repetition of patterns or proportions, is the most stable mode of harmony or symmetry (more typical of previous levels). In this framework, chance appears as the closest limit to systemic disintegration, typical of disorder and neguentropy.

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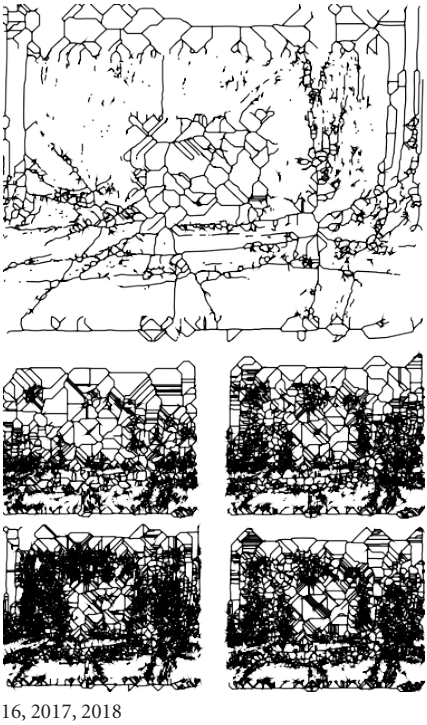
- The Study of transitions and hybrid formations, texture and landscape. The fractal lines that are conurbate and branch to scale, in processes of fragmentation and formation of gradients, allows the emergence of continuous interactions with the form and the environment, through proportions and tensions between planes and forms, alternating between regular and irregular compositional patterns. The above allows to explore, compositionally, the mixture and morphological variations from the continuity of the conurbation of the line or fragmented stroke, which allows to appreciate the forms thus created, as patterns and global figures, oscillating between points of greater or lesser opening or gestalt closing, multiplying, varying and alternating spaces of greater or lesser interiority or exteriority at the same time. The whole of this evolution process is a source of landscape generation.

Figure 7
Progressive morphological vectorizations
with different scale factors and transforming gradients



Source: Cañete 2012, 2016, 2017, 2018

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These principles allow us to rethink the classic distinction between regular forms, conceived as ideal forms, and the rich and still little systematized range of irregular forms and relationships, usually conceived as transformational and interactive.

Methodology

Given the above, the author has worked on a model based on the following principles:

- Linear Order and Order of Complexity: The study of complex forms has expanded the field from which the notion of order was understood, moving from a static conception to a changing and generative look. generating new irregular morphological configurations.
- Fractal morphology: This dimension will be modeled using image vectorization techniques such as the use of iterated languages, resulting in pure lines that branch, twist and scale into morphological units, maintaining a global compositional coherence from the same essential minimalist trace.
- The study of patterns and textures as transitional forms in morphological transformation: The fractal lines, which generate patterns through transformation to scale, allow the modeling of processes of growth or fragmentation, based on continuous interactions between regular and irregular patterns, varying and alternating spaces of greater or lesser interiority or exteriority. The whole of this evolution can be identified as a form of vectoral landscape.

Following these criteria, minimalist morphological patterns are generated that allow the design of shapes and spaces, with pre-architectural value and sense, that can progressively be assimilated and adjusted to architectural, projectual, functional criteria, and others, following levels and moments of complexity and development.

Morphological experiences of procedural modeling

The study of this type of morphology appears as the general framework for the development of teaching and learning strategies in creative ways in relation to the problem of the assimilation of form from a pedagogical framework of architectural teaching, which has been addressed by the author, both at the teaching level and in successive visual arts projects

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funded by FONDART (Cañete, Bahamondes, López, 2012). From these experiences and scope of digital morphological exploration the following work principles were derived:

- A general approach of the minimalist type.
- A generative-transformational approach.
- A relational-configurative process, ranging from the notions of module and assembly to the notions of landscape and digital landscape.

On the other hand, from the pedagogical point of view, the aim is to encourage in the student the exploration and individual expression, suggested from the very exploration of modeled forms. This allows us to distinguish levels of morphological-operational complexity, on the one hand, and levels of aesthetic-architectural assimilation explored on the other hand, directing morphological-spatial models oriented, both towards; a). a pre-projectual sense and/or; b). a morphological-aesthetic sense akin to the previous point. The above has resulted in the following model and general methodology of work, using various materials, in different experiences and commissions since 2015, called: Generative Minimalism, whose formal principles are associated with procedural mechanisms (operatory-algorithmic) modular growth and fragmentation scale defined by Cañete (2017). In this framework, a working model for morphological modeling is proposed, with the following general characteristics:

Architecturally mediated algorithmic modeling

The following complex exploration model can be summarized in three axes, morphological, algorithmic (procedural) and architectural, and can simply be abbreviated as MAA:

Morphological Complexity of the Pattern: This complexity ranges from:

- Individual or grain module level.
- Tissue, pattern or landscape level.

Level of Algorithmic Complexity: Spatial-morphological operations, such as: filled, void, extrusions, circulations. These have two algorithmic levels

- Joint operations.
- Local operations involving particular modules or sectors.

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Level of Architectural Complexity: A continuum of two formal poles:

- Pre-projectual sense.
- Morphological and spatial sense, as an aesthetic expression (includes approaches such as installations or formal interventions).

This is summarized in the following diagram of pedagogical complexity:

Figure 8
Working model, by type and complexity of design

Tipos de modelación morfo-espacial		Nivel de complejidad pre-arquitectural	
Modelación morfológica en base a ecuaciones no-lineales y tramas vectorizadas e iteración de funciones	Diseño espacial en base a crecimiento y fragmentación de tramas modulares Diseño espacial en base a deconstrucción de volúmenes y ensambles modulares	Nivel 1: Incluye Variables como: a). Vacío y espacio arquitectural, b). Circulación, recorrido y promenade. c). Jerarquía y relación espacial entre volúmenes	Nivel 2: Incluye, además, variables como: a). Niveles y accesos, b). Sub-unidades (piezas morfológicas) c). encajes o ensambles modulares entre niveles.

Source: Cañete, 2018.

This type of morphological modeling of textures and global landscape patterns has been approached within the framework of parametric design and modeling, and explored by the author, in successive visual arts projects funded by the Regional FONDART of visual arts. It has also been developed as part of the fractals and form module, at the City Workshop, in the third and second year of the architecture career of the University of Valparaiso, respectively. However, in addition to the formation of landscape textures, it was also interesting, as a means of exploring the process of morphological transformation as a generative language (taken to the plane of fragmentation and modular assembly) and its possibilities as a methodology for exploring interstices, volumes, assemblies and relationships between pre-architectural modules, which the texture suggests.

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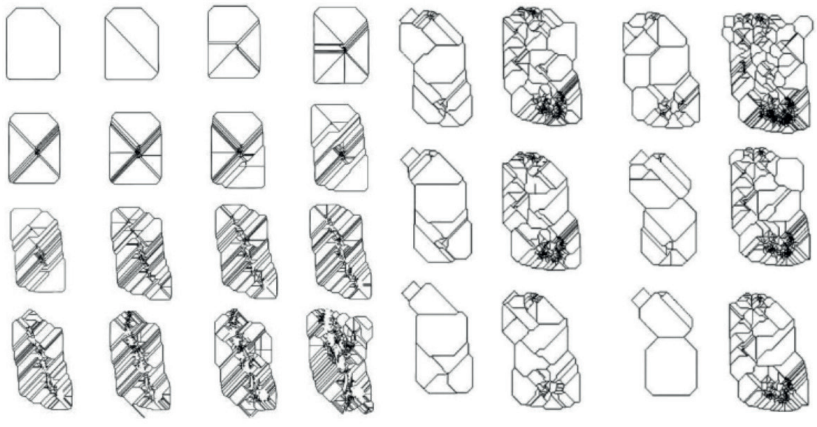
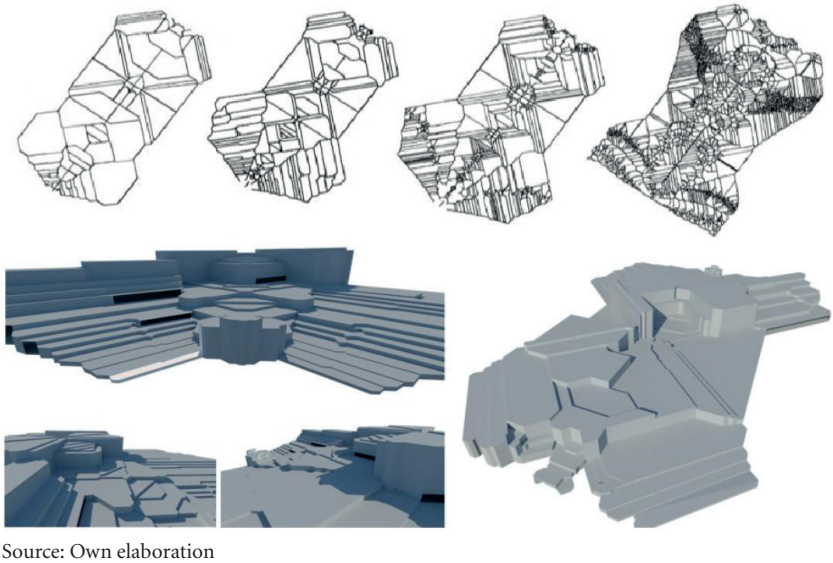
Figure 9 and 10
Studies of the formation of transformational morphologies
based on fragmentation processes and vectorized modular growth



Source: Cañete 2014, 2016, 2018.

Fig. 11 and 12
Variations of configuration of independent modules,
generated from a vectorized modular pattern



Source: Own elaboration

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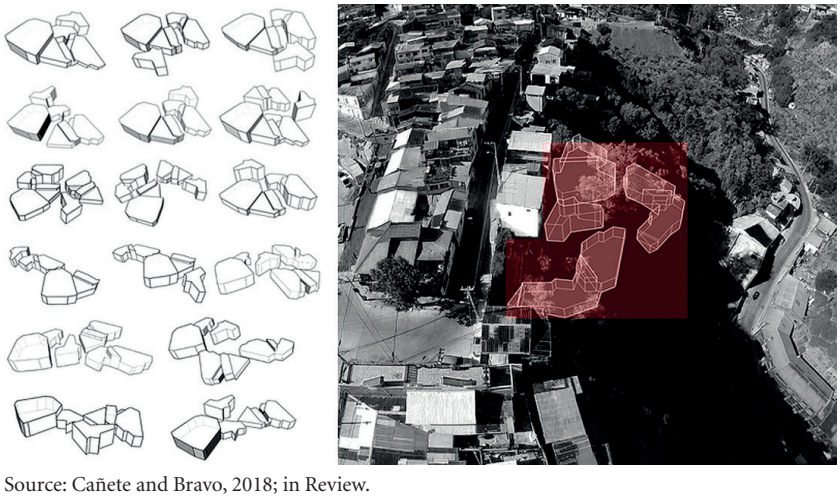
In this sense, experiences are articulated as a method of genetic morpho exploration that is generative and creative, proper to the so-called complex thought, since it requires processes of cognitive emergency, regulated by procedural planes, oriented to purposes, but from plans and metacognitive levels that allow him to orient the problem of the form to a formal field of modeling.

Moreover, this type of experience does not necessarily admit a single result, being able and allowing different solutions from the morphological point of view, but from the meta-regulatory level of the pre-architectural criteria to which it must conform. However, this is a self-regulatory and generative process that gives it flexibility and procedural robustness.

Figure 13
Exploration and placement of modular clusters in the territory



Source: Cañete and Bravo, 2018; in Review.

Conclusions

Complex thinking has developed on various bases and principles elaborated and refined during the debate of the twentieth century. Among them, the convergence of the transformational principles characteristic of structuralism stands out. Which derives in processes of creative and generative, and not only re-productive, modeling in addition to increasing regulation and understanding of these creative processes from perspectives and synchronous and diachronic principles of all process-inte-

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ractive levels. To this are added different levels and forms of information configuration to generate emergent fields, based on scalar adjustments of the primary data, in mechanisms of generative feedback. This allows us to assess a new feature, which is to generate multiple solutions and pathways, for similar initial working conditions, even if they meet the same purpose criteria.

A particular case of these emerging processes has been the study of complex patterns and morphologies, such as fractals, iterated systems or theories of chaos, progressively assimilated into and from fields and disciplines in art, in general, and architecture, in particular, of which some cases and teaching experiences relating to them have been presented. This clearly opens up a growing area of confluence between science and art, typical of complex interdisciplinary thinking, in which this era is breaking through.

In the strictly disciplinary sphere, from the point of view of the contents and themes that cross the debate in architecture, and from which the subject of forms, in general, and the various scientific or artistic models, currents, approaches that arise in other disciplines are assimilated, has been the framework generated from modern architecture, with the principle of pure forms that currently continues to have an important weight and project validity. This has conditioned that the problem of architectural forms, respond not only to its functionality and systemic capacity to solve or address the various design plans of a work, but rather, today, as an aesthetic-refining criterion of the morphological explorations that, from various authors, moments and currents, are continually raised, appealing to it.

That said, it is important to highlight this aspect of self-regulation of knowledge and its generation, linked to creative processes, since creativity is also part of a larger process that seeks to integrate and be guided by criteria and solutions to a problem, according to different conditions to be elaborated, according to levels of complexity. Indeed, this approach allows not only a new way of approximation to the plans related to the resolution of problems, on the one hand, but to the creativity underlying an approach that admits and enables various possibilities of development and results, refined since its act, as procedures that act on a form, following different criteria that regulate variables such as space, circulation and its integration with design, aesthetic, functional criteria, etc. that are acting, as layers of work in a creative process.

This allows to advance in the development of work models, through the notion of conditions of a problem, regulated by the active and mediating role of the teacher within a creative process. For this, it

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is necessary to ask not only the what, but also the how and the why of a creative process, establishing various levels of creative interaction, in a way that is sensitive to conditions, and especially to transitions and moments of interaction between one plane and another, and the open possibilities that its constant exploration creates.

Finally, this type of approach also opens a field of self-observation and regulation measured and mediated on the students' own creative processes, since they can have pre-project exercises that allow them to take the weight, impact and constant flexibility of a morphological-spatial act, from a perspective of continuous transition from and towards the project itself.

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Convergences and differences between complex thinking and the ecology of knowledge

Convergencias y diferencias entre el pensamiento complejo y la ecología de saberes

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Abstract

This review article analyses the convergences and differences between complex thought and knowledge ecology with the aim of exploring possibilities of complementation and synergies within the framework of a critical epistemology. For this purpose, a bibliographical review has been carried out, supported by deductive and hermeneutic methods. For the characterization of complex thought, the work of Edgar Morin and other authors has been reviewed. For the characterization of complex thought, the work of Boaventura de Sousa de Santos has been reviewed. From the review we conclude that both complex thought and knowledge ecology have many similarities since they share to a greater or lesser extent the principles of organized systems, dialogicity, recursion and retroactivity. In addition they are explicit in overcoming the subject-object distinction to move to a subject-matter relationship. Both proposals constitute alternatives to hegemonic scientific thought and place value on cognitive pluralism and cognitive justice. The main difference is that knowledge ecology has a more explicit commitment to the knowledge of social movements in their resistance struggles against the various forms of colonialism in force, which have a correlation with an economic system that privileges the market to life. In this sense, it is possible to recognize in the ecology of knowledge a more political character. Both proposals, although with different degrees, stand as alternatives that transform social reality.

Keywords

Education, knowledge, science, sociology, thinking

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Resumen

El presente artículo de revisión analiza las convergencias y diferencias entre el pensamiento complejo y la ecología de saberes con el propósito de explorar posibilidades de complementación y sinergias en el marco de una epistemología crítica. Para tal efecto se ha realizado una revisión bibliográfica apoyada por los métodos deductivo y hermenéutico. Para la caracterización del pensamiento complejo se ha revisado la obra de Edgar Morin y otros autores. Para la caracterización del pensamiento complejo se ha revisado la obra de Boaventura de Sousa de Santos. De la revisión se concluye que tanto el pensamiento complejo como la ecología de saberes tienen similitudes pues comparten en mayor o menor medida los principios de sistemas organizados, dialogicidad, recursividad y retroactividad. Además, son explícitos en superar la distinción sujeto-objeto para pasar a una relación sujeto-sujeto. Ambas propuestas constituyen alternativas al pensamiento científico hegemónico y ponen el valor el pluralismo cognitivo y la justicia cognitiva. La principal diferencia es que la ecología de saberes tiene una apuesta más explícita por los conocimientos de los movimientos sociales en sus luchas de resistencia frente a las diversas formas del colonialismo vigente, que tienen correlato con un sistema económico que privilegia el mercado a la vida. En tal sentido es posible reconocer en la ecología de saberes un carácter más político. Ambas propuestas, aunque con diferencia de grados, se erigen como alternativas transformadoras de la realidad social.

Palabras clave

Ciencia, conocimiento, educación, pensamiento, sociología.

Introduction

This review article analyzes the convergences and differences between complex thinking and the ecology of knowledge.

The coronavirus pandemic and the resulting social confinement have made it possible to reflect on the hegemonic pattern of development that has demonstrated its limits and its social and environmental reach. The health crisis has, in turn, allowed us to visualize the social, political, and environmental crisis, and an economic recession is looming. Now, this reflection has two orientations, one that proposes how to return to the normal way of life that existed before the pandemic and another that proposes that this is an opportunity to rethink the civilizational model. Faced with the global crisis processes that affect western civilization, proposals that seek to transform relationships between human beings and between human beings and nature and the cosmos are significant. Promoting new ways of thinking, feeling, speaking and acting is fundamental for a civilizing change under the principles of sustainability, justice, equity, and peace. In this sense, both the complex thinking and the ecology of knowledge are promising epistemologies and therefore a better understanding of both proposals is required that translate into sustainable processes of transformation.

The hegemonic thinking of science characterized by being disjunctive, reductive, rationalist, objectivist, universalist, determinist, le-

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galistic and linear has proven to be very effective, and will be so in the future; However, its limitations in dealing with the complexity of reality have been shown. There are many critical thinking proposals, including southern thinking, decolonial thinking, complex thinking, relational ontologies, among others. Specifically, the article makes a comparative analysis between complex thinking, whose most outstanding exponent is Edgar Morin and the ecology of knowledge, whose most relevant representative is Boaventura de Sousa Santos. Both perspectives are sources of critical and transformative thinking, even if they have different origins. However, the extent to which the two proposals correspond or differ is not sufficiently known. This analysis is relevant for establishing possible dialogical and recursive processes of feedback and mutual enrichment.

The aim is to demonstrate that both complex thinking and the ecology of knowledge share central premises and consequently both aspects would be valid sources in the formulation of alternative development proposals. The aim of this article is to find similarities and differences between complex thinking and the ecology of knowledge in order to explore possibilities of complementarity and synergies within the framework of a critical epistemology.

This topic is relevant today, because humanity needs to pay more attention to the alternatives to development, while it has become clear that the hegemonic development model, dominated by neoliberal capitalism, has not provided genuine sustainability responses and serious social deficiencies remain and has led to the alteration, degradation and pollution of natural ecosystems and urban ecosystems. The recovery of marine and terrestrial ecosystems and the quality of the air resulting from mandatory isolation have drawn attention and caused society to think about how it has related to nature and the impacts it has caused.

In order to make the comparison between complex thinking and the ecology of knowledge, a bibliographic review has been carried out, supported by deductive and hermeneutic methods. Edgar Morin and other authors have been reviewed for the characterization of complex thought. Boaventura de Sousa Santos has been reviewed for the characterization of complex thought.

The present work is structured in three sections; the first section presents the reference framework in which the scope of complexity, complex thinking and the ecology of knowledge are described; the second section presents the comparative study; the third section comprises discussions and conclusions.

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Reference framework

To understand complex thinking it is necessary to understand what complexity entails. For Maldonado (2009) "there are basically three great understandings about the complexity of the world and nature: complexity as a method, as a worldview and as a science and among these three understandings there are several communicating vessels of different order and range" (p. 3). For his part, Osorio (2013) finds the following meanings of complexity: daily or psychological, classical science, phenomenal context of reality and metaphor.

According to Maldonado (2012) complexity is based on three distinguishing features: i) the importance of time and the arrow of time; ii) non-determinism; and iii) that changes and processes characterized by complexity concern sudden, unforeseen and irreversible movements (p. 17). Maldonado et al. (2013) point out that, in general terms, complexity refers to that class of phenomena, systems or behaviors that have no solution or possess more than one (non-linearity) (p. 15). In this sense, Carrasco and Vivanco (2011) mention that "in complexity the answer is not necessarily sought but all possible answers are. This is contrary to the deterministic system characterized by only one possible result corresponding to an event (p. 172).

Maldonado (2005, 2015) points out that complexity works with crisis phenomena, systems, times and behaviors, depending on whether: a) the crisis is already present and imminent, b) the crisis has not yet arrived but could happen and c) crises that never take place. A useful tool for the study of complexity relates to the approach of complex adaptive systems.

There is no single way to understand complexity. What can be identified are the main features of complexity and its properties. From Morin (1998), Segura (2009), and Maldonado (2001, 2003, 2005, 2011, 2013, 2014, 2014a, 2014b) it appears that the complexity also refers to the understanding of border concepts and problems, phenomena, systems and behaviors that are essentially unpredictable, changing, uncontrollable, non-parametrizable, irreversible, sudden, surprising, dramatic, systems of increasing complexity, and which are not explained in terms of causality. It can, therefore, be said that complexity is the science of rare, sudden or unforeseen events and behaviors, unique or singular situations, exceptional and extraordinary phenomena, attention to local cases, divergent phenomena, extreme events, borderline situations, critical points and states, and crisis.

Complexity alludes to multiple elements, self-organization, interactions and interdependencies, interlinkages, emergencies, entanglement, recursivity, feedback loops, feedback, networks, synergies, disorder,

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chaos, ambiguity, uncertainty, random events, instabilities, bifurcations, fluctuations, turbulences, instabilities, symmetry ruptures, catastrophes, evolution, imprecisions, voids, attractors, non-linearity, no causality, no specialization, dissipative structures, algorithmic complexity, dynamic equilibriums, working primarily with nonclassical logics, in short, all those phenomena that are on the edge of chaos in the reality of the world.

Pastor y León (2007), Ricigliano y Chigas (2011) affirm that non-linearity refers to the fact that there is not necessarily proportionality between cause and effects and that small disturbances can produce big changes. This is where it is understood that non-linearity is associated with the theory of chaos.

Luengo (2016) refers to the notion of complexity, in a first approximation:

> Refers to a set (system, totality, unit, etc.) composed of multiple elements (components, agents) heterogeneous (diverse) articulated (connected, interrelated, interdependent, interdefinable) among themselves in an organic (or systemic) non-linear manner, which exhibit collective behaviors and are in constant process of dynamic transformation as they vary over time (p. 3).

Moreno (2002a, 2002b) affirms that complexity is a mode of thought that links order, the universal and the regular, as well as disorder, the particular and transformations. Arnold and Osorio (1998) mention that complexity is linked to the number of elements in a system (quantitative complexity) and, on the other hand, its potential interactions (connectivity) and the number of possible states that occur through them (variety, variability) (p. 43).

Maldonado (2014a) mentions that, from a perspective of complexity, the study of the dynamics and structures of a system cannot be reduced to explanations or steps of cyclical, periodic, regular or predictable type. It is then understood the emergence of phenomena that do not necessarily have logical or rational explanations or have their own logic and rationalities (p. 73).

It is also mentioned that these systems appear between the boundaries of the disciplines which is an invitation for interdisciplinary, transdisciplinary and even undisciplined approaches. Rodríguez y Aguirre (2011) points out that complexity can be understood, therefore, "as an emerging scientific paradigm involving a new way of making and understanding science, extending the limits and criteria of scientificity, beyond the boundaries of modern science" (p. 2).

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The complex thought derives from Morin's extensive work (1981, 1983, 1994a, 1998, 1999, 2000, 2001, 2002a, 2002b, 2003a, 2003b, 2004a, 2004b, 2008) expanded and enriched by various authors such as Barberousse (2008), Gonzáles (2010), Rodríguez (2011a, 2011b), Luengo (2012, 2016), among others.

Complex thought is recognized as philosophy, strategy, method, attitude, and practice that differs from a simplifying form of thought, that is, a form of thought that is not disjunctive, not reductionist, not deterministic, not linear, not predictable, not reversible nor predictable. As such, it does not remain in the rationalist, objectivist, universalist, legalistic and controlling perspective of positivism. On the contrary, it is a type of thought with the capacity for conjunction, integration, synthesis and dialogue with the environment and coexistence with uncertainty. Thus, it can be said that complex thought is highly religant. Moreover, unlike simplistic thinking, it does not seek unique answers but multiple possibilities.

The complex thought in his expanded perspective of reality is more likely to think what has not been thought before or would be thought, to look at what has not to be seen, is to hear what has not been heard, to feel what has not been felt before. According to this reality, complex thought escapes institutionalized, standardized, normalized truths because its field of action is beyond the obvious.

Complex thought is not intended superior or inferior, rather it promotes epistemological pluralism as it considers that all sources of knowledge are worthy of consideration and can enter into a deliberative dialogue that will make it possible to find, in a concerted or negotiated manner, an agreement that represents better alternatives with deep respect for life. It recognizes the value of a reductive approach to knowledge that has enabled humanity to achieve great techno-scientific achievements for the benefit of humanity. However, knowledge derived from the Cartesian approach has also demonstrated its limitations in the face of complex realities. The intention is therefore to enter into a synergistic dialogue that allows for respectful complementarity.

Complex thinking considers the multiple dimensions, planes, spatial and temporal scales and hierarchies; therefore, it recognizes and values the diversity of the elements, these being diverse expressions of matter/mass, energy, information and meaning. As can be seen from Tobón and Núñez (2006), complex thinking is multidimensional, multi-scaled and multi-temporal.

Likewise, complex thinking knows how to recognize the various interactions between systems, both directly related (such as the indivi-

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dual-society-human species relationship) and concurrent systems (such as when social, economic, cultural, psychological, environmental and other such dimensions). In the interaction of the various elements, tangible and intangible, it is verified the capacity of self-organization and of emergence that are new properties or behaviors that are not found in their constituents in an isolated manner. It further considers that systems have dynamics that are far from balanced and that there is not necessarily proportionality between causes and effects, reflecting the high sensitivity to initial conditions.

Complex thinking opens up multiple possibilities of thinking such as systemic, critical, linear, lateral, arborescent, evolutionary, among other ways of thinking. This means that it does not remain with a conventional form of logical or casuistic thought, but has sufficient permeability to apply various methodological forms of thought. Therefore, complex thinking is not reduced to traditional logic, nor to traditional mathematics, but accepts uncertainties, discontinuities and blurred boundaries. This is a revolutionary way of thinking because it moves away from positions that seek objectivity, linearity and reject or evade uncertainties and indeterminations. This way of thinking recognizes that reality is more complex than man had imagined and had accustomed to, as a product of a strong tradition of Cartesian thought and positivist science. However, this opening is far from a reductionist holism in which "everything goes" but has the capacity to recognize the strategic, those phenomena and elements that have the capacity to be catalysts of change.

Complex thinking is condensed into the principles of organization, recursivity, retroactivity, dialogicity and hologram.

The ecology of knowledge is part of the proposal of the epistemologies of the south. The proposal of southern epistemologies is a response to Eurocentric and colonialist epistemology that claims that scientific knowledge is the only valid source of knowledge and therefore dismisses other forms of knowledge. This generates an abysmal line that generates exclusions, distances and asymmetries marked by power relations. There are epistemologies of the south because there are epistemologies of the north. In this case, it is not a geographic south but an epistemological south.

Cartesian science is characterized by being rationalist, ignoring the role of emotions; it adopts an objectivist position that generates a subject-object relationship; it assumes a universalist and monocultural perspective that pretends to be unique and valid. In the face of the arrogant position of positivist science, the epistemologies of the south value the knowledge that comes from the daily life of peoples and social move-

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ments in their struggles to achieve equity, a better relationship between human beings and between human beings and nature. The epistemologies of the south are a recognition of diversity and the affirmation of life in all its manifestations. In this sense, the epistemologies of the south seek to decolonize thought.

To question the hegemony of scientific knowledge is not to deny it or to reject it because its contributions are recognized. What is proposed is the valuation of other legitimate sources of knowledge that are the product of other expanded ways of understanding knowledge that are not limited exclusively to reason and that gives rise to the emotional and spirituality of peoples. This does not mean that the southern epistemologies assume irrational positions. The idea is a symmetrical relationship between knowledge and an invitation to collaboration and co-creation. The aim is, thus, to strengthen democracy and equity.

The characterization of the ecology of knowledge corresponds to the Portuguese sociologist Boaventura de Sousa Santos (1998, 2009a, 2009b, 2009c, 2010, 2014, 2018, 2020) who is the promoter of the concept. It is within this framework of the epistemologies of the south that the ecology of knowledge can be understood, which alludes to the recognition of the various sources of knowledge and the dialogue between different forms of knowledge. From the exclusivity of reason, emotionality is incorporated, from universalism, the value of local knowledge is recognized, from the subject-object relationship to the subject-subject relationship. According to de Sousa (2009b) ecology presents the following elements: 1) inexhaustible epistemological diversity of the world, 2) radical and egalitarian co-existence, 3) contextual definition of ignorance, 4) counterhegemonic use of modern science, 5) intercultural translation, 6, knowledge-as-intervention, and 7) contextual hierarchy of knowledge.

The ecology of knowledge, and therefore the epistemologies of the south, are part of decolonial thinking. Mignolo (2007) and Fonseca and Jerrems (2012) point out that decolonial thinking is a proposal that arises from the questioning of the values of European modernity and therefore of unique thought. In this sense it seeks to decolonize thought and overcome the effects on the colonial subject.

Likewise, the ecology of knowledge corresponds to relational ontologies. Escobar (2014) notes that "relational ontologies transcend an anthropocentric vision and recognize that human and non-human (organic, non-organic, and supernatural or spiritual) are integral parts of these worlds in their multiple interrelations as sentient beings (p. 129).

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Results

Now, we continue with the comparative analysis between complex thinking and the ecology of knowledge.

Complex thinking is recognized by different authors as philosophy, strategy, method, attitude and practice. Luengo (2016) recognizes the most epistemological vein of complex thinking as it makes the basic criteria that enable the generation of complex knowledge and its cognitive operations (p.4). De Sousa (2010) considers that the ecology of knowledge is a post-abysmal epistemology (that is, it seeks global cognitive justice) or a counter-epistemology. Both epistemological proposals recognize the need for cognitive pluralism.

Morin (1998) states that the reductive vision of science produces limitations as the partiality of hyperspecialized knowledge loses its connection with the whole. Methodologically, the Cartesian science is powerful for the knowledge of the details, but it loses effectiveness in its integration. Hence, the limits of scientific rationality become apparent. De Sousa (2014) mentions that "The ecology of knowledge implies a radical break with modern Western ways of thinking and acting" (p. 40). Both complex thinking and the ecology of knowledge are recognized as self-reflective.

Soto (1999) mentions that in complex thought the cognitive subject is incorporated into the reality to be studied, thus surpassing the vision of Cartesian science that separates the object from the subject. De Sousa (2018) mentions that, in the ecology of knowledge, "the definition of objects of knowledge is not distinguished from a relationship with subjects constituted as objects of it" (p. 241). Likewise, the search for intersubjectivity is as important as it is complex. Complex thought is not an exclusively rational subject, but recognizes the whole being. For his part, de Sousa (2010) states that the ecology of knowledge refers not only to logos but also to mythos.

While complex thinking is part of the paradigm of complexity versus the paradigm of Cartesian simplification, Sousa (2009a) points out that the ecology of knowledge is an alternative to both "the crisis of the dominant paradigm" as to the postmodern response to such a crisis (p. 31). De Sousa (2009b) considers that the rational model of Western modernity is indolent, since with its arrogance it proclaims itself as the only valid form of rationality. Both proposals therefore critically share the limitations of Cartesian science and invite wider recognition of other forms of knowledge. Consequently, it can be pointed out that both proposals coincide in constituting alternatives to single and universal thought.

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Morin (2007) considers that one of the principles of complex thinking is systemic or organizational one, thus recognizing internal interactions and interactions with the environment. In this way it is possible to recognize nested and hierarchical systems of mutual inter-fluence, which link the part with the whole, and the whole with the part. This makes it possible to recognize the importance of contextualization. Chacón (2015) realizes that through the principle of autonomy/dependence (eco-organization) the systemic approach to complex thinking is reflected.

While complex thinking is recognized as systemic and totalizing (recognizing the incompleteness of knowledge), the ecology of knowledge is not explicitly recognized as systemic, however it presents some elements of the general theory of systems. As stated by Sousa (2010, 2018) the fact that the ecology of knowledge recognizes that all knowledge has internal and external limits, is similar to the concept inscribed in complex thinking that every system is within another system and that these systems are in dialogicity. In this direction, Sousa (2009b) recognizes a contextual hierarchy of knowledge according to the degree of openness to the participation of social groups. It also recognizes that, despite the vocation of completeness of the various forms of knowledge, they are incomplete and, in this sense, coincide with the complex thinking that highlights the incompleteness of knowledge.

Morin (2000) affirms that in complex thinking, the multiple and heterogeneous elements, tangible and intangible, are recognized and valued, and therefore diversity is valued. Morin (1999) in linking the whole with the parts and vice versa recognizes the importance of focusing on both the element and the whole, thus broadening the spectrum of attention. Chacón (2015) alludes to the fact that the view of relations and interactions of complex thought are expressed through the principles of retroactive loop, recursive loop and dialogicity. In this sense, the approach of paradoxes and antinomies in complex thought is recognized. One element that is common to both complex thinking and the ecology of knowledge is the recognition of the interactions and interdependencies inherent in a web of interlinked relationships.

De Sousa (2010, 2018) mentions that the ecology of knowledge promotes the interdependence between scientific knowledge produced by western modernity and different non-scientific knowledge. It also recognizes that these interconnections between heterogeneous knowledge are continuous and dynamic without compromising their autonomy. As knowledge interacts and intersects, so does ignorance, consequently, for the ecology of knowledge, all knowledge is interconnection. Niño (2017)

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mentions that an ecology of knowledge is based "on the recognition of the plurality of knowledge and heterogeneous values, their interconnections, their discontinuity-continuity, heterogeneity and autonomy" (p. 179). This is where the matrix of complexity of the two proposals can be recognized, as it refers to the recognition of the various elements that are interrelated and interdependent. With this outlook, the approach of Cartesian science that privilege the fragmentation of reality to know it are broken.

Morin (2000) mentions that complex thinking incorporates the principles of dialogue and recursiveness. De Sousa (2018) points out that the ecology of knowledge "promotes an authentic dialogical articulation between knowledge considered western, scientific and modern, and knowledge considered traditional, native and local, without discrediting scientific knowledge" (p. 253). Likewise, de Sousa (1998, 2009b, 2010, 2018) indicates that the ecology of knowledge seeks to generate a new type of relationship between the different types of knowledge, also, ensuring equal opportunities for all types of knowledge without meaning that all are accepted and incorporated in an uncritical and thoughtless manner, since prudence is recognized, and intercultural translation weights in the contributions of knowledge. It is recognized that not all knowledge has the same validity, but everyone has the possibility to enter into a reflective dialogue and, as a result of the dialogue, complementarities or contradictions can be recognized. In this sense, the ecology of knowledge is governed by the principles of human dignity and the possibility of democratic discussion. The final decision on the best knowledge for a situation corresponds to the precautionary principle. Consequently, for the ecology of knowledge, non-scientific knowledge is an alternative to scientific knowledge. De Sousa (2010) states that "Incommensurability does not necessarily prevent communication and even unsuspected forms of complementarity may appear" (p. 57).

On the other hand, complex thought, in the Morinian version does not explicitly speak of the diversity of existing types of thought, it can be deduced that, not remaining exclusively in rational knowledge, and giving rise to other sources of knowledge such as imagination, intuitions, emotions, spirituality, art, among others, the plurality of knowledge is being recognized. For its part, De Sousa (2010, 2018) indicates that the ecology of knowledge is based on the plurality of heterogeneous knowledge, and identifies and values other types of knowledge and criteria of rigor and validity. From this perspective, the ecology of knowledge incorporates pluralistic epistemologies, upholds cognitive justice and seeks to give epistemological consistency to plural and propositional thinking and ac-

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tion. According to de Sousa (2009b), the cognitive justice to which the ecology of knowledge alludes to is a caring and respectful relationship that considers the other as an equal. What the author calls the ecology of recognition. Thus, Binimelis and Roldán (2017) affirm that popular knowledge, indigenous knowledge, urban popular knowledge and peasant knowledge, among others, have a place (p. 227).

Complex thinking generates new ways of thinking, feeling and expressing oneself. Vargas (2011) affirms that complex thinking when proposing a human ethics and an ethics with the land-homeland constitutes a proposal that harmonizes with life. Morin (1994b) points out that the complex vision of the human being, society and knowledge, is the ideological substratum of a critical pedagogy that is articulated in a project of a transformative and revolutionary nature. Complex thinking seeks to understand, explain and transform reality. De Sousa (2010) affirms that the ecology of knowledge promotes innovative and disruptive forms of knowledge as it assumes a political ethical position so they are on "this side of the line" (mentioning the invisible or those who have not had a voice) as opposed to those "on the other side of the line" (referring to those who stand beside the power of modern science) (p. 52). The concept of the abysmal line alluded to by de Sousa puts the issue of power and exclusions of all kinds into the discussion. It is, therefore, not just a question of the cognitive, but of the different relationships that have arisen between human beings and between human beings and nature.

De Sousa (2010) points out that the ecology of knowledge makes a distinction between analytical objectivity and political ethical neutrality, in this direction it is recognized as a destabilizing epistemology because it commits itself to a radical critique of policies. De Sousa (2009b) explicitly claims the character of knowledge as an intervention for transformation as opposed to knowledge as an interpretation attributable to scientific knowledge. For his part, Rincon (2016) emphasizes that "The ecology of knowledge is not only an epistemic alternative, but an ethical one, in the face of the challenges of man, nature and the planet as a whole" (p. 49).

As can be inferred from Pereira (2010), complex thinking recognizes the arrow of time in which the past, the present and the future come together and interrelate, therefore history and the context are extremely important for the understanding of the reality in question. De Sousa (2010) points out that the ecology of knowledge recognizes the situated, partial and constructed character of all knowledge. In addition, "it recognizes the radical co-presence involved in conceiving both simultaneity and contemporaneity" and consider knowledge as trans-scalar (p. 49).

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De Sousa (2009b) through the ecology of temporalities recognizes the various ways of conceiving time, and through the ecology of trans-scales recognizes local and global interactions. It can therefore be said that both proposals coincide in the importance of the local, but with the capacity for dialogue with the global.

Discussions

Technoscience based on the reductionist approach has had great achievements that translate into the great technological advances achieved by humanity. The reductive approach has been important and will be important in the future. It has, however, shown its limitations in dealing with humanity's complex problems. Quantum theory has exposed that the truths that claimed to be universal are not quite so. On the other hand, the development of computational science has allowed a significant improvement in the capacity to process information that would previously have been inconceivable. The sciences of complexity show that there are other realities beyond standardized, normalized, institutionalized truths. Although science already knew about the uncertainties and ambiguities, what it did was to evade them, to deny them in order not to disturb scientific objectivity.

Although the limitations of the Cartesian approach to science had already been noted, it has maintained and invigorated its hegemonic character. Hence it still maintains its primacy as the main source of valid knowledge. The strength of scientific knowledge is not based solely on the ability to explain the phenomena of the world, but is interwoven with political and economic relations. Thus science, consciously or unconsciously, becomes functional to the structures of power. Hence the strong criticism of a science without conscience that pretends to be neutral and apolitical. As a result of its attitude, science has separated itself from society, its struggles, its dreams, its emotions and hopes. Although the colonized peoples achieved their political independence, another form of colonization remains in force and could be called epistemic colonialism. Thus, a science of control and regulation is legitimized to favor the discipline of the population according to the prevailing development model. The symbolic value of scientific knowledge is so strong that sectors of the population attribute their situation of poverty or extreme poverty due to the "limitations" of their daily life knowledge.

It is in this context that we understand the emergence of various epistemological proposals critical of universalist and rationalist scien-

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tific thought, to value other forms of generation and socialization of knowledge. Among these proposals, it has been pointed out, are decolonial thought, southern thought, relational ontologies, among others that have emerged under the cover of the epistemological, socio-critical trend. This set of technical and political proposals have similarities and differences, but they share a critical view of the rationalist, universalist, legalistic positions of Cartesian and positivist science.

Complex thinking, on the other hand, has also been influenced by a variety of proposals that have called into question the fundamentalism of reason as the sole source of knowledge. It is also possible to affirm that complex thought receives the influence of postmodern thought. As Arce (2018) points out, the complex thinking inscribed in the complexity paradigm represents a response to the simplistic thinking paradigm of Cartesian and positivist science.

From the comparison between complex thinking and the ecology of knowledge there is a similarity because in both proposals there is talk of a systemic and ecological thinking that means interrelation. When we talk about systems, it refers to the fact that they are not knowledge isolated from the environment because, as Barberousse (2008) states, it is "a co-organizing relationship with their environment" (p. 104). The main difference lies in the fact that, although the ecology of knowledge has elements of the complex systems proper to complex thought, it does not explicitly assume it. The ecology of knowledge does not come from the development of the sciences of complexity and complex thought, therefore, each aspect has its own construction process in such a way that, unintentionally, they establish bridges, parallels and distances but which strongly share the critique of the simplifying thought of hegemonic science.

While the ecology of knowledge is of particular concern to those on the other side of the line, understood as such to the invisible, to those without a voice, to those displaced by the power of knowledge, complex thinking has a special concern for everything that has not been seen, thought or felt; here lies we find another of the great coincidences. However, as the ecology of knowledge does not interact with complexity, beyond recognizing uncertainty, it does not explicitly recognize breakdowns, fractures, bursts, sudden changes, discontinuities, blurs, mists, randomness and chance, among other attributes of complex reality.

The ecology of knowledge does not explicitly use the relinking character of complex thought, but in practice it assumes it as an attribute by pointing out that all knowledge has the same opportunity to enter into dialogue. Although complex thinking speaks of dialogicity, the ecology of

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knowledge is explicit in mentioning that it is not a "participatory" dialogue in which arithmetic solutions must be achieved, but rather to generate thoughtful and prudent processes of dialogue based on the principles of human dignity and the possibility of democratic discussion. It may be important to incorporate the principle of sustainability. This contribution is important for complex thinking to integrate reason, emotions, imagination, intuition, poetry without the whole appearing as an amorphous and inconsistent mass of meanings. Although complex thinking indicates that it is strategic, in the sense of knowing how to ponder the best paths, a better explanation such as ecology of knowledge could give it greater strength.

Complex thinking is not a subject that is reduced to the synaptic processes of the brain, but it is recognized that the process of knowledge involves the whole being and is linked to the environment and action. That is why the ecology of action is spoken of. The ecology of knowledge not only alludes to logos but also to myths, therefore it is giving rise to the recognition of emotionality, spirituality, narrative, discourse and history. In this sense, both proposals go beyond an exclusively rationalist vision.

Although both proposals are recognized as ethical-political in nature, there remains the feeling of a greater political weight of the ecology of knowledge as Sousa (2010) explicitly speaks of decolonizing knowledge, reinventing power. According to García's interpretation (2014), the epistemology of the south, and therefore the ecology of knowledge, has great potential to generate an alternative epistemology that contributes to democratization and social transformation.

Questioning the primacy of scientific knowledge does not imply denying or underestimating it, but rather resigning it to a more respectful relationship with other sources of knowledge. The fact that it expands the sources of knowledge does not imply giving rise to irrationality or to reverse arrogance. Epistemological, cognitive and linguistic injustices need to be overcome by life-affirming relationships in all their manifestations.

Applying the very attributes of complex thinking and the ecology of knowledge requires practitioners of both perspectives to enter into a complementary and synergistic dialogue so that they can take advantage of what they consider important for strengthening their own proposals. As a result of this process of mutual enrichment, alternative proposals to the hegemonic exercise of science will be created by the thoughtful and weighted incorporation of other knowledge and emotions.

The analysis of both epistemological perspectives recovers the value of complexity as a novel paradigm. Complexity breaks the charm of a disciplined society determined by the prevailing rationality of institu-

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tions, policies, laws and social conventions. It also highlights the limitations of predictability and reaffirms the permanence of change.

As can be seen from its very name, the sciences of complexity have a more scientific orientation and complex thought a more philosophical approach, but they are complementary as is science, itself, with philosophy. Both perspectives embrace the general theory of systems, but in the case of complexity sciences, in addition to systemic considerations, they explicitly include crises, uncertainties. This is why the approach of complex adaptive systems offers a good theoretical framework for understanding the epistemology of complex thinking and of the ecology of knowledge.

This is how it has been possible to visualize that an epistemological system is composed of numerous and heterogeneous elements, tangible and intangible, visible and not visible, that are highly interrelated, interdependent and inter-definable. This nonlinear dynamic of interactions is what allows the processes of feedback and recursiveness. This also makes it possible to recognize the processes of dialogue and negotiation between the elements, thus verifying processes of complementarity, collaboration and synergies. The relevance of intercultural dialogues and intercultural translation is therefore understood.

The theoretical framework of complexity with its facets of the sciences of complexity and complex thought converges in the approach of complex adaptive systems and it is noted that the approach of systemic organization, with its interactions and emergencies, allows a better understanding of the nature and behavior of knowledge systems. If the perspective of crisis and indeterminations is added to this, then epistemology is better understood as a complex system in which agents, sudden or unexpected behaviors, converge in a multidimensional, multi-scale and multi-temporal perspective.

One aspect of complexity refers to the fact of phenomena at the edge of chaos or away from balance that alludes to an entropic description of systems. Moreover, the fact that there is a high sensitivity to initial conditions calls into question the fact that it is no longer possible to maintain epistemological, cognitive and linguistic injustices because it legitimizes exclusion, inequality and poverty. In this sense it is possible to recognize in complex thinking and the ecology of knowledge a commitment to justice, equity, peace, democracy and an affirmation of life in general, starting with humans, but respectfully including nature. It is the same orientation that relational ontologies have.

Both the sciences of complexity and complex thought, although they have shown great advances in terms of institutions, authors, publi-

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cations, congresses, among other expressions, still constitute marginal proposals to the predominant thought. For their part, the epistemologies of the South, with their approach to the ecology of knowledge, face the barriers of hegemonic science that is more in tune with the capitalist and neoliberal economic system.

Critical proposals to the hegemony of scientific thought have a background in Participatory Action Research (Fals Borda & Rodríguez, 1987) and Participatory Technological Development (Gonsalves et al. 2006). There are also current trends in open science and citizen science that consider the importance of citizen participation in scientific research processes (Anglada & Abadal, 2018). It is also important to note that innovation techniques such as Design Thinking also use approaches that focus on the creative development of multiple options and possibilities. Thus, they are not limited to rational aspects, rather, they incorporate aspects that come from the emotions, intuition, imagination without shackles. They, therefore, value the diversity of equipment, experiences, stories and perspectives. Likewise, they are more tolerant to ambiguity, uncertainties and volatility of situations. It is recognized that the perspectives of complex thinking and the ecology of knowledge find fertile ground in them. In this same direction, Maldonado (2019) affirms that science is situated on the same plane as the arts and, therefore, it is necessary that sensibility can sprout and manifest itself freely, even letting out the passions and the dreams. In this way, science becomes an act of subversion and rebellion. Therefore, the role of complexity is to discipline, indeterminate, and unbalance established truths.

The confinement by the pandemic has made it possible to highlight the limits of the hegemonic development model by revealing social precariousness and making visible the impacts that were being caused to the planet. But it has also revealed the limits of Cartesian thought and generated the need to improve human relations, to extend the collaborative spirit, to value the "simple" things of life. It is in this context that one can visualize the epistemological potential of complex thinking and the ecology of knowledge to generate alternatives to development that allow a humanitarian reunion with ourselves and with nature, which has been neglected. The processes of reflection on the way in which the normality of life had been constructed have led to the recognition that beyond the rationality of accumulation, materialism and consumerism, there are other values that give meaning to life.

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Conclusions

The review concludes that both complex thinking and the ecology of knowledge have similarities because they share, to a greater or lesser extent, the principles of organized systems, dialogicity, recursivity and retroactivity. Moreover, they are explicit in overcoming the subject-object distinction in order to move on to a subject-subject relationship. Both proposals are alternatives to hegemonic scientific thinking and value cognitive pluralism and cognitive justice. The main difference is that the ecology of knowledge has a more explicit bet on the knowledge of social movements in their struggles of resistance against the various forms of current colonialism, which correlate with an economic system that favors the markets over life. In this sense it is possible to recognize in the ecology of knowledge a more political character. Both proposals, although with different degrees, stand as transforming alternatives to social reality.

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The integrator character of the Morin's thought in university formation

El carácter integrador del pensamiento de Morin en la formación universitaria

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Abstract

This theoretical study is deployed in two areas. One of them is that of the ideas of a leading figure of complex thought, Edgar Morin, from whom he reveals some of his considerations regarding integration, which are mostly implicit in his meditations. The other area is the university formation. Whit regard to it reflects on complex thinking and the elimination of characteristics that temp against its integrating character. The objectives of this work are: to argue the integrative character of Morin´s thought and to criticize the actions that reduce the integrative character of the university formation. The methodology used is Documentary, consisting of the critical study of texts and the analysis of written information. Some of the results are: the revelation of the integrating character of Morin´s ideas, the formulation of a definition of the academic category formation, and the critic of the reduction of the inherent integrative character of university formation. Among the conclusions are: the integrative character of Morin´s thought has an objective basis; The distinctive feature of academic formation is that it is carried out from the conscience of the person involved and attention to affectivity in university formation strengthens its integrative character.

Keywords

Complex thinking, integration, formation, university, reason, affectivity.

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Resumen

Este estudio teórico se despliega en dos ámbitos. Uno de ellos es el de las ideas de una figura cimera del pensamiento complejo, Edgar Morin, de quien se revela algunas de sus consideraciones en torno a la integración, las cuales están mayormente implícitas en sus meditaciones. El otro ámbito es la formación universitaria, a propósito de la cual se reflexiona acerca del pensamiento complejo y de la eliminación de características que atentan contra el carácter integrador de la misma. Los objetivos de este trabajo son: argumentar el carácter integrador del pensamiento de Morin, y criticar las acciones que reducen el carácter integrador propio de la formación universitaria. La metodología empleada es la Documental, consistente en el estudio crítico de textos y el análisis de información escrita. Algunos de los resultados son: la revelación del carácter integrador de las ideas de Morin, la formulación de una definición de la categoría académica formación, y la crítica a la reducción del carácter integrador consustancial a la formación universitaria. Entre las conclusiones están: el carácter integrador del pensamiento de Morin tiene una base objetiva; el rasgo distintivo de la formación académica es que se realiza desde la conciencia del implicado y la atención a la afectividad en la formación universitaria fortalece su carácter integrador.

Palabras clave

Pensamiento complejo, integración, formación, universidad, razón, afectividad.

Introduction

One of the most studied authors during the last years of the twentieth century and the first of the twenty-first is Edgar Morin, a French sociologist and philosopher born in Paris in 1921; author of a voluminous written work, has a prominent place in complex thought, with which it contributes to shaping its essence, establishes much of its basis and principles and gives consistency to many of its concepts, and outlines them. His great struggle has been guided by the purpose of getting humanity to think in an articulating manner (this does not mean that it denies the mode of thought that fragments and separates); such objective necessitates that in the substratum of his ideas, there should be an integrating spirit, not always explicit in its considerations.

This type of thought, called complex, since the penultimate decade of the last century has caught the attention of many scholars of different specialties and already has a large list of authors and a abundant bibliography. Years before the word complexity had begun to vary its use, which was already broad, because it has several meanings, since it alludes to everything that is composed of different elements, as well as what is complicated, difficult, tangled, but also sets or unions of two or more things, from where other meanings take consistency. From the first meaning and throughout the second half of the twentieth century, this word became associated with a group of sciences that have, among other characteristics, the orientation to non-linear dynamics and self-organization. They

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began to be called the 'sciences of complexity'. But the extension of the use of the reference term, in turn, was due to the fact that it began to name a type of research approach (according to which the research interest is developed from the aforementioned new specialties) and this markedly philosophical mode of thinking, which relies heavily on such scientific knowledge. In this way, the open systems, the multiplicity of perspectives, the autonomy, the value of the affective for the scientific activity, and, among many other things, began to gain relevance (or to increase it), in opposition to forced fractions and reductionism.

It is in this theoretical scheme that Edgar Morin's thought moves, sustained and driven, above all, by his interest in sowing in humanity the propensity to think through relationships and to set aside disjunction and reductionism. On this basis is erected the integrating spirit, mostly not explicit, that permeates his ideas and one of the causes of the interest his writings has generated. This spirit constitutes the core of the first part of this paper, where its existence is revealed immersed in various theoretical elaborations around scientific knowledge, culture, the future of humanity, morality, education, these universal and permanent themes in the passage of time.

The integrative nature that irrigates Morin's thought is, in one form or another, in all his written work, which is numerous, made up of a considerable number of books, articles and other texts, also numerous, of it. For this work, only *Method*, consisting of six volumes, and *Seven complex lessons in Education for the future* were selected. This selection is due to the fact that in them the integrating spirit of his ideas, almost always implicit in them, offers great possibilities to think and create theoretical elaborations. In addition, there are substantial considerations that invite us to reflect on contemporary society and its future, as well as on university education, whose social value is growing. The revelation of the integrating spirit of the thought of Edgar Morin is not in itself the most valuable of this work, but its unveiling highlights the importance that it has for human life of the present times and those to come. For the development of humanity requires changing the fractionating and disjunctive way of thinking and opening the way to an integrative mode, which must be visible throughout society and culture, from which the university, and the formative work that takes place in it, is a part of.

The second part of this paper is devoted to this subject, that of university education, where, at the beginning, some considerations are presented in relation to the category of 'specialized education', a subject that is controversial and in need of greater attention from scholars of

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these and other related subjects; this exposition opens the way for the development of ideas about university education, which is approached from the perspective of complex thinking and supported by the current great development of science and technology.

This highlights the fact that, at the beginning of the third decade of the twenty-first century, in the midst of accelerated progress, profound transformations and hitherto unthinkable creations, the demands for the training of university professionals are increasing, who can be better specialists if they are formed with an integrative vision; however, this is not always the case, because fractionation and reductionism still make themselves felt in it in various ways. For this reason, it is necessary to redouble attention to the integrative character that will sustain and promote it.

Such an intention has a marked importance not only for the present, but also for the future, and not exclusively for the upper house of studies and its graduates, because, in turn, it is valuable for society as a whole, since it attacks the disjunctive and reductionist character that is still present in university education, a trait contrary to the tendency to strengthen an integrating way of thinking, which is what today's society is demanding from the development of science and technology and its great further advances. This insufficiency can be observed, among other possible forms, in the overestimation of labor and the over-dimensioning of the rational, which causes the segregation and annulment of the affective. Both cases are, strictly speaking, manifestations of fractionation and, even more, reductionism. One of the greatness of the university is the breadth and variety of the formation it offers, although it is spread around certain cognitive purposes, aimed at the realization of specific social functions. To prevent university education from narrowing is to contribute to its optimization and to the survival of human diversity.

On this basis, the present work is developed with the aim of contributing to the solution of the following scientific problem: What significance does the integrative essence of Morin's ideas have in combating the reduction of the integrative character of university education? Thus, the idea to defend is that the integrative character of Morin's ideas offers basic arguments to fight against reductionism and disjunction in university education. In correspondence, this text has two objectives, one is to reveal the integrative character of Morin's thought through some of the considerations contained in his works: *Method* and *Seven complex lessons in Education for the future*; the other is to criticize the reductionist spirit in university education. The methodology used is documentary, consisting of the critical study of texts and the analysis of written information,

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through which present-past-future are combined. The literature used is varied; a considerable part is recently published.

Finding the Integrative Character in Morin's Ideas

One of the most important works of Edgar Morin is *Method* (2002), in which he exposes theoretical developments that transcend the historical moment when they were written, and this happens because, as the author Botto assures (2018), can be used to explain features of today's society. In the book, Morin shows the inadequacies of mechanistic, linear and deterministic thought (typical of the classical scientific paradigm, which has prevailed in the sciences since the seventeenth century) and does so supported by the development of science, which shows that the fractionation and disjunction inherent in this mode of thinking are not sufficient to grasp, in their proper measure, the complexity of the present life. As the author Calvo Cereijo (2019) asserts, humanity is "dealing with science that comes out of simple situations, for a study of human processes that grow in complexity" (p. 324).

Morin (2002) highlights the separations that humanity has built over centuries and emphasizes the need to become aware of this and to reverse this situation; to do this he proposes to vary the way of thinking: not only from one angle, not in a simplified way, but from multiple perspectives, in a way that captures the complexity of life. Many of his ideas are valuable when used as a lens in conducting studies. They have been used in various specialties, for which many examples can be given: occupational therapy, psychology, political sciences, geography, pedagogy, as shown by authors such as Bellido Mainar (2016), Campero (2017), Martínez-López (2017), Rubio Terrado (2018) and Velducea Velducea et al. (2019). The essential category of his thinking is complexity. It alludes to the multiple and diverse links in which everything exists, looks at the whole and refers to the need to articulate.

We often use the verb «to articulate» from one of its meanings: to join two objects, or more, so that there is freedom of movement between them. Now, when using this word, one doesn't think so much about another of its meanings: organizing elements to achieve a coherent and effective whole. With these two meanings Morin (2002; 2003; 2006) uses the word; but from his texts it can be understood that his final purpose is not the articulation, but the achievement of integration, not with the sense of completing a whole with the missing parts, nor to merge divergent

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aspects to arrive at its synthesis, but to achieve complementation, which is more than completing a whole with its parts.

This idea does not explicitly abound in his texts, however, in some reflections he makes it more or less explicit, as when he states that "the product of local selection, which is complementarity, therefore integration" (Morin, 2002, p. 74). With regard to this statement, it is worth noting that the term "complement" is to make each component contribute to the existence of the whole, and of the other components of it. With this clarification it is easier to grasp his integrative spirit that he makes explicit in the following words. "The fundamental problem, then, is to re-establish and question what has disappeared with dissociation: this relationship itself" (Morin, 2001, p. 22), that is, the articulation: Purpose that became in his thought a constant, a constant, which surpasses itself, because its aim goes beyond achieving the articulation of something for the first time; its final, supreme intention is the rearticulation and with it the arrival at the integration of what is separate and which was, at another time, articulated in a whole, which is to return to the previous state, but already at a higher level. Its purpose (in his own words) is "the search for a method that can articulate what is separate and re-unite what is disunited" (Morin, 2001, p. 28).

In correspondence, Morin (2001) states that it is "of first necessity, not only to rearticulate individual and society (p. 22). but also, to effect the articulation reputed impossible (worse, "outmoded") between the biological sphere and the anthropo-social sphere." (p.22) Thus, one of his first intentions is to link the natural and social sciences, an action he conceives as part of the reorganization of knowledge, which is where the integrating essence of his ideas begins to unfold, the crown of which is his conception of the human being as a trinomial: "individual-society-species" (p. 22), where none of these aspects is reduced, nor subordinated to the others or to one of them. The previous position corresponds to Morin's request (1999a) to exterminate in the 21st century the unilateral, fractional way of conceiving the human being, whether it be "by rationality (*homo sapiens*), technique (*homo faber*), utilitarian activities (*homo economicus*), compulsory needs (*homo prosaicus*) "(p. 27) and understand him as a complex being, full of contradictions, consistent understanding with his way of seeing the human being in a bipolarized way: each of the characteristics human has its antagonistic counterpart, and this makes it a complex being.

This way of apprehending the human being unfolds from two aspects that in the thought of Morin (2001) are articulated in its very

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foundation. The first is given by the reflections around the opposition between two types of scientific paradigms: the one that fragments, separates and isolates to know and the one that unites and relates; however, its critique of the first, recognizes its importance and achievements obtained with its use, but he stresses that today the diverse knowledge and its development show that the vision that fragments is not enough because "the first concepts are no longer isolated, substantial or self-sufficient. They relinquish and relativize one another" (p. 104). He does not reject the simple, but condemns excessive simplification.

The other basic aspect of comprehending the human being is given by the links between the biological and the physical, of which he assures that they are in need of each other. He states that before dealing with biological complexity it is necessary to deal with the physical complexity, not just to be "an extraordinary physical complexity, not only that of an informationa1/communicational machine-being, but also that of cosmic connection and micro-physical connection, where life then, and only then, takes existence both autonomous and solarian." (Morin, 2001, p. 417). This statement is due to the fact that Morin (2001) conceives the organization of life with an eco-dependent character, from where he emphasizes "the extreme fragility of its conditions of existence, the extreme quality of its organization which allows it to be informed and to communicate, and its extreme solidarity with all the physical phenomena on which it depends." Thus, according to his opinion (2002), adaptation is not only the survival in given geophysical conditions, but also the constitution of "complementary or antagonistic relations with other living beings, in order to resist the competitions and to face the random events of the ecosystem in which we are integrated" (p. 70), that is, not only relinkage is present, but also integration and with it complementarity, a quality that determines its essence.

The purpose of integration also emerges in his reflections on knowledge, which he conceives as a multidimensional phenomenon, because, inseparably, it is physical, biological, cultural, social; because it combines energy, electrical, chemical, physiological, cultural, linguistic, collective, personal and impersonal processes which mesh in each other (Morin, 1999). This criterion has more and more supporters, although as Viguri Axpe (2019) points out, there is no shortage of those who only see scientific value in the knowledge resulting from the so-called hard sciences.

It can be understood that Morin (1999), with this positioning, does not look favorably on the separation between the natural and human sciences and the closure between them. He condemns the fact that

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this phenomenon is seen as natural, without noticing that it is a way of mutilating knowledge and that it gives rise to a new obscurantism. One can think of the affirmation of the authors Vallejos and Coll (2017), that this separation exists where "the so-called humanities seem to be discredited and their usefulness seems not to be sufficient or far removed from the social needs of the moment" (p. 109), though fatally, sometimes contempt has not the slightest justification, much less discredit and futility.

Fractionation contrasts with one of the demands of the 21st century, pointed out by the author Rodríguez Torres (2016): have a high cognitive level that allows the knowledge to be articulated in an appropriate way, both for the solution of problems and for understanding life as a whole, for the realization of which it is essential to know how to relate new and previous knowledge, as well as making connections between different examples of a concept, resulting in increased capacity to organize an ever-expanding information base.

But for Morin (2001) the rearticulation of knowledge is not enough; it is essential that the subject and object of knowledge be relinked: "The greatest progress in contemporary science has been effected by reintegrating the observer in the observation. Which is logically necessary: every concept refers not only 10 the object conceived but also to the subject conceiving". In correspondence, he rejects the denial of subjectivity because he identifies with error, and questions the belief that error can be eliminated by the concordance of observations and the verification of experiences (Morin, 2001). In his ideas (Morin, 1999), the researcher is part of scientific research and should not be segregated from it. Thus, as the authors Escobar and Escobar (2016) argue, it is possible for the subject to express in scientific activity his individuality, his feelings and passions his human nature.

Morin (2001) believes that as objects are part of their physical reality, subjects must be integrated into their culture and society, but these two must be "integrated into biological evolution, which needs to be integrated into the organizational evolution of physis, which again refers to the observer-subject and so on" (p. 405). This path is followed by the author Campero (2017), who places the subject in a great mesh of relationships, where "it becomes possible to observe an integral trace of the subject himself and also to allow his own investigation" (p. 136).

Morin (1999) asserts that "knowledge, which depends on physical-bio-anthropo-socio-cultured-historical conditions of production and on systemic-linguistic-paradigmatic conditions of organization, is the same

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thing that makes one aware of physical, biological, anthropological (…) conditions of knowledge" (p. 34).

In this case, where the spirit of complementarity is present, it ensures that the socio-cultural conditions of knowledge are, by their essence, different from the bio-cerebral, but are formed, preserved, transmitted and developed through brain interactions between individuals, therefore they are not isolated; and to isolate them is to go against these natural relationships. This spirit of integration extends it to the interior of culture.

Articulation between scientific and humanist culture

In the thought of Morin (1992) culture is a whole that includes society and of which the role of knowledge stands out. On this basis he maintains that contemporary societies are polycultural, as they are made up of types of culture, among them those he calls scientific and humanist. He conceives the latter as human-centered and with the purpose of clarifying its conduct and its relations with the world and society. He sees scientific culture as nucleated by science (only natural and exact ones). He opposes the epistemological separation that has been established between it and the humanist culture, where morality and knowledge communicate closely, unlike the scientific one, which is based on the disjunction between value judgments and reality judgments and is characterized by specializations, difficult access for those who are not part of it, and an exponential growth in its knowledge, which is confined to disciplines and expressed in formalized languages, suitable only for their specialists.

Morin (1992) condemns the rupture of communication between the two cultures and the fact that each one has developed its structure and emphasizes, in this way, that scientific knowledge "does not know itself: it does not know his role in society, it does not know the meaning of its future, it ignores the notions of conscience and subjectivity, and thus it deprives itself of the right to reflect" (p. 73). Such separation is illogical in these times, when science and technology have become a central factor on such a scale that scientific and technological activity is not the sole responsibility of those who carry it out; its impact forces all people to reflect on it and its consequences. Today, as stated by the author Corona Fernández (2019), what society requires is a critical reflection that breaks with this false idea and a struggle against schematism and the lack of creativity in the teaching of science.

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The spirit of integration in ethical ideas and about the human community

The ideas of Edgar Morin that fit under this title (which expounds them, among other texts, also in *Seven complex lessons in Education for the future*) are the cause that, as the author Vallejo-Gómez (2017) says, Morin has been considered a planetary sociologist and a humanist.

With regard to ethics, one of the integrating objectives of Morin (2006) is the development of a self-ethics, which consists, firstly, in a reflection on ethics and, secondly, the perception of the human being. In this he includes the integration of the observer in his own observation and the reflection on himself to understand and correct himself, as well as to enhance the similarities between human beings and, on this basis, to enable fraternity, and relegate differences to the background, because they encourage hostility.

Morin (2006) considers that in science the excess of separation is bad, since it prevents relinquishing knowledge and "to know, you have to separate and unite at the same time" (p. 114). But if he sees that separation is bad in science, he finds it worse among humans because it facilitates the worries, uncertainties and anxieties of individual life. That is why he calls for a reversal of it through relinkage, which he sees as "a primordial ethical imperative, which commands the other imperatives relating to our neighbor, to the community, to society, to humanity" (Morin, 2006, p. 114), because it allows us to find answers to concerns and uncertainties and leads to the sources that make it possible to fight against anguish.

Related to the previous thematic core, the following questions take shape in Morin's thought (2006): how to understand? how to understand oneself? and how to understand others? He believes that the answers must lie in the conjugation of objective, subjective and complex understanding. The first is linked to the explanation, through which information providing causes and determinations is articulated. The second takes place between subjects and goes to inner feelings and motivations. The complex understanding encompasses the two elements above and is multidimensional because it does not reduce the human being to any of its features and tends to comprehend it with the diversity of its characteristics and in various dimensions: psychic, cultural, social, historical, as well as the singular and the global. He believes that reducing a whole to one of its components is an intellectual shortcoming, and that this is worse in ethics than in science.

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In Morin's (2006) reflections on ethics there is a space for his ideas of anthropology, which "carries in itself the trinitarian character of the individual/species/society loop and thus makes us assume the human destiny in its antinomies and its fullness" (p. 176). It is worth noting that the word loop alludes to a cycle that returns and returns on itself endlessly, without end. According to Morin himself (2006), anthropoethics raises to the ethical level the awareness of the unity of all human beings in their diversity, of diversity in all that is unity, and gives value to the mission of safeguarding human unity and diversity.

With this position he establishes links between the ethics of the universal and that of the singular. The first points out that it has been drowned by closed community ethics and that it has been able to emerge in the great universalist religions, although it has been the victim of the monopolistic pretension of each one of them and their intolerance. Morin points out, moreover, that it has manifested itself in secular universalist ethics, in the Kantian imperative and in the (yet to be realized) idea of human rights. Morin (2006) says that it was an abstract idea "as long as our species had not been concretely brought together, in connection and interdependence by the development of the planetary era" (p. 176), which is for him a community of destination for humanity.

This community, in the words of Morin (2003), carries within it an awareness of human destiny and carries not only common dangers, but also a shared identity and insists on the need to be aware "that we are children and citizens of the land-homeland" (p. 268). This idea of the French thinker, according to researcher Huertas Díaz (2015), is a genuine orientation to form an associative thought that aims at eliminating feelings of exclusion and strengthening solidarity. Here is one of the most colossal values of Morin's thought.

It is significant in this case to highlight, as does Restrepo Zapata (2017), education from earthly identity, as long as it guides the learners to understand that any decision has repercussions and that it can affect humanity as a whole. This is why Morin (2003) stresses that "ethnic or national roots are legitimate provided that they are accompanied by a deeper rooted in the terrestrial human identity" (p. 268), one of humanity's greatest needs.

It is not surprising that the French thinker (2003) considers that "the thought that perceives nothing but the parcelarium, the fragmentary, the decontextualized, the quantifiable, is incapable of any global and fundamental conception" (p. 272) and that disjunction must be replaced by the wisdom of living together, which Morin (1999a) calls "symbiosophy" (p. 37), which is not to set all parts in opposition, but to link them, that is "to integrate them

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into the concrete universe of the earthly homeland" (p. 37). It is an idea that increases its brightness when it says: "All cultures have their virtues, their experiences, their wisdom, at the same time, as their shortcomings and their ignorance" (p. 37). A valuable statement to study not only the types of culture, but also to delve into the depths of the role that the academic has in them.

The integrative nature of ideas about education of the future

Morin's (1999a) ideas on this topic are related to the integration of cognoscente in his knowledge as a principle and a continuing need for education. This requires an understanding of the fact that, for the execution of education, there are bioanthropological and sociocultural conditions that allow the formulation of questions about the world, the human being and knowledge. He considers questions towards students to be very important in teaching. It is worth mentioning the affirmation of the author Álvarez Nieto (2017) that in academic activity the recognition of uncertainty is accompanied by the awareness of inaction and the avoidance of simplifications, fictitious facilities and gross inconsistencies. In turn, it is worth taking into account the idea of Ruiz Lara and Torres Soler (2016) that the stimulation of curiosity, imagination and the discovery of the hidden, impel the student to want to investigate.

With regard to the education of the future, two considerations stand out in the thought of Morin (1999a) that demonstrate the integrative character of his ideas. One of them is the urgency of overcoming the type of education, according to which it is taught "to separate, compartmentalize, isolate and not to bind knowledge" (p. 18) this is why the body of knowledge becomes a kind of unintelligible puzzle and the interactions, the feedback, the contexts, the complexities become invisible and the inability to organize, contextualize and globalize dispersed and compartmentalized knowledge increases, to thus "the great human problems disappear for the benefit of technical and particular problems" (p. 18). With regard to these ideas, it is opportune to mention the opinion of Álvarez Del Valle et al. (2019), that in the light of complex thinking, the integration of knowledge, skills and attitudes becomes vigorous, which is true, but one cannot lose sight of openness in the design of integration, for integration, for example, can be trapped within the framework of one specialty (scientific or academic) and thus closed to the other; hence the importance of openness.

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The other of these two ideas is to build for tomorrow an education that relinks knowledge of the natural sciences and those of the human sciences, to clarify the multidimensionality and human complexities and to take care that the idea that "the unity of the human species does not erase that of its diversity, and that of its diversity does not erase that of unity" (p. 25). It is not to lose sight of the dialectical relationship between unity and diversity, for as he says: "We must conceive of the unity of the multiple, the multiplicity of the one" (p. 25), which is to preserve human diversity.

The idea of the relationship between education, the natural sciences and the human sciences invites us to reflect on the work of universities, especially if we are looking for an integral formation of students; to this can be added that, as the scholar Vega Cárdenas (2016) points out, most of Morin's work, particularly *Seven complex lessons in Education for the future*, serves as a guide to inspire the necessary changes in education systems and to training full-fledged professionals capable of living adequately in the coming society. To all this can be added the statement offered by the Cuban philosopher Guadarrama González (2018) that if researchers and professors keep in mind the thought of Morin, they can avoid epistemological reductionism. The integrating spirit of Morin thought is thus an incentive in the aspiration to reinforce the integrative character of university education.

The Integrative Character of University Education: The Validity of Edgar Morin's Thought

The importance of science and technology is growing steadily, and in turn the value of those involved is increasing, including university professionals. They have a prominent place because of their high level of expertise and their participation, often decisive and irreplaceable, in the various scientific and technological processes; with the increase in their importance, at the same time, the value of university education is growing.

Regarding the 'formation' category and its use in the academic sphere

It is opportune to specify the meaning of the word 'formation', which is used in many contexts and has several meanings; in the case of the university level it is related to the preparation of a senior specialist, suitable for performing certain tasks and doing so with high quality.

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The word formation proceeds from to form; its earliest meaning was to give form, which was then enriched with the meaning of nurture, training, educating; through these two ways relations are woven with academic action. Venegas Renauld (2004a) points out that the reference word has among its meanings, to in-form, from the idea of information, that is, to incorporate data, ideas, information, from which a network of links with school work is also constructed and invites us to bear in mind that the term "instruct" has among its meanings, to inform. At the same time, this author says that there is another meaning of the word "to form", which is to acquire, in a person, development, aptitude or ability in the physical or moral, with which formation rather than forming, gives another idea: to form. This clarification seeks to emphasize that the active character of the person being formed is not simply an ideological result of the moment, but that the word itself carries that meaning in its path.

In the academic context, the category of "formation" is complicated, not only because the word is polysemic, but also because of the number of different criteria that exist around it, although there is no shortage of texts where it is used without a minimum definition, so its meaning must be deduced from the objectives pursued with it or from the content of the writing itself; this is the case with Duarte Díaz and Valbuena Ussa (2014). Not infrequently, as in the article by Bizquerra (2005), it is understood in relation to the fact of equipping people with knowledge that prepares them for some specific social function, while in others, for example, that of Cuervo Ballesteros (2017) and that of Pérez Guzmán (2018)is related to the development of general professional or human characteristics, such as knowledge, handling of emotions, communication, but with the express purpose of their use and manifestation in concrete actions. In other works, among them that of Álvarez (2017), it is conceived closely related to culture and society and is associated with the work aimed at shaping the natural capacities and faculties of individuals to ascend to the generality.

When someone is asked what his or her formation is, it is very common that he or she answers with reference to the his/her studies, the diplomas and the recognition he or she has obtained, that is, he or she is associated, first and foremost, with the academy and the preparation he or she has obtained. The author González Rivero (2016) assures that the deepening in the literature specialized in this topic has allowed her to appreciate that the word formation has a long history as a category in philosophy and other specialties, especially pedagogy (where its use is very frequent), however, "extensive studies on it are limited as it is generally

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alluded to in a faint way or as a trait that does not need further explanation" (p. 153). This is a condition of the reason why, as she herself states, "it is generally assumed in view of its more superficial characteristics" (p. 154) there is not enough theoretical clarity, it is used from different perspectives and "a theoretical development on the subject cannot be generally found" (p. 154).

González Rivero (2016) affirms that in the study of the category of "*marras*" in the academic field two perspectives are distinguished; one extends from the outside of the subject in formation and the other from within it. She asserts that many scholars assume the first variant, from where formation is conceived as an influence that is exerted on a subject (which becomes its object) and that it is conceived as a process or system of actions to act on a subject and realize a formative purpose. The other perspective, that of interiority, is, according to González Rivero, recent, scarcely studied and with little theoretical development, although it clarifies that the fact of considering the subject as an essential element of formation has long roots. The author points out that the guiding idea of this variant is that formation is "a kind of function proper to the human being, which is cultivated and can be developed: the evolutionary function" (p. 163) and points out that, although there are different criteria in this respect, from this angle, in the general sense, formation is conceived as the incessant appropriation that the human being carries out throughout life. In keeping with this latter modality, she emphasizes that in the formation process the will of the person being formed is decisive, his "decision and self-assessment to be involved or not in his own transformation" (p. 166).

Regardless of the value that each of these perspectives has, it is worth noting that both separately show a fractionating perception; the two exist in dialectical relations. Formation is an interior-exterior-interior process, it is a creative exchange between the subject and the external to him, from where he takes what he wants, and incorporates what he selects, either by his own decision or by external action (influence, insistence, obligation). It is not that formation must be of our own free will, it is that, in its realization, our own will and convictions are decisive, in connection with the external world: it is taken from it and carried to it continuously; hence the cardinal role of persuasion, of the guidelines, of the guidance.

With regard to the above, it is worth emphasizing that formation is not self-formation, because although the decisive role is played by the subjective component of the person being formed, that is, his will, decision, perseverance, conscience. In formation the external influence and

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the dialectical interplay between the subjective and the objective is important, if not the subject is embedded in itself; hence the valuable role of the formator and not only as a guide, but also as an impeller. The teaching-learning process is quite important, but more attention needs to be focused on learning.

In the academic context, the category of reference refers to a process in which the historical, the social and the philosophical are present, hence its breadth. This characteristic, while certainly making it very complicated, also gives it great theoretical possibilities and a wide and diverse practical scope. When used in the academic framework it is related to other categories no less complicated and controversial: education and development.

In the above-mentioned framework, these three categories are dialectically related because they allude to a process in its complexity; when used separately it is for the purpose of theoretically specifying. Thus, with the category of education, it is possible to refer to the shaping of existing traits, qualities, principles, with the intention of changing them or creating others; therefore, molding, forming. In the meantime, the category of training emphasizes, highlights, that something new is created, superior to what exists, in which there is development, but also molding; that is, in the fact of formation, there is education and development. It is worth opening a parenthesis and with it a remark about the author Venegas Renault (2004), and that is that she places the beginning of the pedagogical use of the word "formación" in the framework of the concept of education during the Renaissance, "in a slow process of differentiation" (p. 30) and relates it to the work of the thinker Erasmus Rotterdam (1466-1536). The links between the two categories should therefore not be surprising. Education and development are implicit in formation; only with a rigid and limited vision is formation conceived in the academic context as forming something static, that does not change, that does not develop in some way.

A clarification is timely: In the light of empiricist and positivist currents, the word "form" tends to be reduced to relations that can be generalized by the verification of a regularity verified in the facts. Venegas Renauld (2004a), assures that with this philosophical influence on modern sciences the word 'form' is replaced, "by substantive and non-verbal terms, such as "structure", with a meaning of regularity, associated more with the aspect of static structure than with dynamic functioning" (21), thus it can be found in geology and in the military universe, which alludes to structure and with it, to a particular order, to a composition or organization.

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The strong educational burden that the category of formation carries at the academy level, leads some authors, as happens with Ferrada-Sullivan (2017), to a reflection that begins around formation and takes a course that leads directly to education and places it at the center of analysis.

Generally, when the category of formation is taken into account from an academic perspective, it is associated with the teaching-educational process and is seen as a part of it, which, according to some authors, such as Ramos Serpa (2006) and Zabalza (2011), can be understood by areas: political, economic, legal, and professional formation: teaching, medical, legal; in all cases linked to the acquisition of new knowledge and the rearrangement of existing ones, as well as to skills and abilities. In correspondence, Vázquez Alonso (2014) and Velásquez Jiménez (2016) associate with it the knowledge of the specialty that is taught and the skills that professionals must have. In general, in the use of this category there is no lack of attention to the educational and didactic aspects, although the degree of attention may be greater or lesser, depending on the interests of the person studying it, that is, the research purposes and possibilities of researchers.

In the universe of criteria and specificities around formation, seen from an academic perspective, there is an essentially integrative variant, socio-formation. In the work of Vázquez et al. (2017), it is noted that the core of this modality are the social and environmental challenges, as well as the needs for personal self-realization and its intention is for people to learn to identify, interpreting, arguing and solving problems in a collaborative way, with an ethical life project, as well as developing their entrepreneurial capacity. The breadth of this spirit can be seen in the text of the authors Balladares et al. (2016) who understand training as a task involving more than one teaching discipline at the same time.

There are other integrative variants that go beyond the limits of what is strictly academic. One of them is the one that has the purpose of forming (and developing) in the person his status as a citizen; thus is spoken of citizen formation, which in the words of González Rivero (2019) is a "a systematic, intentional and continuous process of socialization, whose purpose is to promote in the person his status as a citizen" (p. 343); this is to develop in human beings the capacity to participate fully in society, that is to say, to become a social actor, a purpose which goes beyond the limits of preparing them to participate actively in the destinies of their community. This type of formation has in its foundations the "critical, reflective and creative attitude to carry out transformations around human well-being" (p. 343). It is noteworthy that citizenship formation,

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which includes not only knowledge but also the full development of the personality, is "a concept that does not have sufficient studies" (p. 348), to which it can be added that this is the case with the category of academic formation, although this statement seems exaggerated and categorical.

Another integrative and extremely broad view is the so-called human formation, the purpose of which is to form human beings, that is, to form characteristics in human beings that make them better, to humanize them, to make them ascend to higher scales in the process of humanization; in the voice of Pacheco González and Pupo Pupo (2017) "it is based on the goal of forming human beings" (p. 52).

After a review of various understandings on this subject, it can be said that formation as an academic category is a system and, at the same time, a process, where there are relationships of various kinds, which can be observed in stages and levels, always nuanced by concrete historical-social conditions and by the links between the external action of each individual and his spiritual universe (rational capacity and affectivity, with the results of each and their mutual links), although its identifying feature is that, in it the determining role is the consciousness of who is being formed and his/her subjectivity: convictions, aspirations, purposes, ideals, which are impulses to overcome obstacles, reach goals and surpass them.

University formation in the light of complex thinking

In speaking of formation in the academic context and as has been said in various ways throughout this text, it is impossible to ignore or underestimate unprecedented scientific and technological development; but such a link is much stronger when it comes to university education. As is well known, its results are professionals, who will work in various areas that are crucial for society, many of them linked to science and technology. It is not difficult to understand that the quality of professional performance depends to a large extent on how the formation was conducted, its breadth, depth and scope. For this reason, integrity, a key feature demanded by the aforementioned development, is of great importance. For reaching it, the perspective achieved when assuming the reflections and suggestions from Morin are extremely valuable.

In this sense, it is opportune to emphasize the recommendation of Hernández and Figuerola (2016) that in the university formation an integral optic must prevail, that is deployed through the conjugation of external and internal actions (with the determining role of the subjecti-

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ve component of the one being formed and with the widest attainable amplitude). It is good to remember, as González Velasco (2019) points out, that when these tasks are carried out with a reductionist vision "the classroom does not cease to be seen as a closed space" (p. 38). It should be added that, as a result of this perspective, closed professionals are also responsible for reproducing these characteristics, since they are the result of a narrow, one-sided mentality, and these are not the professionals needed by today's society; today formation must be integrating.

Professional knowledge and skills are not enough for university graduates to succeed in their profession, because if today's society requires mental openness and flexible rationality, in summary: an integrative outlook also needs to have professionals who meet these requirements; hence the importance of education being more and more comprehensive, which cannot be understood as superficial, nor as generalizations. This conception demands a complex and ductile vision, which, taking into account the potentialities of individuals, their initiatives and autonomy, aims, as emphasized by the author Castellanos (2016) to "the integration of knowledge, skills, motives and values that are expressed in an efficient, ethical and socially committed professional performance" (p. 148) together with autonomy, flexibility and the ability to take on dizzying changes, to transform themselves in line with the changes in society and to be able to make them always move towards a better future.

A strategic line for this type of training, as Escobar and Escobar (2016) say, is to provide meeting spaces "that the one may converge with the other, the unique with the multiple, the individual with the group, and subjectivity may be enriched by the relational objectivity of all with all for all" (p. 96). It is necessary to transform thought and, in the words of Ruiz Lara and Torres Soler (2016), it is also necessary to create spaces that foster it and open the way to creativity.

In the light of complex thinking, when the formation of university professionals is designed, it is opportune that the people to whom the action of the formation is to be directed towards be placed at the center of attention. This modality avoids the presence of utopian aspirations, centered on the professional conceived as an object and not as a concrete historical-social subject; it also encourages him/her to be active in this process and to participate from the spaces where he/she lives, but this also avoids, as Castellanos (2016) remarks, the imbalance between the real context of formation, the individual and the curriculum.

There are several features that characterize the curriculum when conceived from complex thinking, González Velasco (2017) points out

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the following: disciplinary integration, retroactivity, recursivity and reintroduction, openness, flexibility, dialogical character, great social and humanist sense, which is why it is important to pay attention to the personal and social dimensions, to the values, the culture and the planetary consciousness, proposed by Morin. This conception is based on the objective of forming men and women with their own criteria, autonomous and, as Maldonado emphasizes (2017), with sensitivity to the natural and social environment, so that they are able to solve the problems that arise. Most of which will concern humans. The purpose of this type of curriculum is to train human beings and is therefore, in itself, human formation.

It is not superfluous to emphasize that this way of conceiving formation urges the present human society, especially with regard to the development of critical and creative thinking, and university education cannot be exempt from this. This purpose is favored when the university is a space for open dialogue, driven by emancipatory objectives. And here the spirit of integration is the vigor to go forward and the compass that marks the way; then its opposites and negators are the fractionation and overestimation of some aspects to the detriment of others. Bias has a negative influence on creativity, as demonstrated by a study carried out by Cabrera Cuevas and De la Herrán Gascón (2015), two researchers from the Autonomous University of Madrid. However, in order to carry out this work, it is essential to educate formators with a complex thinking, which means, among other things, that they oppose arbitrary fractionation and propose integration and complementarity.

Here is a sample of the methodological and guiding value of Edgar Morin's thought in every work of formation, including university formation, where there is still division, which is observed not only in the separation and isolation of characteristics, properties or purposes, but also in the persistence of overestimation of some of them, which is a reduced way of understanding them. Reductionism is the result of fractionation and separation.

The Work Component of University Education. A Look Through Complex Thinking

In the works of Balladares et al. (2016) and Velducea Velducea et al. (2019), it can be observed that in university education there is a tendency to prioritize the teaching of subject contents and to relegate to inferior levels the development of cognitive skills and abilities. This modality is favored by

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the growing relationship of university institutions with scientific and technological knowledge, including consumption, production, dissemination and storage. Such knowledge and the resulting products are disseminated in society and, many, become objects of trade. Such characteristic has facilitated the existence of a business outlook towards university institutions and has intensified the claim that they respond to market demands, which is why, as the author Brower Beltramin (2014) points out the way of attending them as if they were one more company or an appendix to the industry continuously spreads. and there is no lack of scholars, such as Restrepo Zapata (2017), who stress the desire for vocational training to meet the demands of companies and the market and like Bermúdez-Aponte and Laspalas (2017) who highlight training in terms of the market and think that "teachers must behave like entrepreneurs or sellers" (p. 113). Fortunately, however, there are scholars, such as Brower Beltramin himself (2014), who think differently and think that this position is a distortion of the essential meaning of university education.

It should be made clear that one of the central objectives of university education is to train students in work related skills. There can be no doubts or misgivings about this. This purpose is not wrong, not harmful, not evil. What does prove to be harmful is that such training is reduced to that objective, not only because it is subordinated to commercial mandates and to the satisfaction of the requirements of possible jobs and the market for them, but also because it attacks the inherent breadth of the university and its formative work.

The formation in the labor component is an extremely complicated and demanding task, and it must not be underestimated, nor overestimated. If one follows Edgar Morin's logic, the crux of the matter is that the professional is not just a worker. If university education is limited to certain qualities, its mission, which is to train a competent professional and a human being, is mutilated in the historically attainable integrity, that is, in its multiple social relations and not only in its work relations. If a component of the training task is attended solely or preferably, others are relegated to lower levels, or excluded.

If a utilitarian approach prevails, in which the student specializes in solving specific work situations, the university will become a mechanism that generates graduates with instrumental abilities for specific purposes. The overestimation of the labor component consists not only in the fact that knowledge is conceived solely according to the profession, but, as can be seen in the text of Aguilar Astorga (2017), that it becomes something enclosed in itself and, therefore isolated and insulated. Accor-

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ding to Rodríguez (2017), the training of professionals capable exclusively for work is typical of the nineteenth and twentieth centuries and is therefore a residue of the past.

According to the authors Navia-Antezana and Hirsch-Adler (2015) and Picazo et al. (2018), there are experiences that show that the social component is sometimes better valued (as a desirable feature of a good professional) than the technical or cognitive component. This shows that there is no shortage of those who recognize that individuals trained in purely practical aspects do not, after all, possess the social and human skills that are also very necessary for successful work. But what is striking is that in such circumstances there is also the risk of going to one extreme and with it succumbing in the arms of another kind of reductionism.

There are scholars, such as Ciurana and Regalado Lobo (2017), who worry about the reduction, the reduction that is observed in the overestimation of the purpose of training professionals with high qualifications to meet the technical standards in an efficient way, with the ability to adapt to and obtain from technological change optimum results and that which occurs when the focus is on meeting the demands of the labor and techno-industrial market, such as when this objective is overstated and other very important aspects of the life of an individual and of society remain at a lower level, for example, the development of critical and creative thinking and the training of men and women as citizens, able to live actively in the community to which they belong. In all this work the enrichment of the spiritual universe must not be forgotten, for which the study of philosophy, ethics, aesthetics, history, art, artistic literature and mother tongue is invaluable.

An university graduate who only has excellent work qualities is not enough. One of the great tasks that teachers have today is to enable students to learn to orient themselves in the enormous amount of information available and to understand that this is a means to achieve an end: to know, with increasing depth, nature and the human being, with the results of his creativity. In correspondence, teachers face the challenge of motivating students to investigate the roots of phenomena and to learn to value knowledge not only in its intrinsic value, but also in function of the human being.

University education must shape all the abilities and faculties of students, not only to meet the economic or political demands of the moment, but to advance on the path of human improvement, which, while corresponding to what is achievable under the circumstances, at the same time constitutes an incitement to progress to higher levels.

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The rational and the affective in university vocational training

The changes that humanity is undergoing have not been able to eliminate the technocratic and pragmatic mentality, according to which the most important thing is technology and the solution of practical problems, purposes that are neither perverse nor erroneous, as long as they are not absolutized. According to this type of thinking, the professions exist only to solve such problems and the route that is conceived as suitable to satisfy this requirement and to do so with thoroughness, is that of the exclusive use of rational capacity, because it is conceived that it is through it that the objectivity and scientific purity of knowledge is achieved, that is its ultimate end. Here there are two types of reductionism: the professions only serve to solve practical problems, and rational capacity is worth exclusively because nothing else arrives at objectivity, therefore the subjective is excluded (assessments, beliefs, opinions).

The high level of attention to the labor component of university vocational training is accompanied by the exclusive estimation of rational capacity. We share the criteria of the author Martínez (2015), who emphasizes that this way the basic role of affectivity in human life is forgotten. It is worth mentioning the exploratory study carried out by Professor Curiel León (2018) at the University of Havana, with which she observed that in teaching, the object of her study, the mastery of the conceptual system of each subject and discipline was emphasized, less attention was given to the affective level and that there were training needs in the teachers related to self-knowledge and affectivity.

That fact is not unique to the University of Havana, not even to Cuba. Many teachers from all over the world and at all levels are worried about the predominance of the intellectual approach and the relegation of affective aspects to inferior or null planes, among them Fernández et al. (2009), Castañeda Serna (2014), Barrantes-Elizondo (2016) and Ojalvo Mitrany and Curiel Pawn (2018). However, this interest and the assertion, with gained authority, of the Spanish philosopher José Antonio Marina (2005), that the literature on emotional education is very broad. With regard to university education, the number of texts devoted to studying these issues is not notoriously abundant, not only the emotional, but also the affective in its integrity. This statement, which is limited to the world of the Spanish language, can be verified with a bibliographic search that covers various journals, from any country, in which there may be studies of related thematic universes. This assertion does not deny the

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existence of profound and current works, such as those of Fragoso-Luzuriaga (2015) and Curiel et al. (2018), although it is notable, as can be seen in the text of León et al. (2019), the privileged attention on the rational.

With regard to university education, it is necessary to increase theorization around the affective, especially at present, because at the present time the high houses of study are marked by tensions resulting from internal and societal transformations and demands, largely due to advances in science and technology, where the scant attention to the affective and the Manichean polarization between the affective and the rational stand out.

The above statement does not mean that the number of scholars who recognize that in affective bonds there is a great potential to make the teaching-learning process more effective; examples are Maldonado-Torres et al. (2018) and Goicoechea Gaona and Fernández Guerrero (2014). The latter recommend that "all the affective dimensions that have been forgotten by traditional scientific and philosophical discourses" be taken into account" (p. 45), to which it is worth adding that it is essential to take this idea into account, because formation is not a cold endeavor.

It is urgent to strengthen the affective component and to do so as an intentional process to promote the proper expression of emotions, feelings and passions and to encourage self-knowledge. In university formation one cannot do without reasoning or the rigor of intellectual discipline, but a balance between the rational and the affective is necessary.

The presence of both, in a balanced manner, is important. And this is where the problem lies, because there has been a favored party or one that has gained more attention: the rational one. It is necessary to emphasize the affective component and to attend to it in a specific way. It is necessary and convenient, as can be understood from the text of Bisquerra Alzina (2005), that university professors know the work that is done regarding the affective, are encouraged to apply the results in their daily formative work, not only as teachers, but also to write about their considerations and experiences in this area. Affectivity, affective manifestations, are not exclusive to women, nor to the humanities. There is as much masculine affectivity as feminine, and mathematics, physics or engineering can provoke the affective as much as a poem or a play; each one with its specificities.

It is not superfluous to return to Morin (1999) and to emphasize that he emphasizes the need to understand that reason and affectivity exist in close relationships and that there is no reason to observe them separately or to conceive them as opposed. Nor is it superfluous to

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emphasize the attention it gives to the belief that rejection of affectivity eliminates the possibility of making mistakes, to which it points out that while holding such a creed one does not think that, if certainly the affective can suffocate knowledge, it can also strengthen it. It is also appropriate to emphasize that the observation of the links between the rational and the affective also leads him to affirm that if it is true that "the faculty of reasoning can be diminished and even destroyed by a deficit of emotion; the weakening of the ability to react emotionally can become the cause of irrational behaviors" (p. 5). And it exposes with ostensible energy a principle of the struggle against the simplifying and disjunctive scientific paradigm and, in turn, in favor of its opposite, that other, the integrator and complex, when it asserts that "hatred, love and friendship can blind us; but it must also be said that already in the mammalian world, and especially in the human world, the development of intelligence is inseparable from that of affectivity" (p. 5).

In the specific case of university students, and from a perspective of practical utility, it is worth emphasizing that the intelligent handling of one's own and others' emotions, can be a tool that contributes to the fulfillment of our goals, which are more competent and integrally formed. It is intelligent who directs his affectivity with intelligence and it is affectionate he who expresses his intelligence with affectivity. It is of great value to know how to lead affectivities towards a goal and achieve it. Feelings, emotions and passions can stimulate optimism and entrepreneurship. Life in society can be more comfortable if one knows how to recognize the affectivity of other human beings; knowing how to interpret it (with gestures, expressions of the face, tone of voice) makes it easier to put oneself in the place of the other, have empathy and improve human relations and, in turn, face the challenges of the present and the future. It is worth bearing it in mind, and not only in the positive, but also in the negative; this is a way to understand what needs to be strengthened or transformed and in what direction.

With regard to the relations between the rational and the affective, it is worth referring to a theoretical body called neuroeducation. In its light, as can be found in the writings of Mora (2015), it is recognized that emotions and feelings are essential pillars for the teaching-learning process (and, by extension, also for university formation) and that emotions are an engine that each one carries within ourselves, that moves us to want to be alive in interaction with the world and with ourselves, which is an unconscious reaction that favors survival, although in human beings it becomes conscious.

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Close to these criteria is another, which can be found in the work of Bueno Torrens and Forés Miravalle (2018), and is that learning is consolidated much more and can be applied to new situations when it manages to mobilize emotions and reasoning, as well as that, in order to learn, one has to stimulate the ability to want to know, because the significant, motivation, emotions and, above all, pleasure are very important.

If one thinks in correspondence with the complex vision of Edgar Morin, one can understand the basic links between reason and affectivity, as well as the methodological value of the unfolding of an apprehension that integrates both human faculties or at least, that it does not separate them and, even more, that it does not oppose them. The integration of these human capacities represents the strengthening of human possibilities and must be used within the framework of university education so that it is more optimal, and humanity has professionals trained in an integral manner, which is a way of helping to solve current and future problems.

In order to be truly valuable, university education must correspond to the characteristics and needs of society. With this affirmation, which is a principle of its functioning, we must today fight against arbitrary division and separation and reductionism. The current development of science and technology highlights the need to transform thought in order, as Edgar Morin emphasizes, not to escape from the complexity of life, but to understand and assume it, to apprehend existing links (visible and hidden), establish others, and open the way to integration.

Conclusions

The spirit of integration that sustains and runs through the thought of Edgar Morin has an objective basis: the need to transform the thinking of humanity to correspond to the characteristics of today's society, which in turn requires the rearticulation of all that has been separated over the centuries, such as the various knowledge and scientific and academic specialties. For the thinker, integration is a process of complementarity, the course of which is human improvement achievable within a historical framework.

There is a coherence between Morin's suggestions and the characteristics of his thinking in terms of articulation and integration, because they form an interrelated mesh, both in their manifestation and in their spirit.

The integrative essence of Edgar Morin's thought is valuable for university education, first of all because it can be constituted as a theoretical support to preserve the universal nature of this academic level and to

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end the mentality that divides and reduces, which is felt in many conceptions and facts, such as the overestimation of the labor component and the schematic division between the rational and the affective.

The integrative character of Morin's ideas offers two basic arguments for carrying out the great reintegration task, one being that fractionation takes place not only in the separation and isolation of characteristics, properties, purposes, but also the persistence of overestimation of some of them; the other is that, in order to strengthen the integrative character inherent in university education, the tendency towards overestimation must be curbed, as is the case in the strictly professional sphere, and, in turn, it is necessary to pay more vehemently and systematically attention to the balance between the rational and the affective. University education must not be biased in favour of any of these human qualities.

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Teaching Professional Identity: Conjoining Complex Thinking and the Educational Field

Identidad profesional docente como religación entre el pensamiento complejo y el campo educativo

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Abstract

This article presents reflections on the results of an investigation carried out during 2015-2018. Its main concern was related with the alienation of the educative spectrum, of initial teacher training in Colombia (collegians) regarding social networking, subjective dynamics and the disposal of correlations, relations and demands of the social framework which teachers are instructed for. It centered its attention in unveiling complex components of such systems, from the constitution of curricular elements, dimensions and structures for its modernization and reconfiguration in Colombia. It was carried out using a mixed method analysis approach on a stratified sampling of 3 different populations, teachers in diverse stages and places of practice; it found new understandings in 3 primary niches. The first one, the discernment of the educational spectrum as a field that subsumes systems of education being fed by open social systems. The second one, reconfiguring the subjects and their position as the center of the being and doing of the related systems of the education field; assuming, at least, seven complex principles, generating a third niche that links education actions to school actions. It concludes with a modernization proposal, the Teacher Professional Identity and its attributes as an organizational category of the system, an action element that relates from complex thinking the findings and raises challenges to be considered by education institutions.

Keywords

Training, professional, teaching, identity, education, systems.

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Resumen

Este artículo presenta reflexiones sobre resultados encontrados en una investigación realizada en 2015-2018. Preocupada por el enajenamiento del espectro educativo, desde sistemas de formación inicial de profesores en Colombia (universitarios) respecto los tejidos sociales envolventes, dinámicas subjetivas, y el desechamiento de correlaciones, relacionamientos y demandas coligadas al entramado social para el que se forman los profesores, centró su atención en develar componentes complejos asociados a estos sistemas; desde el configurar elementos, dimensiones y estructuras curriculares para su modernización y reconfiguración, en Colombia. Gestionada con un método investigativo mixto sobre un muestreo estratificado de 3 poblaciones, profesores en distintos estados temporales de acción y lugar, encuentra resignificaciones asociadas a 3 nichos primarios. El primero, resignificar el espectro educativo en tanto campo que subsume sistemas educativos y es alimentado por sistemas sociales abiertos. El segundo, reconfigurar los sujetos y su posición, como centro del ser y hacer de los sistemas tratados en el campo educativo, en un hálito que asume, mínimamente, siete principios complejos, generando un tercer nicho que religa actos educativos con actos escolares. Concluye con una apuesta de modernización, la Identidad Profesional Docente y sus atributos como categoría organizacional del sistema, elemento actuativo que religa desde el pensamiento complejo los hallazgos encontrados y plantea desafíos a atender por parte de las instancias formativas.

Palabras clave

Formación, profesional, docencia, identidad, educación, sistemas.

Introduction

Understanding being a teacher, from a non-casual professional perspective, has put in the spotlight the need for studies that highlight how it has been, how it is and how it can be constructed. In the last few decades, there has been a lack of current frameworks that go beyond and link pedagogical, didactic and disciplinary studies, re-signifying themselves to the educational framework, beyond the school level. This phenomenon is the ground on which the study stands and which seeks to uncover resignifications, relationships, and configurations that must be the basis of being a teacher from and for a teacher professional development that responds to contemporary demands, from the perspective of initial training.

To this end, this text is composed by five sections. The first, introduction and phenomenon of study, the tensions and problems are described; giving way to the second, initial recognitions, in which the current state of the art in Colombia is presented in a global manner. This opens the third section, an exposition of the method used for the research, for the analysis and weaving of results. As a result of the tensions, data and associated theories, a fourth component is presented, in which the 3 niches formed by the results of the analysis are exhibited along with their corresponding reflections. This development is concretized in a fifth space that proposes the Teaching Professional Identity (IPD) as an organizational category found by the study and exhibits conclusions inscribed to

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attributes of the IPD to finally analyses the main challenges found during the research.

The research[1] started from the recognition of the following tensions: 1) The Colombian education system (from pre-school to university) exemplifies exclusion and lack of social mobility. As stated by García et al. (2013), it is reproduced as a 'tilted playing field'. 2) There is a lack of understanding of education systems, which generates a "resident inequality principle". Assuming this, from a surrounding dimensional triad, it is proposed to devise strategies that respond to three founding tasks according to Rivero (1999): (a) Central tasks in overcoming growing poverty and achieving inclusive development; (b) modernizing education systems and practice; and (c) ensuring equal educational opportunities for children living in poverty. And 3) Muñoz (2009) states that it is known that "curricula have not been designed from the needs of the disadvantaged sectors, causing a deterioration in the momentum of learning, thus maintaining the dominance/subordination relationship in education systems" (p. 41).

On this basis, the study, in a particular way, recognized that education, from the initial teacher training systems, presents two vital needs that are highlighted by recognizing the premises, presented above, as true. Firstly, as Nicolescu (1996) and Morin and Delgado (2016) express, the training of the agents is alien to the social composition and their recovery occurs in assuming elements of exogenous fields and of social composition and fabric, that is to say, in looking for 'inter and transdisciplinary' formation, characteristic of the field of complexity. Secondly, the system of initial teacher training is part of university systems which, according to Didrikson (2004), require modernization in conjunction with social and cultural identity foundations. The same applies to the development of dimensions configured in curricular designs, in so far as the 'extended social dimension', the 'institutional dimension' and the aulic-didactic dimension' as set out by De Alba (1998). A cultural and political-educational proposal that responds to the social and environmental aspects of the curriculum as a meeting of subjectivities, as stated by De Alba (2015), refers to "nodal features of the identity of the curriculum and of the institutions with which it has ties of belonging, such as the State, the Nation, the Church, the social class, the neighborhood, the community, the ethnic group, etc." (p. 196). As a result of these two inadequacies, the study was framed in the complex thinking and it was proposed to reveal complex components inserted in the systems of initial teacher training in Colombia, to give account of challenges and nodes that allow to reconfigure them. Because the problem makes invisible the sense and function of the educational field and its transforming role of complex realities in a social setting.

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Initial recognition

From the existence of the world, education takes place. Understood, according to León (2007) as a revelation of evolutionary learning constants that take shape in and through the relational acts between subjects and collectives, is conceived from a need for cultural survival. Consequently, its occurrence transcends, by far, what is characterized as schooling. Even with this reality, in everyday life the tendency persists to denominate with a high degree of synonymy, education as a school. Therefore, teacher training is restricted to an understanding, in the collective imagination, which exclusively assumes it as teaching/learning acts, thus reducing educational acts to schooling acts.

In this scenario, the investigations of León et al. (2013) allow us to glimpse trends that, although they assume a formal declaration of recognition and need for education, maintain fragmented curricular organizations that deal with an overt reduction and a disciplinary and knowledge formation weight to be transmitted at school, as they note when saying that 25 curricula studied are supported as follows: 39.07% of disciplinary training, 21.47% pedagogical training, 5.48% practical training and 5.4% research. A reality that is in line with the Ibero-American outlook, as shown in the studies of Gil (2015, 2016); García et al. (2013); Marcelo and Vaillant (2009), Tardif (2004), among others.

For the Colombian case, there is also a recognition of its historical behavior that has had two macro scenarios. The first of them: understanding being a teacher considering training as capabilities, from 1822 to 1960; the second: understanding the teachers as transformation (scope of professionalism), which comes from the 1960s to date. In short, Zambrano (cited in Gil, 2015) concurs with this by stating that "training as a capacity refers to acquired knowledge, while training as a transformation is the effect of that knowledge on our being as people" (p. 152).

Research method

The investigation was covered by a mixed method as proposed in Creswell & Plano (2011), so that the following sections present the encounters between the sentences of the actors, from a quantitative-qualitative analysis, intertwined with theoretical constructs and their respective resignifications. For the elaboration of this mesh, the construction of instruments was used, according to the referential framework of the macro research, assuming three blocks, with their respective categories and subcategories (Chart 1).

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Chart 1
Research blocks and categories

BLOCK	Category of analysis	Subcategories
1	Beliefs about the teacher's being and knowledge	What the teacher should be
		What a teacher shouldn't be
		What the teacher needs to know
		What the teacher doesn't needs to know
2	Effectiveness and efficiency of influence received by curriculum design in initial teacher training	Degree of influence of the curriculum design and initial training received for a good performance of the profession in various instances of accomplishment
		Perceptions of scope that one has from being a teacher and from curriculum design in initial training
		Demands on curricular designs. Needs from a retrospective view of what has been received vs. what has been experienced
3	Sense of being a teacher from sub-group notions and elaborated perceptions	Sense of the way I am
		Sense of how people see me
		Sense of how they are
	Self-image and evolution	Self-perception of change and current image regarding the time of experience

Source: Own elaboration

The collection of data was done through a stratified random sampling that revealed the need for the application of instruments to 131 practicing teachers from 10 Certified Territorial Entities (CTE)[2] in Colombia, supported by the administrative linkage of public sectors. It was also applied to 77 teachers in training (TiT) from 5 universities located in 4 CTE. The total sample of the first application recognized two stratums of its own, by normative effect (those belonging to Decree 1278 and those belonging to Decree 2277). The model was run with a total population of 27180 practicing teachers. For the total of each stratum it was obtained: Decree 1278, 64 instruments to be applied and, Decree 2277, 67 instruments to be applied. For its part, variance analysis, cluster analysis and analysis from correlation factors and the triangulation of theories and information gathered through semi-structured interviews were used for the analysis of the data.

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Results and discussion

Once the data collection and field work is done, the results of the research, recognition of the voices of the actors, have enabled three vital niches to be set up for the understanding of complex variables to be recovered and relinked in initial teacher training systems, as shown below.

Niche 1: Resignification of the educational spectrum as an educational field, a precursor domain

The study managed to understand education as a precursor domain of the teacher training system. The actors have managed to consolidate this clarity, since they understand that learning is not always linked to previously conceived, designed and planned teaching acts. This is what Morin (2011) proposes when he alludes to Rousseau in his speech in the *Emile*: "when the educator says referring to his pupil: «I want to teach him how to live». The formula is excessive, because one can only help someone to learn to live. To live one can only learns through one's own experiences (p. 135).

Understanding with this that, although there is an important link between teaching and learning, their coexistence is relative to the individual and the particular situation, therefore, they are not bound, in exclusivity, as a principle of cause (teaching) and effect (learning). By highlighting this distinction, it is possible to make their existence contiguous and separate. Each, and both as a unit, are part and all within a system. For García (2006) a system "designates any organized set that has properties, as a whole, that are not the additive result from the properties of the constituent elements. The organization of the system is the set of relations between the elements, including the relations between the relations" (p. 181). The notion of a system is vital, as it overcomes the staticism of the components and figures their feeding from the relational and interactional of the parts, with which they are constituted nodes that resignify and are constituted as more than the union of parts.

A non-dichotomous relational principle manifests itself here, in which is revealed connection of diversity from experience since, according to Jiménez and Valle (2017), "all knowledge is based on a previous world of lived experiences, where what is lived is not reduced to the satisfaction of needs, nor to the inclusion of a symbolic order…" (p. 37). Thus, for León (2007) "education is a complex human and cultural process […] for which each particularity makes sense by its connection and interdependence with others and with the whole" (p. 596) which is part

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of open systems[3] associated with the notion of field. For Pupo (2014), this need is sustained because "the cultural, cosmic and constructivist sense of complex thinking is conspicuous by its absence" (p. 17)

This new relinkage, which is found by analyzing the voices of the protagonists in their daily dynamics, makes visible a new link between the very nature of complex thinking and the study of fields and systems. For Bourdieu and Wacquant (2005) "to think in terms of field is to think *relationally* (1982a, pp. 41-42). The relational mode (instead of the most closely "structuralist") of thinking, as Cassirer (1923) in *Substanzbegriff* und *Funktionsbegriff* demonstrated, is the hallmark of modern science" (p. 149). In the same way, it translates this by expressing the relational character -non-interactive or intersubjective- between agents. In other words, following Marx (the authors say), relations are independent of the individuality of consciences and wills. Then, the field idea is characterized, merely, according to its constituent systems, its relationships, its agents (and independent of them). Consequently, it is defined by its particularity, that is, by conditions that are peculiar to it alone and also by the relations that exist between the different positions of the latter.

As a result, as Gil (2016) aptly sums it up, the field is conceived as "A system of relationships that delimit a specific area of activity and knowledge, always dynamic and in permanent motion" (pp. 114-115) and is associated with the notion of *habitus* and its resignification from "trans-relational" efforts, according to Piaget and García (1982), achieving modifiability in the structuring of structures, which are themselves structuring. As exhibited by Bourdieu (1991) "Conditioning associated with a particular class of conditions of existence […] systems of durable and transferable arrangements, structured structures predisposed to function as structuring structures, i.e., as principles that generate and organize practices and representations" (p. 2) may pose a distance from the subject-object principle and its relationships, since it alludes to it from the beginning of domination in its development. In the research it is determined that this fracture is solvable and must be treated in the proposed resignification, because as Martínez (2017) states, it is the product of an associative alienation of the substantive vs. the explanatory of the whole, as shown below:

> We have pointed out that the concept of *habitus* is an attempt to break with classic dualities of social theory, such as objectivism-subjectivism, or sociological research, such as "quantitative-qualitative". In its attempt to overcome the dualism of objectivism-subjectivism, it seems that

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> Bourdieu's project ended up following the side of objectivism, while the *habitus* is produced by the social position of the agent (p. 12).

In addition, the author responds to allegations of excessive objectivism and determinism in the field and *habitus*. Because it states that these are remedied, by understanding:

> As for the accusation of determinism, Swartz (1997, pp. 216-7) points out that we must bear in mind that the Bourdieu explanation model tells us, as we have already pointed out, that [(*habitus*)(capital)] + field = practice (Bourdieu 1991b, p. 99), so the behaviors produced by a habitus will also depend on the functioning of the field (pp. 8-9).

In short, the relationship built between the category habitus and the principle of complex thought is consistent in assuming that the action and understanding of the agent, field and practice, go beyond the understandings of particular situations or the sum of these in causal states of the intra plus inter, producer of the trans; Because in its deepest sense it has resignified each one of them and has forced to observe the field in the totality of its fabric and not in the particularity of the points of the loom, but in the relational aspect of the point with the whole and its connectivity with the other points.

With these foundations the resignification elaborated in the research allows to establish an understanding of educational field as that in which it is intended, as attractor of the action, the accompaniment of others in their learning experiences (learning being an experience in itself), causing a recursion that allows me to experience learning experiences in myself. It functions as a medullary tissue that feeds and permeates any system that configures its own and external knowledge, that seeks to generate, make more or less comprehensive, learning relationships, not knowledge reproduction (from analytical understanding) exclusively. In this field the educational system is assumed, as shown by Mockus (1995), "[…] as a system for the circulation of knowledge, as a great network that allows knowledge to circulate and reach the places where it causes change, which, while being local, it is still significant" (p. 11).

Niche 2: Repositioning the subject and complex principles in the educational field

The achievement of the exposition above, in niche 1, implies the acceptance and staging of seven principles of complex thought that compose its network. Without them, the attempt to develop the educational field

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is a futile effort. In this sense, the study finds that the composition of the educational field is given by linking different systems (school, educational, organizational, social, cultural, political and economic, among others) and their interaction in different orders, in other words, a systemic principle.

This systemic principle, the recovery of action in, for and from the trained subject, that is, from the actors linked to the experience to be a teacher. This fact plays with the dilution of the dichotomy between subject and object, that is, for Morin (2002), a principle of cognitive re-introduction that implies "returning the leading role to the one who had been excluded by a blind epistemological objectivism. We must reintroduce the role of the observer subject […]" (p. 32). By having an interconnectivity between relationships and components it is recognized that any fluctuation and/or disturbance of one of them acts and reacts on others and on itself generating new emergencies in the field, the principle of retroactivity. Similarly, Obando et al. (2018) state that this complex process subscribes to perception linked to epistemological action as "From the relationship created in the process of observation, the cognitive subject has to divest himself of his subjectivity in order to possess the qualities proper to the object" (p. 95).

This means that there are premises of autonomy that are on an equal footing with premises of interdependence and that are given in a loop of recursivity. Emitted and immersed in the previous interconnections, the educational is inscribed in particular and general cultural states in which, as León (2007) states, it is recognized that "Education makes it culture. Man is made and educated with man, as iron is sharpened with iron" (p. 597), therefore, self-correspondence is kept as a particularity of the components and systems associated there. For Morin (1999), this is to understand that "the whole is somehow included (engramed) in the part that is included in the whole. The complex organization of the whole (*holos*) requires the inscription (engram) of the whole (hologram) in each of its parts, which are nevertheless singular (p. 113), that is, a hologrammatic principle. A principle that also communicates with the notion of collective action, as noted by Simbaña et al. (2018), since this interdependence conceives:

> This set of common beliefs and feelings allows for the development of a collective action, one that commits the individual to act according to established norms, Durkheim recognizes the educational centers as collective actions, describes them as integration scenarios… (p. 91).

In addition, these statements understand that the educational as a field involves the recognition of action from notions of the self-eco-or-

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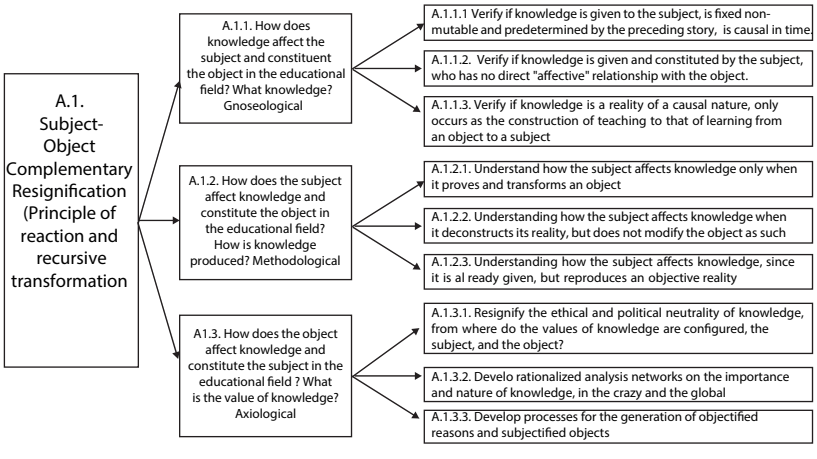
ganizational principle. In the words of Morin (1979), this one, interpreted from the *Auto* and *Oikos*, means that it is carried out on a complex organizational basis "both of opposition/distinction and of involvement/interaction, of otherness and unity" (p. 66). What Soto explained (1999) implies "that these notions cannot be thought of or treated in a totally independent way from one another" (p. 69). Finally, the complementarity required in the foregoing requires mobilization mechanisms that guarantee what has been built. Thus, for Morin (2002) a "complex association (complementary/concurrent/antagonistic) of jointly necessary instances for the existence and development of an organized phenomenon" is recognized (p. 31) which means, involvement in and of the dialogical principle.

These foundations allow us to establish that from the educational, as action, meaning, sense and complex phenomenal construction, as a field, the aforementioned principles must be associated with structures of knowledge that relate the parts and the whole in the completeness, and the characteristic differences between each subject and each collective, keeping a self-correspondent relationship, as conceived below.

Regarding the principles of feedback and recursive transformation (figure 1), we have:

Figure 1
Resignification from the principles of feedback and recursive transformation



Source: Own elaboration

Given the evolution of the development of the subject and object in the historical evolution of the educational field, we have the following points that take force in the principle of cognitive and systemic reintroduction (figure 2).

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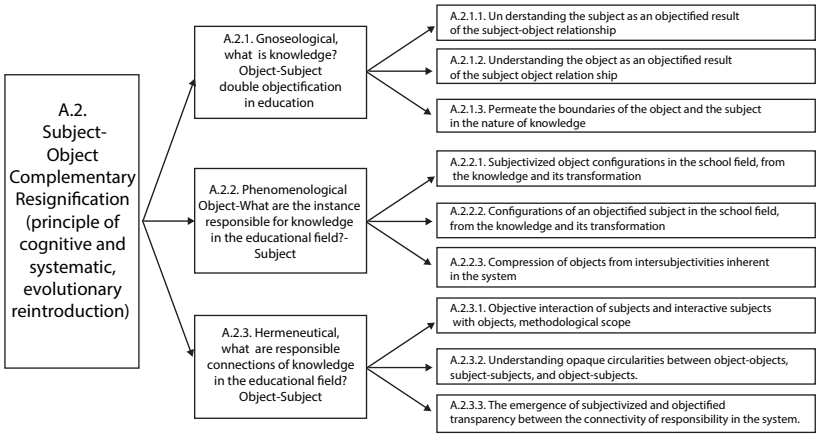
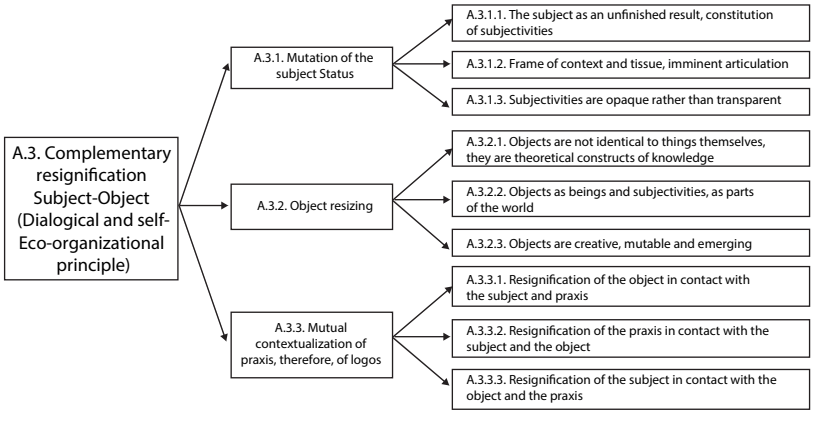
Figure 2
Resignation from the principles of cognitive and systemic, evolutionary reintroduction



Source: Own elaboration

Thirdly, we have the processes belonging to the dialogical and the self-eco-organizational from the composition of the subject and the object, as an individual and culture, both the part and the whole, and their relationships for resignification (figure 3).

Figure 3
Resignification from the dialogical and the self-eco-organizational



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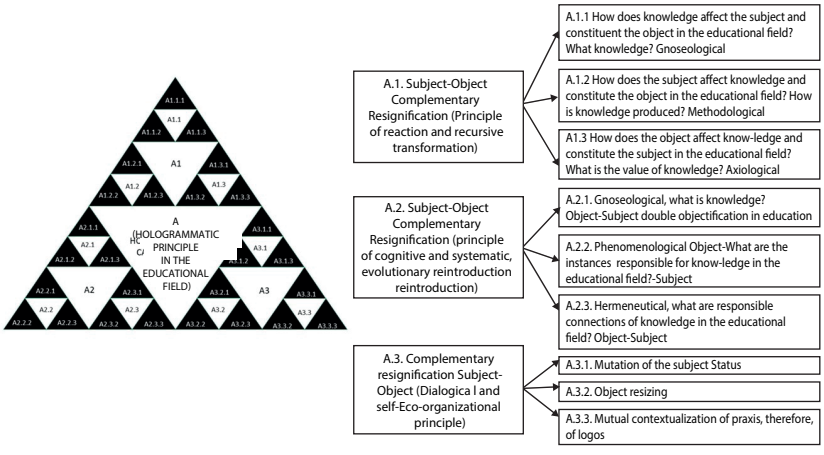
In sum, 7 principles of complexity as relational configurators that generate from and in the educational field that focus attention on the fact that the configurative engine of such process occurs in the subject's learning and actions (actions and structures) (Figure 4).

Figure 4
Resignification from the 7 principles of complex thought



Source: Own elaboration

Niche 3: Relinkage of educational acts and schooling acts (the change of didactics)

These bases and configurations give way to the constitution and relinkage of educational and schooling acts. Educational acts and schooling acts are vehicles of manifestation in the field of education. These have intimate relationships, both form complex networks and assume a relational structure, that is, present convergences of meaning, but, in turn, are eminently different in scope, nature, interactions, intentions and occurrence, which results in divergences of meaning.

Schooling acts are conceived from the point of view of the institutionalization of learning spaces as a predisposed concept of transmission, that is, the result of previously designed teaching events (teaching/learning binomial). Consequently, they occur in the simulated, unnatural experience of the world and the arrangement of specific roles, limiting interaction to what Brown et al. (1989) calls as "artificial or substitute practices" between predetermined subjects; so its intention insists on iterating meanings that explain -recreate- culture, but do not build it up constitutively. Moreover, they are constituted from the construction of a

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reigning rationality (whatever this may be) and prioritizes the decanting of the corresponding regulatory and disciplinary science. Posing, in some cases, its nature 'inter-relational' as Piaget and García (1982) point it out.

On the other hand, educational acts are based on the principle of learning as a notion of dynamic, changing and autonomous evolution, and therefore occur in the natural life of the world that does not have an obligatory assignment of roles. It has a reflexive scope of conscious awareness among the inhabitants of that world and, in the alienation of the natural state to reflect (your world in parentheses, the *epojé*) following Husserl (1907), therefore, its intention is to construct a social fabric that shapes culture. It is not found in the pathologies of reason, it is not subordinated to conceptions of regulatory and disciplinary science, but to the notion of knowledge as a synergy of knowledge constructed and deconstructed by subjects and collectives. In short, an educational act is one that provides experiences of potentialization of the learning of the other and of the self and, as Piaget and García (1982) show, evidences its 'trans-relational' nature.

The previously found relinkage locate the formative actions "to train teachers" from a principle of subjectivity of/in the subject and, from the discarding of a binary code, which corresponds to the de-structuring, resignification of reason, its rationalities and rationalizations (figure 5).

Understood, according to Morin (1979), as:

- Reason as "a method of founded knowledge… employed to solve problems raised to the spirit".
- Rationality as "the establishment of an adequacy between a logical coherence (descriptive, explanatory) and an empirical reality"
- Rationalization as "the construction of a coherent, totalizing vision of the universe from partial data, a partial vision, or a single principle" (p. 293).

These links, according to Costa (2006), set the understanding of "to know as it is presented by reflective analysis and scientific knowledge, a pre-technical knowledge that is presupposed by it and that will become evident through a different perspective that qualitatively separates traditional dualism" (p. 4). They also combine a logical didactic framework that drives the manifestation vehicles of the educational field and function as methodological devices that activate their reconfiguration. Consequently, didactics understand its codependency of the notion

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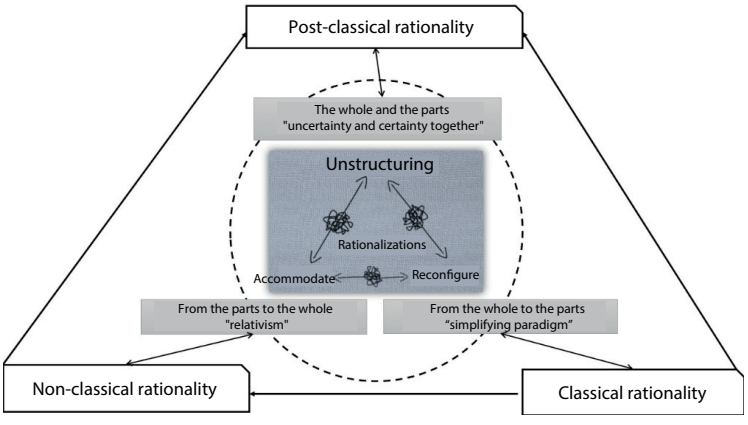
of science, but it assumes it from constitutional practices that have been carried out by their subjects and collectives (the educational).

Figure 5
Relations and de-structuring between rationalizations



Source: Own elaboration

This should change the way in which didactics are understood as a system for studying teaching techniques and monitoring the learning of a science, to be recognized as a system that is concerned with revealing that the treatment of a particular science involves making visible the place from which it is treated and that this knowledge is a fundamental part of the teacher's knowledge. This includes considering components such as its historicity, its epistemic configuration, its social emergence, its regulatory capacity, its ideological infusion, its cultural phenomenology, its chronological disposition, its activity, its geographical implication or, the conjunction of different sources of treatments. Merleau-Ponty (1985) framed it in the perspective of being-in-the-world. Therefore, didactics assumes the search and treatment from the coexistence of the 'experience', as the pragmatism of being and the knowledge from the objective, as theory of being. That is, in a spectrum of a praxeological character.

In these spaces of emergence and resignification, praxeologies appear that, according to Chevallard (1999) and Bosch and Gascón (2004), are understood as professional activities linked to the tasks of being a teacher and his professional practice. In that place, ostensible or not, two levels are indissolubly conjugated. On the one hand, the level of practice, *praxis*, associated with the basic elements: tasks and techniques, referring to the set of procedures that give meaning to knowing how and how to

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do. On the other hand, the reasoning about practice, *logos*, in which two other elements are circumscribed: technology and theory, referring to discursive constructions that justify and validate the technique.

Praxeologies reside in the spectrum of motion of differentiated processes, depending on the scope of study. For Lucas (2010) this means considering the existence of Point Praxeologies (PP) that imply oneness in the task and oneness in the presentation of facts. Local Praxeologies (LP) that mean the integration of various PP, composition of a thematic body. And, the regional praxeologies (RP) that manifest integration of diverse LP in an articulated manner.

Given this, it is necessary to consider the LP as the minimum basic unit of analysis for the configuration of a didactic organization, assuming two basic principles, as indicated by Bosch and Gascón (2004): The first that the indivisible unity is constituted in the encounter of codetermination between the didactic organization as a process (regional praxeology) and the disciplinary object as a product (local praxeology); the second, that "the phenomena of didactic transpositioning is at the heart of every didactic problem" (p. 20). In addition, the basic conditions for teacher training must be considered as those proposed by Ball and Cohen (1999): to learn to contextualize; to adapt; to continuously improve; to generate alternative teaching dynamics and; to understand various meanings of learning.

In addition, Vezub (2007) identifies the focus of teacher training from four generative issues, namely: "institutional organization and regulation of training; curricular aspects; training models and approaches; formators; teacher training teachers" (p.6). These developments demand an organization that encompasses praxeologies and that lives in indissoluble codetermination between object and its sense, thus emerging the didactic organization as institutionalized knowledge, through mutable systematizations, of acquired knowledge. Finally, since every schooling act is (must be) an educational act, if it recovers and accentuates its dynamism, however not every educational act is a schooling act, as has been shown. The resignification of the system and understanding of the field makes it necessary to unite them from the viewpoint of the formative models and associated perspectives and to involve designs that allow the mobilization between the different proposed states, together with the development of the praxeologies working in a global scheme (Figure 6).

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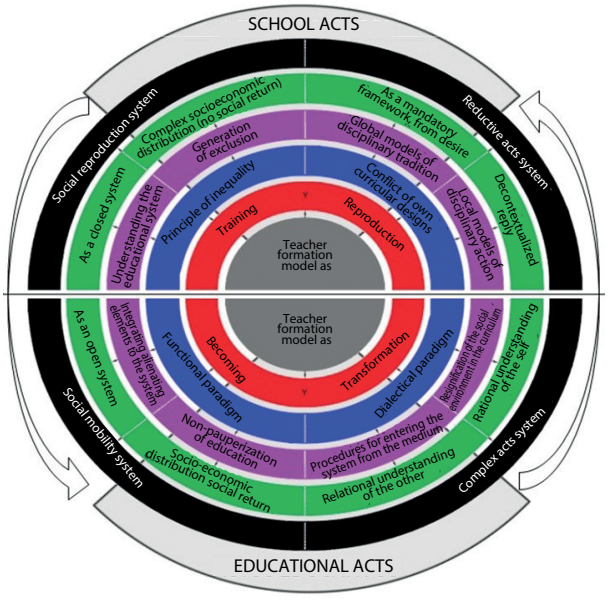
Figure 6
Relinkage between acts, perspectives and models for teacher training



Source: Own elaboration

The commitment to modernization: Relinking from the action of the professional identity of teachers

In line with what was stated, the result of the relinkages and reflections found in the research, initial teacher training must be seen as a response to the creation of elementary conditions for being and learning in and from the action of the person being trained and of the training subject, and hence from his collective (community of practice). In this sense, identity emerges, particularly the Teachers Professional Identity of (TPI), as an organizational category of actions developed in the initial teacher training system and, therefore, in the field of education.

The configurations generated in the preceding reflections assume the lack of constant dialogue with the environment and social impact generated by its development. As the field has been constituted, primarily, from one of two perspectives of study of the social representations that are accepted, in turn, as a spectrum of movement of the model of initial teacher training.

In the first place, the social representation that assumes the training of teachers in the search for their actors and actions to break the

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dependence on the socioeconomic results of a cohort of individuals with respect to that of their parents, characterization coined by Azevedo and Bouillon (2010). This is a model of social mobility that includes mutability; a relational, interactional and interdependent character; in the words of Morin (1994) a complex prospect that understands that the teacher is formed (acts) from uncertainty and certainty as complements.

Secondly, the social representation that suggests the training of teachers in order to subsume the actors/actions subject to cultural domination, from an asymmetric distribution of existing positions of power, as manifested by Bourdieu and Passeron (2003). What it is in itself, a model of social reproduction that implies a formation that considers reality as static; immutable; composed of dichotomies, therefore, its meaning is to transmit unique and exclusive predetermined models.

In response to the dichotomy generated by the models, a relinkage of the two forms of social representation is proposed, as shown in niche 3. In this sense, it is necessary to contemplate that the model of social mobility as presented by Romero et al. (2006) is understood as a system of "effective relationships that determine the particular ways of being, producing, interacting and projecting in the family, community, work and citizen" (p. 11), must be in harmonious coexistence with provisions specific to the school system and its resignifications, that is, with the model of social reproduction. This proposal generates the emergence of Professional Identity as an organizational category for the initial training of teachers in response to the social fabric.

The notion of identity, in a general way, has undergone a multiplicity of understandings and meanings as the social fabric is constituted and imposed in a given society and culture. In this regard, Altamirano (cited in Arias, 2017) identifies the use of the term, from the sociological point of view, at the end of the twentieth century; it also provides us with two references for its understanding consonant with the idea of sources of nature, being these "the essentialists, for whom identity comes from an identical shared nature, and the constructionists, who consider that identity is artificially constructed in social interaction" (p.15).

Even if this bifurcation exists, identity in the educational field has generally been placed in the first source, without any doubt or discussion. Consequently, there is no alternation design that allows the transition from the static (essentialist) state to the understanding of dynamic (constructionist) states, even more to a non-dichotomous configuration that is related to the two sources.

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For such reasons it is common to speak of the discourse of identity of and in the teaching profession with the manifesto of tension of the replica offered in the compartment of essentialism. Even so, the works of Gysling (1992); Cattonar (2001); Lasky (2005); Vezub (2007) and; Marcelo y Vaillant (2009), among others, have successfully demonstrated the importance of this concept in the field of the teaching profession and how it is found within the framework of dynamic states that are co-constructed between the synergy of the subjects.

On this basis, it is important to consider new perspectives for these states. In this regard, Arias (2017) makes a brief but elaborated reference framework for this notion and shows dimensions of understanding the notion of identity, sufficiently separate and interdependent:

- The notion of identity, in general terms, could be understood as the self-referential image that everyone has of himself.
- Identity cannot be grasped as a fixed and predetermined nucleus that typifies the subjects, it is not a representation of the stable and imperishable self that transcends history and is invoked from a supposed coherence of personality; it is more and less.
- In the words of Levi-Strauss (quoted by Ortiz, 2004), "identity is a kind of virtual place, which is indispensable for us to refer to and explain a certain number of things, but which does not really have a real existence" (p. 77).
- For Ortiz identity is a symbolic construction that is made in relation to a referent, which can be a culture, a nation, a color, a gender or another collective
- Tugendhart (2001) describes the concept of identity as the orientation of life towards happiness, points out that everyone experiences his life as pleasant if one considers himself lucky
- Ricoeur (2006) confirms that "to say the identity of an individual or a community is to answer the question: who has done this action? who is its agent, its author?" (p.997).
- Identity is a social construction, that is, it is in the midst of the social dynamics that individuals construct the constitutive aspects of their being: "the meanings that the key words will have for me will first be the meanings that they have for us, that is, for me and my conversation partners" (Taylor, 1989, pp. 51-52; 15-18).

In line with the proposed declarations, we understand a path in which identity is resignified from a constructionist and essentialist understanding. Going further, it understands the notion of knowledge as

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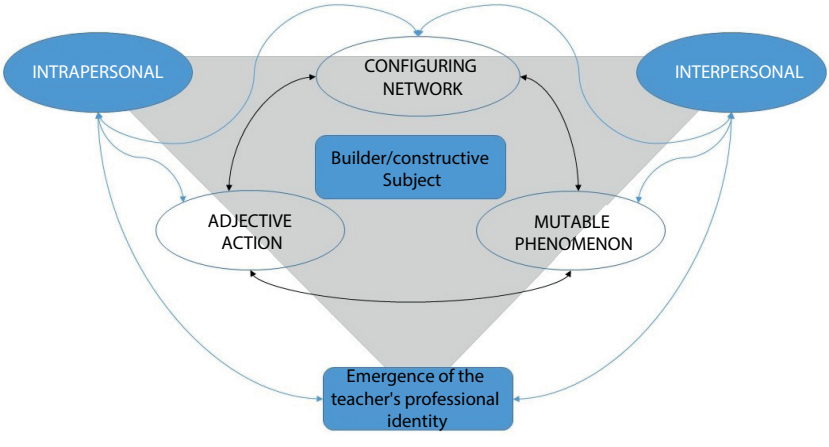
a conscious experience. In this sense, the resident identity in the subject and in a collective is susceptible of modifiability and constant concretion, it is evidenced in the staging of actions, operations and actions carried out by the latter from the point of view and in the context of the group.

Consequently, the study succeeds in concluding a characterization of TPI in which it is understood as an expression of feeling of being that recognizes itself and is recognized by others, as a teacher; it is the breath that involves entering and staying in a particular community of practice, in which one is always trying to energize processes of accompanying learning (from the other and one's own) as the motor of his actions, from the intention of teaching (not as a transmission) but as a learning experience *per se*. It is an expression of the complexity inherent in the educational field in relations with the social fabrics that surround it.

It can be conceived from three nodular attractors: identity as an intra- and interpersonal network; identity conceived as a mutable phenomenon; and identity from the adjective action of the subject and the group (figure 7). Flourishing their relationships, not their mechanisms, that place the Professional Identity of the teacher as an organizational category of the system.

Figure 7
Nodular attractors, TPI configuration



Source: Own elaboration

Thus, the professional identity of teachers is constituted as a mutable phenomenon, implying and evolutive development in which, from the life, particularly from the experience (Husserl), two basic questions

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are configurated 'Who do I want to become?' along with 'Who am I right now?' This pair refers to elements such as self-efficacy, motivation, commitment and satisfaction in the work of teachers and is an important factor in becoming a good teacher. That is to say that identity is influenced by personal, social and cognitive aspects, in other words, it is housed in what Bourdieu (1977) considers as *habitus*-systems of personal and collective practices-.

Morin (2001) speaks of identity as a dual process, in which the subject must be taught to recognize himself and to allow him to recognize the diversity inherent in all that is human. Self-awareness and diversity of the other are essential for the subject to assume its status as a planetary citizen. In turn, Gee provides the concept of identity from the understanding of relational phenomenon, in which there is not a fixed attribute but a continuous development process that occurs in an intersubjective field, for which the premise of Habermas (1989) to consider that identity does not imply speaking "of something that we find there, but of something that is and, at the same time, our own project" (p.21) is accepted.

From these considerations, arguments have been found that lurk around considering the existence of identity in conjunction with the essential and the constructive, but, in addition, place the concept of core identity within levels of understanding of the subject, intersubjectivity and the collective. In this sense, Fernandez (2006), points out that identity "is a continuous process of constructing a sense of the self, according to a cultural attribute -or a related set of cultural attributes- that is given priority over the rest of the sources of meaning" (p. 102). As a consequence of the above, the professional identity of the teacher, for Sloan (2006), configures a complex "network of stories, knowledge, processes and rituals".

In this way, even if the singular of identity has been used, it must be considered that it expresses a multiplicity of trajectories and transformations as numerous as teachers exist; as configured by Huberman (1999) "teaching identities can be understood as a heterogeneous set of professional representations, and as a way of responding to differentiation or identification with other professional groups" (s.p).

Therefore, from a basic mathematical notion, classification, representing oneself as an actor of a collective automatically differs from others, in such a way that the professional identity of teachers also implies difference, as Costa argues (1993).

But it is these same facts of dynamic and complex understanding that, according to Téllez (cited in Ávalos, 2006), paradoxically allow us to see that professional identity is more difficult to forge in university

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institutions (especially at the secondary level) where training is shared by disciplinary faculties and educational faculties. This division generates fractures of the meaning of the task and the profession; therefore, its understanding is debated between the specialist of a discipline and the teacher of a specialty. In this line, we should be breaking down these barriers and understanding that disciplinary boundaries must be diluted, in the interests of a social sense and its needs, inviting us, as a university, to a paradigm shift that is concretized in the curriculum. Avoiding that our interest is centered, exclusively, in preparing specialists in the discipline rather than teachers, because this affects the vision of themselves that, then, the students assume (Ávalos, 2006).

With this aim in mind, the research succeeded in characterizing the attributes that give meaning to the Professional Identity of Teachers and that allow consolidating tools of curricular action, both in the desired and in the actuated, to address the problems associated with the educational field in this study. With this in mind, the following conclusions can be drawn with regard to this category:

Attributes of the teaching professional identity

The professional identity conceived as a relational phenomenon is configured from recursive attributes that retroact one another and constitute the actions of the teacher subject. In this sense, predominantly, it responds to four relational sources of its action, namely the source of temporal relationship of action; the source of self-image relationship; the source of self-consciousness and memory; and the source of social interaction and cultural dimension. Each of them, associated as nodular attractors that constitute the mobilization trajectories through which the formed subject and the forming subject must transit within the framework of the curricular design experienced in the initial teacher training system, are conceived as follows.

Source of temporary action relationship: De naturaleza estructural, esta fuente configura la influencia del tiempo para la evolución, mutación y constitución del sujeto profesor, desde lo propio de la experiencia y la progresión compleja que requiere para la constitución del ser profesor. It is the integrative and transversal medullary tissue of the others as it is spectrum of movement of the subject and its evolution. In a bounce effect, recursive and retroactively, it is expected to be a framework for the evolution of the community of practice in which the subject is inscribed.

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Source of self-image relationship: Of an interactional nature between the subject and the collective (community of practice), this source is the process and result of intra-personal and interpersonal networks that concretize interactions with the otherness of subjects that constitute themselves in the collective. There is manifested how I see myself (what I am); how they see me (what I am from the other) and how I see (what I want to be from the perspective of the other). The three levels of understanding of self-image are related both as an example and as a counterexample, that is, the acceptance or rejection of attitudes external to the subject, which are assumed by the subject. In line with the temporal source of action, it is understood that there exists evolutionary mutability, therefore, only instants of expression of the being can be understood, not objectivization of the being.

Source of self-consciousness and memory relationship: Metacognitive in nature in three orders. First, the understanding of its action around a composition of educational field in association with a particular school system (Metacognition as an expression of the school process -the being a teacher-), that is, the identity from the self-regulatory notion of being embedded in a school process that seeks to know how to mediate in learning and how to generate production devices for the learning of others in recognition of various variables which retroact and self-eco-organize there. Second, identity from the understanding of its performance versus how he learns and how he manages mediations to provide experiences (of learning) to himself (metacognition as self-reflection about his mental processes-being a teacher of a discipline-). Finally, identity from the understanding of knowing knowledge, that is, the resignification of how I am a self-observer who mutates the object and the subject from my own historicity (metacognition as knowledge - being-).

This source assumes that only self-reflective exercise allows the temporal source of action to influence the constitution of the subject. It is the privileged instance of conscious awareness of actions, actions and attitudes that have been installed as operational invariants of the pedagogical practice of the teacher subject. It is the space of recreation of autobiographical development that involves recognition of the source of the relationship of self-image and its incubation in the subject. Implying recognition of being a teacher in both metacognition and knowledge of the acting self; of the self as an architect of an educational process; of the self that it knows and how it knows.

Source of social interaction and cultural dimension: Of a realization nature, this source comprises elements of systems exogenous to the ini-

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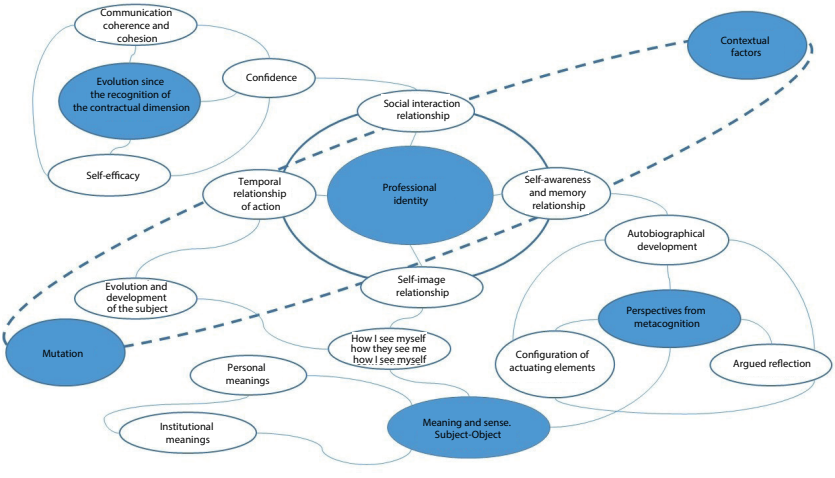
tial training system and provides the filters that interconnect elements of competencies, contents, designs and scenarios, diluting and converting them into social networks that inhabit the noosphere of development of the teaching subject. This source highlights the incubation of the professional identity of the teacher, as it allows versatility of his actions in one's own system and in alternate systems of feeding of the task. It superimposes components of exogenous processes and endogenous constituents of the profession to be a teacher, generating relationships in the triad of confidence, coherence and communicative cohesion and self-efficacy.

In unity, the attributes and the sources of relationship of the teaching professional identity, relinked from the composition of complex thought and the reconfiguration of niches 1, 2 and 3, are conceived as follows (figure 8).

Figure 8
Constitutive attributes of the teaching professional identity



Source: Own elaboration

Some associated challenges

Two major challenges need to be addressed in order to achieve the results of the study. The first is a reconfiguration of the profile of teachers (trained and trainers) and their conception in the system of initial teacher training, as part of the educational field and the associated social fields. The second is the need to restructure and modernize the system's cu-

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rricular designs in order to achieve this profile, based on the previously shown relinkages.

In the case of the first challenge, it is necessary to create profiles of the teacher (as well as of his trainers) as the subject who acts, consciously, from the intention of accompanying others in their learning experiences (learning being an experience in itself), which means understanding teaching as a complex recursion, which allows learning experiences in others and in me, which disturbs the system, generating new knowledge. That is, subjects that respond to current principles (relinkage between complex acts and principles) from three layers of action and organization, as shown below:

- A first layer, associated with founding the acting self, is to construct a subject that assumes itself as a teacher with precise edges "to be a teacher and/or to be a teacher of teachers".
- The second layer, associated with the constitution of oneself as an architect of education, is to recognize that one is a teacher with the burdens of the educational field, school systems and, of course, the social fabric in which one develops (school, university) and make us part of a community. Finally,
- A third layer, associated with the foundation of the intersubjective self, which means configuring oneself as a subject in recognition of the elements of knowledge (curricular organizers of training).

This proposal challenges the idea of TPI to weave elements that allow action from the three mentioned layers, layers that act as domains. According to Côté and Levine (2002) these three domains of identity constitution are assumed as: the plane of the self which refers, roughly, to the constitution of the personality of a subject; the personal plane, in which the interactions between the self and the reality are activated, product of the relationships between the self and the reaction of the others and; the social plane, which includes the characteristics and understandings that the subject elaborates in relation to the environment and its prescriptive perceptions.

Therefore, our TPI sources move in these planes, having the source of temporal action relationship and the source of self-image relationship move directly between the two stated planes, while the source of self-consciousness and memory and the relational source of social interaction reside, most strongly, between the last two planes (figure 9).

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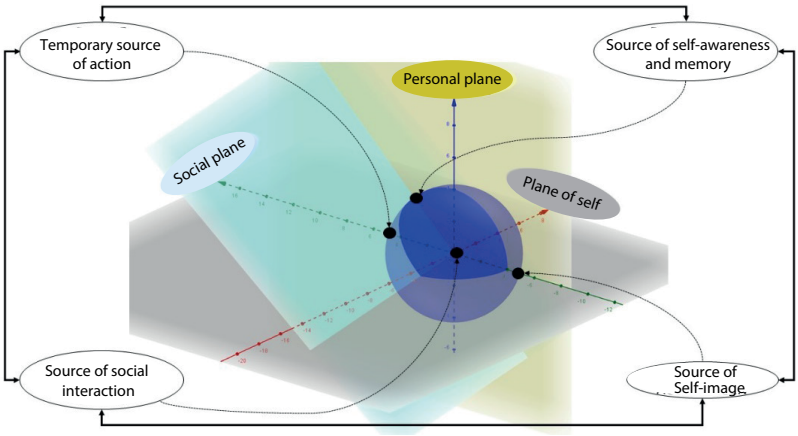
Figure 9
Interaction planes and domains of understanding
the professional identity of the teacher



Source: Own elaboration

What can also be stated as the possibility of generating methodological devices that allow the reconfiguration of the actions in the system of initial teacher training from the movement through the dimensions associated with the constitution of identity of a subject.

For the second challenge, there is a need to reconfigure the curriculum organizers; the interaction schemes; the methodological arrangements for action; the scenarios of constitution and living and, of course, the organizational category of the initial teacher training system from the relinkages presented here, linked to the particularization of the social fabric to which it is confined. Thus, the results found in this text, pose a fundamental challenge to the understanding of the complexity of the teacher training system by associating it with links between the educational field and social fabrics; therefore, the design of a single global model is not feasible.

Notas

1 Doctoral Research: Architecture for the curriculum design of initial teacher training in mathematics. Incursion from the perspective of Complex Thought.
2 Modality of spatial, political, administrative and economic distribution within the framework of educational decentralization in Colombia, as provided for in the 1991 Political Constitution and in Law 60 of 1993 and Law 115 of 1994.

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3 System which "remains in continuous incorporation and elimination of matter, constituting and demolishing components, without reaching, as long as the life lasts, a state of chemical and thermodynamic equilibrium, but remaining in a state called "steady" that differs from it." (Von Bertanfaly, 1968, p. 39).

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The education under the sign of complexity

La educación bajo el signo de la complejidad

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Abstract

Complexity involves the adoption of a new vision of the world, of oneself and of the relationships between various levels involved. The basic problem is that there is a disarticulation between a discourse that declares complexity as an essential construct and a schematic and reductionist practice that generates an incoherent context for learning. It is about introducing a holistic understanding that aims to respond to the new challenges that life and the ecosystem pose at the present time. The objective is to consider some reflections on complexity and then approach education from this perspective using a descriptive and analytical methodology, from a reflective position, in dialogue between different positions and with contributions from various authors to try to make something that is simple complex in itself. To carry out the tour, some introductory ideas are raised on the subject; then complexity is defined from its semantic origin to characterize it in its most determining elements. Later, it goes on to describe its principles: dialogic, organizational recursion and hologram. In a next moment, education is presented and the elements that must be considered to become complex to end with the exposition of some challenges that people face if they want to propose and even more, develop an Education under the Sign of Complexity.

Keywords

Complexity, education, sign, dialogue, reflection, learning.

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Resumen

La complejidad involucra la adopción de una nueva visión del mundo, de uno mismo y de las relaciones entre varios niveles implicados. El problema básico es que existe una desarticulación entre un discurso que declara la complejidad como constructo esencial y una práctica esquemática y reduccionista que genera un contexto incoherente para el aprendizaje. Se trata de introducir una comprensión holística que pretende responder a los nuevos desafíos que la vida y el ecosistema plantean en el momento actual. El objetivo es considerar algunas reflexiones acerca de la complejidad para luego, plantear la educación desde esta visión usando una metodología descriptiva y analítica, desde una postura reflexiva, en diálogo entre diversas posturas y con aportes de varios autores para tratar de volver simple algo que es complejo en sí mismo. Para realizar el recorrido, se plantean algunas ideas introductorias sobre el tema; luego se define la complejidad desde su origen semántico para caracterizarla en sus elementos más determinantes. Posteriormente, se pasa a describir sus principios: dialógico, de recursividad organizacional y hologramático. En un siguiente momento, se plantea la educación y los elementos que debe considerar para volverse compleja y terminar con el planteamiento de algunos desafíos que enfrentan las personas si desean proponer o aún más, desarrollar una Educación bajo el Signo de la Complejidad.

Palabras clave

Complejidad, educación, signo, diálogo, reflexión, aprendizaje.

Introduction

This article deals with the issue of complexity and its relationship with education, a task that is not easy in truth, since it involves resignifying the educational context, as well as the learning process itself and even the role that the teacher should assume. This reflection seeks to mobilize ideas and beliefs around education in order to initiate actions that cultivate a precise reflection and a perspective that tends to the construction of spaces in which different representations converge, to turn reality, and its understanding, more complex. The education and quality of this process can only become relevant for growth and development when people are linked to it and understand the multiple elements that determine it; thus, by looking into each other's eyes, perhaps they can get a glimpse of the beauty of the souls that are shown in each glance if they can understand the depth of the experience.

Taking these ideas into consideration, the main objective of this article is to present some ideas about the challenge of thinking and constructing a complex education that contributes to the development of a complete and integral human being. In this type of process, it is necessary that different sides are brought together and assumed, so that complexity become the sign under which education is carried out.

It is necessary to think about an education from a complex perspective, since teachers face a series of problems that, according to Lebus (2003), are found in education today; some of them can be summari-

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zed as follows: (1) A disarticulation between theory and practice, with great concern for didactics in the classroom, without considering other aspects involved in the training of students; (2) there is also very little or almost no awareness of the importance of knowledge, its cognitive and social construction and the processes underpinning it in education; and (3) Many subjects are covered without considering or reflecting on their relevance to the work that the student will have to carry out in their professional future.

All these aspects are qualified by a more or less pronounced rupture of subjective relationships between teachers and students, which determines that each teacher maintains certain conceptions of teaching and learning, without major changes in the course of his work as a teacher. Considering these problems, authors such as Lebus (2003) affirm that the construction of an education from a complex perspective is indispensable at the present time because:

> Social reality today is extremely conflictive, diverse, traversed by intangible processes; because, as epistemological reflection reveals, multiple operations and systems of inference are involved in knowledge (learning). Moreover, the educational activity is conditioned, to a great extent, to the contexts in which is currently taking place (p. 125).

At the present time, the teacher faces a considerable challenge in his daily practice since he is compelled to give account of the factors involved in the phenomena, for which he must move away from simplistic and reductionist schemes of the "cause-effect" type. In this way, the teacher should seek the appropriate methodologies to review knowledge with his students, as well as contribute to the development of other skills, already pointed out by Morin (1999), which allows one to face the avalanche of knowledge existing at the present time.

This challenge becomes even more relevant, because the teacher is faced with a plurality of ways of learning and diversity of aspects that influence the students, making his task one of the most challenging and committed, impacting even on the professional and personal assessment of the educator. It is, from the characteristics of the students, that the teacher can choose their didactic learning strategies and it is they, the students, who are going to give, in a certain way, criteria about the good use of teaching methods, so that they are directed towards a stable and better way of teaching.

The educator must be prepared to involve the student in the new knowledge to be acquired. Similarly, it must be willing and have impor-

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tant competencies to turn the classroom into a valuable learning environment, involving students in conflict resolution within the educational and learning environment, for when the disciple feels involved and responsible, a trait of maturity and personal and community growth that begins to emerge in the student.

In addition, it is essential that the teacher has the ability to rethink the social, historical, philosophical, psychological, cultural and even pedagogical contents, considering the existence of a complex scheme in such a way that, the graduate student, be able to inscribe himself later, in his professional practice, in complex and diverse scenarios where he becomes the protagonist, wise and practical at the same time, without running the risk of getting lost in the sea of data and information requested in a schematic and repetitive way.

In this process, the evaluation of the teaching-learning process is a very important aspect since it provides criteria for improving teaching performance. During the assessment, in a certain way, the cards are put on the table' and what took place on the school day or even in the week or month or throughout the educational period is evaluated.

Thus, evaluation is necessary because, through it, it is possible to estimate the weaknesses and strengths of the entire pedagogical process, with which it is possible to determine whether what is proposed responds to the cultural and social reality of each of the subjects. In this way, one can know what can be maintained and what cannot. Because of this strong impact on the process, evaluation must be taken seriously if one wants to make an education that really transforms.

Moreover, the evaluation of the educational process may raise questions about education, and even about culture, society, educators and learners themselves, both in their development and in their being in education. The interest of education should not be focused on economic production, but on the formation and growth of human and social development; on this depends the most balanced process possible, of economic growth for the benefit of a society, but better still, to increase a social capital for the good of all humanity.

The vision then becomes ecosystem, as Johnson (2008) puts it, at a time when the multiple levels involved in the complex perspective are considered, at both physical and temporal levels. The integration of these levels implies considering them when reviewing them with students and also allowing them to observe and learn the variety of aspects and elements of the same situation. According to Lebus (2003), this implies a bet, in which the teachers are co-creators, together with the students, of

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the learning process, which will allow them to operate wisely in situations where order and disorder are mixed and intertwined to determine multiple perspectives and influences.

The topic is very topical because it is part of the most current trends in pedagogy and seeks to link teaching with complex thinking. To this end, it is assumed that there is a disconnection between discourse that declares complexity as the principal construct of teaching and a schematic and reductionist practice that generates an incoherent context for students' learning.

The methodology used to address this issue is deductive, dialogical and hermeneutic, since it is based on taking advantage of already analyzed concepts in order to involve them in their relationship with education; Thus, we start from the great ideas developed by several authors such as Morin, Bateson, Bertalanffy, Espejo, Flores and many more, both on complexity and on education.

In order to carry out our reflection, we address first the issue of complexity, and then, the characteristics of education are analyzed from this perspective. The text is propositive rather than descriptive because it is considered that, at least, as far as it is possible to determine it, there are still no practical educational approaches from the complex perspective in the Latin American context.

Some basic considerations about the complex perspective

Ballester and Colom (2017) affirm that supporting education in the complexity paradigm would contribute to a new understanding of the multiple factors and elements existing in the social scenario, among which the following should be considered: 1) the interdependence of social subsystems (education, economy, technology, etc.); 2) interaction with the outside world at many levels; 3) the growing interest in rediscovering a certain quality of people as individually and interactively integrated subjects; 4) the transformation experienced by the hard sciences that try to move from an analytic to a more holistic look involving the construction of a more unified language that can be used by all of them and 5) the intention to achieve an integration between sciences of the nature and social sciences.

Ballester and Colom (2017) point out that, in recent years, the approach of a series of scientific works that support the bases of complexity has been enhanced; among the most outstanding are the following: Gregory Bateson and his particular concepts of unity, wholeness and com-

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munication; David Bohm and quantum complexity; Iliya Prigogine and chaotic systems; Niklas Luhmann and the complexity of systems; Humberto Maturana and circular complexities; Fritjof Capra and the ecological paradigm and Edgar Morin and complexity.

According to Gómez (2010), these profound changes add to other transformations that deeply affected the understanding that human beings had of reality, these are the revolutions:

> "Copernican", "Kantian", "quantum-relativistic" and "technical scientist". The first caused a shift with the elevation of abstract thinking over common […]; the Kantian took a step toward towards the breaking of the immutability of nature by the idea of change; […] the quantum-relativist, in which the atomist notion of the conformation of a world composed of indivisible atoms began to reach it end […] the scientific-technical, […] which is configured on a conception of reality as a complex totality (p. 190).

Education cannot evade the trend towards change that affects the evolution of all sciences and that requires a broad and sufficient discussion about each of these two aspects: education on the one hand and complexity on the other; an issue that escapes totally, the purpose of this text. However, it is necessary to reconsider the question already revealed by Espejo (2010): What does it mean to have a complex approach in education? That is why it is important to outline some aspects in order to advance the discussion on these issues.

Complexity

Thanks to the tremendous advances made in many sciences such as physics, mathematics, biology, sociology and many more, all of them were forced to develop a much more complex and multifactorial vision of the world in which different disciplines that are related to each other converge; thus, it seems that a new way of thinking about knowledge is being constructed and that, According to Morin (2004), it begins to position itself as the epistemology of complexity.

According to UNESCO (2013), from the etymological point of view, the word complexity comes from the Latin *complectere*, the same that arises from the union of two words: the root *plectere* which means "braid or link" to which the prefix com has been added which gives the sense of the union of two opposites that bind without nullifying their particular identity. Thus, complexity implies the synthesis of two oppo-

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sites in which the particular identities of each one is considered and the synthesis produced from this union.

Thus, the question arises: what are these opposites that are intertwined in complexity? The question is not easy to answer because it refers to the entire development of knowledge throughout history. It may be assumed that it constitutes the synthesis between the one and the whole, but is not the whole one? or vice versa. These ideas will be tried to be clarified.

For centuries a conception prevailed, which could be characterized as reductionist of natural, social and human phenomena as expressed by Tarride (1995). The human being tried to understand what was happening around him and, consequently, had to develop a method to do so. Thus, analysis became the procedural source for breaking down the whole into its components in order to try to understand them.

The whole, much more complex, was divided into its parts with the purpose of trying to know each of them individually. This approach allowed for a better understanding of the parts; however, an unexpected result was obtained, that is not yet well understood, as the knowledge of the parts lost sight of the whole to which they belonged. Therefore, although the part keeps some information at of the whole, it lost its relationship with the other components that surround it and that are a very important and determining aspect at the moment of understanding what happens in an element.

There were gains in individual understanding but a very important aspect such as the relational one was lost, despite the fact that Socrates (Araya et al., 2007) had already pointed out that "everything is more than the sum of the parts". The most obvious and, at times, dangerous consequences of dealing with reality under this approach, is to consider that, the elaborated explanations about each of the 'parts' correspond to and explain the 'whole', which is, in part, true: if a tree is known and what happens to it, it is expected that the forest will be better understood. The problem arises when one begins to postulate that the understanding of the whole can be achieved only with the analysis of the parts, since the impact that the whole has on them is not taken into account.

This apparent dichotomy was called into question when, in the middle of the 19th century, systemic thought emerged whose bases were formulated by Ludwig von Bertalanffy (1989), who put at the center of the debate the question of the relationship between the parts that constitute a whole and that this, after all, is an expression of the previously existing relationships and cannot be explained solely by its components.

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Characteristics of complexity

According to Tarride (1995), complexity, being understood as the parts and their relations, possesses some interesting characteristics that allow to understand the phenomena in another way, among them are: 1) the parts are units in themselves; 2) their functioning is affected by their belonging to and association with a system that includes them; 3) it is important to visualize and understand them both in their own characteristics and in their interactions with the whole in which they are registered.

Then, the relationship between a subject and the object becomes one of the primary aspects of this perspective, which allows us to understand that a phenomenon is linked to the elements that sustain it and to the relations between them. According to Rajsbaum and Morales (2016), the most recent discipline in charge of analyzing and understanding these phenomena is cybernetics, which, moreover, has helped to deduce the importance of the interdependence of the components that also characterize complex systems; that is, each element in interaction maintains and is maintained by the others; thus, the perspective becomes more a network than a sequence.

In this regard, Tarride (1995) points out that it is "the set of possible states of the object, on which, in some cases, a probability density of occurrence may be defined" (p. 47); that is to say, considering the complexity implies noticing the possibilities of a phenomenon and not the facts. A system can have different states and any one of them has a high degree of probability of appearing, which will only be determined by the initial conditions of the system.

In addition, complex systems are determined by their capacity for self-organization, also known as' 'the autopoiesis', a concept coined by Maturana and Varela (1984) to resolve the issue of the ability of complex systems to achieve high levels of organization unlike the physical systems that respond to the second principle of thermodynamics, which results in an increase in entropy and, therefore, a loss of organization until fading into the environment.

All these aspects are addressed by cybernetics thanks to whose approaches, and following the work of Segal (1986), one goes from a conception in which the object observed is important, to another in which the observer becomes decisive. With all these contributions, we arrive at the emergence of a new paradigm which, according to Barberousse (2008) has been named as 'of complexity':

> It would try to articulate and contextualize scientific cultures, humanities cultures and artistic cultures. To carry out this purpose, it was

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> based on the integration of ideas, concepts and notions from various theoretical sources (p. 1).

In order to think about complexity, it was necessary to question the existing paradigms since, according to Morin (2005), "it is difficult to conceive the complexity of the real" (p. 95) and, dialectically speaking, to propose a significant antithesis, new and productive that calls into question the legacy of all these theories, while proposing a creative synthesis in which it integrates them into a qualitatively different and original totality.

In this reflection, it is important to think of two additional themes, namely autonomy and completeness, in respect of which, Bateson (1972) indicates that the question arises of how autonomous a person can be whilst in interaction. Thus, according to Ortiz (2012), a complementary conception emerges to understand this apparent contradiction that is resolved with interdependence, understood as a responsible autonomy with itself and with the other. In this sense, Habermas (2000) is very emphatic when he states that:

> Autonomous can only be called the will directed for moral reasons and therefore entirely rational. From it have been removed all the heteronomous traits of will or choice for a singular life, mine, authentic, ultimately. But Kant confuses the autonomous will with the omnipotent; in order to think of it as the dominant will, he had to place it in the realm of the intelligible. But in the world, as we know, self-will becomes effective only to the extent that the motivational force derived from good reasons succeeds in imposing itself against the power of other kinds of motives (p. 133).

In pragmatic questions, practical reason refers to the exercise of the subject's own will. In the case of ethical questions, it refers to a goal that guides every human being and that is that of his own self-realization. Finally, in moral matters the duty is directed towards the exercise of the free will of a person acting in accordance with the laws he has chosen to respect.

This interdependence can only be assumed in a complex context, in which the person realizes and becomes aware of his interactions and the effect that his actions have on others. A challenge in teaching since it implies that the teacher perceives his actions in relation to the context in which they register and with the students with whom he works.

As regards the second concept of completeness, starting from Barberousse (2008) it is possible to perceive that it experiences a major variation since the whole and each part are indisputable and complete units in themselves, although they are part of larger units that contain them.

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This "to be contained" does not alter your property of "to be complete" since the one does not exclude the other. According to Carbajal (2016), this is the reason why the new epistemology of complexity requires the formulation of what has been called macro-concepts, that is, concepts that are related to each other. This means also assuming diversity at the level of language.

Principles of complexity

In addition to the characteristics of the complexity addressed in the preceding pages, it is also necessary to consider the principles that characterize it and that have been called by Morin (2004) as: dialogical, organizational recursivity and hologrammatic.

The dialogical principle refers to the necessary connections between the components of a system and between them and the surrounding environment. To a certain extent, this is a dialogue, an exchange between the various aspects that constitute reality. Just as a system exchanges information and energy with the environment around it; likewise, ideas are also exchanged at many levels, favoring the construction of possible and feasible realities when viewed as relevant, as expressed by Serrano and Pons (1999).

The second principle, that of organizational recursivity, refers to a basic aspect of interaction, such as feedback, as explained by Arnold and Osorio (1998) by which, a system receives feedback from the world around it and that allows it to better organize the internal processes that characterize it.

The last principle, the hologram implies that, just as it is possible to see the whole in each of its constituent parts; likewise, it is possible to see the part in the whole. There is a kind of reflection (in the sense of likeness, not thought) by which the whole and the part can be visualized at the same time, when the inescapable connection between the two is kept in mind.

Taking these three principles into consideration, as Barberousse (2008) does, it is possible to echo his words, noting that "complexity is the challenge, not the answer. I am in search of a possibility of thinking transcending the complication (that is, the unnamable inter-retroactions), transcending uncertainties and contradictions (p. 143).

Consequently, it is not a question of denying simplicity, it is sometimes very useful, nor of believing that the complex is the most perfect.

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Rather, it is a question of striking a balance between the two poles so that both can be seen and worked with. Thus, there is also a step to consider uncertainty and the irreducible as necessary areas in the complexity of human existence. When people open themselves to these dimensions, they are able to flow into the avatars of existence because life is simple in all its complexity.

This position, freely and consciously assumed, also frees us from the useless arrogance of believing and asserting; or worse, of trying to convince that the idea that each of us possesses is the ultimate truth, without realizing the complexity of things and phenomena. This position can help to turn each one into humble people aware of the fragility that inhabits us and of the possibilities that unfold when one perceives the simplicity and complexity of things at the same time.

To conclude this part, it is important to make a synthesis of the main points that characterize the complex paradigm as expressed by Gómez (2010) and that imply a different orientation to that of simplicity and reductionism.

First of all, the Cartesian ideal of absolute separation between the subject and the object of knowledge must be questioned, and as a consequence of this, every educator must rethink the social, the disciplinary, and even the philosophical aspects about determinism, causality, the possibility of prediction and change in the way that were previously conceived as situations given in relation to a static world and which, today, come into question by considering a dynamic world in permanent motion.

In a second moment, we have to consider a new notion of reality, going from conceiving it as something static to considering it in a process. This notion, According to Sassi (1972) includes time as an essential component, since it is a series of stages that follow one another, both in individual life and in social life and also in earthly life.

In a third step, we must strive to overcome the separation between knowledge and values, which entails the assumption of a new ethical principle that favors the recognition of values and principles as integral and valuable aspects of human cognition, even considering emotional and affective aspects.

As a consequence of this rethinking of education in the light of complex thought, an increasingly pressing ethical reflection is required on responsibility as a constitutive aspect closely linked to the production of scientific knowledge. It is not possible to advance science just by reaching a new level. A commitment is required that this progress be relevant and appropriate for resolving the most extreme problems facing

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humanity at the present time. In the words of Morin (2004), this is a universal ethic that binds all human beings in the defense and care of the only home we have.

Education from a complex perspective

To address this issue, it is important to note some changes that have occurred in recent years that, according to Gómez (2010), are a consequence of the progress of social processes and have a significant impact on educational processes. One of them is a modification in industrial production, the accumulation of which has caused the associated financial markets to become anarchic and more prone to chaos, which has led to the emergence of both mechanical and virtual productive forces, that were unthinkable before, such as telecommuting.

Globalization, another important effect of social change that the world is currently experiencing, also means that crises are no longer confined to one place or even to one enterprise. According to González (2009), the crises are planetary and what happens on one side of the world has unsuspected consequences in other spaces and, worst of all, is that they are not perceived as related, then:

> Today reality can only be understood as a multiplicity of relationships that make it up, and therefore, everything is interconnected and its separation is a fiction. There is a new relationship between the whole and the parts. The complex as an attribute, belongs to, is inherent to reality, and affirms that the systems of nature are not given in advance, nor immutable; so much so that it is recognized that the systems can vary completely if the initial conditions are changed even to a minimum degree (p. 27).

This gives rise to some important ideas for education, thinking about it from a complex perspective. The first of those ideas is that thought is dialectical and contextualized as stated by Barberousse (2008), hermeneutic from the reading of Joaqui and Ortiz (2015) and complex according to Morin (2005). Thought and its most important fruit: knowledge are in interdependence with the relationships that arise in the interaction between different elements: biological, social, cultural and even historical.

Therefore, the formative process is nuanced by this interaction, thanks to which knowledge emerges as a result of a complex and heterogeneous recursive process, in which diversity is the norm and the teacher

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is its facilitator in order to bring the student closer to the search for adequate information and to achieving better analysis and understanding.

Complex knowledge is then constructed in the teaching practice and the exchange that takes place there between its main actors; it requires a socio-historical, holistic and integrative approach as proposed by Gómez (2010), thus, it can be stated that:

> It is not possible to use categories from a world that no longer exists, because that would only express a dogmatic authoritarianism, a gap with practice. And it would be very serious if education, as a general process of human formation for social development, were to present today, a reality that does not exist, becoming a multiplier of alienation (p. 7).

Taking into account these social situations and the new paradigm of complexity, Gómez (2010) indicates that the teaching-learning process should include the following elements:

- The consideration of students, teachers, the classroom and the institution in which the process is carried out, as an autopoietic, dynamic and self-organized system as affirmed by Maturana (1995).
- The construction and possible reconstruction of each person, of the knowledge he builds during his formative process, of the world and of life in general, as a result of possible interrelations between different elements and not just as the small world of the educational institution as described by Rosas and Christian (2008).
- To contribute to the construction of a pertinent knowledge that discriminates what is possible from what is not and that becomes adequate to face the uncertainty in a sea full of possibilities as Morin (1999) maintains, *in which the options increased and, at the same time, increases the possible anxiety about feasible and appropriate choices for one's life and that of others.*
- In this new direction, accept that all cognitive process is valid, even if it has different characteristics and is accompanied by emotions and perceptions that determine subjective positions that must be considered in the process.

For this reason, it is important to consider what Gómez (2010) says about this topic:

> Neither the reality that is intended to be facilitated, through the educational process, nor the teaching-learning process, represent a causal, predictive dynamic, and consequently, disorders, uncertainty and chaos are integral to the process and that must be recognized. This does not

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> imply the recognition of an epistemological chaos, nor the impossibility of acting clearly in the world, nor, neither, a subjective construction of the world; on the contrary, it implies the consideration of a dialectical perspective, only that certain components such as contradictory relationships, their units, their linear and non-linear interconnections, their forward and backward steps had been eliminated (p. 8).

It can then be argued as does Gómez (2010), when he expresses that: "The educational process -in general- is dialectical and therefore, with a greater degree of emphasis on dynamics and relationships than on structures" (p. 25). However, an essential element, which becomes the center of activity, is the student who is part of a community in which he is pondered at an eco-social and contextual level in all its facets and aspects, some of them contradictory. In the same sense, education must be understood as a continuous process that entails the whole existence of the subject and that extends beyond the classroom and even from the institution to life itself.

In terms of Gifre and Esteban (2012), the aim is to integrate the ecosystem vision at all levels, from the micro-system formed by the student to the meso level constituted by the educational institution up to the macro level, linked to the formulation of public policies that are then operationalized at other levels. The integration of the different levels, will only be possible if education itself and the entities that carry it out manage to overcome the contradiction between a discourse that promotes constructivism and a practice that maintains structure and rigidity at other levels. Therefore, it is necessary to take into account what Habermas (2000) already manifested some time ago:

> Only under the communicative presuppositions of a universally expanded discourse in which all those affected could participate and in which, with their hypothetical attitude, could take a stand with arguments against claims of validity of rules and forms of action that have become problematic, is constituted the intersubjectivity of higher order which is that interlinking of the perspective of each with the perspectives of all others (p. 136).

It is a matter of taking a new path that allows the integration of the human being with the environment; in this challenge, education is a powerful tool to help people understand the complexity in which they are developing currently, and much more in the future. The aspects of multidimensionality, globality, contextuality and complexity acquire a new meaning and become essential to achieve fruitful synthesis that will

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facilitate a better adaptation of the human being to the context that is developing at this moment.

The complex and constructivist vision in practice exceeds the compartments proposed by the disciplines that, until recently, to some extent, were necessary to be able to assimilate the quantity and complexity of science. But now, they have become prisons that prevent the development of more holistic and inclusive thinking. As Escobar and Escobar (2016) argue, the perspective raised by the theory of complexity, applied to education, allows to give a new meaning to the disciplines, given that: "It establishes a need to produce those dialogues, links and articulations without which it is not possible to access a clear understanding of their purposes and developments. There is a clear motivation for introducing the notion of transdisciplinarity" (p. 90).

Thus, the teacher also has to be interested in the result of his construction of knowledge, which is not a personal, much less a thoughtless act. This is a true act of "social production" in the words of Escobar y Escobar (2016), in which education is linked to politics, science, technology, society and the world in which the professional future will have to work and exist.

And, as a social production, teachers must become aware of the "symbolic charge" -according to the previous author- existing behind the teaching practice since everything that is done in the classroom and outside it, when in contact with students, communicates something and refers, the various actors, to theoretical, conceptual, practical and even moral and ethical references. The teaching practice cannot be freed from this social burden associated with practice.

In the same sense, theory must be combined with practice and with the formation of each person as such. It is about reaching the heart of every human being and allowing it to resonate with him, so that he returns to the essential that is invisible to the eyes (Saint-Exupéry, 2009). It is not a question of ending dreams or hopes, but rather of returning to those conditions that are basic to human development: life, purpose, meaning, love, hope. As Frankl (1991) stated at the end of the last century, it is these elements that give meaning to life and make it have a purpose and not be lost in an existence centered on power and money, but empty of meaning. That is the reason why we need more humanity and less professionalism.

The ultimate goal of a complex education in the words of Escobar y Escobar (2016) should be: "To educate to understand the human condition, defend it, preserve it and maintain it as an inexhaustible source of

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life" (p. 93), a purpose also proposed by Edgar Morin (1999). This is the ultimate inspiration of every formative process and of all educators: to rethink and defend the most basic and simple condition of being human, without which the defense of the rest is unthinkable.

It is only when a human being forms another that the greatest principle of relational ethics is fulfilled in the pursuit of the growth and development of each human being in all his potentiality. Both in the aspect of a balance between giving and receiving, but also in consideration of the *ethos* in which the teaching practice takes place and which conveys meanings about that task itself, but also about the way of understanding other aspects of life itself.

This is why Escobar and Escobar (2016) refer to the *habitus*. It is a concept that, in teaching practice, describes the development and maintenance of the illusion that a unique and immediate understanding of the other is possible, which excludes any questioning of the conditions under which such a situation occurs and its possible future development.

Psychologists know very well the effects of this phenomenon and have called it "group thinking" as expressed by Janis (1987). It is a cognitive process that favors the reduction and construction of schemes to facilitate the understanding of the phenomenon and, thus, to reduce anguish in the face of complexity; However, the trap is in that it prevents openness to the various conditions of the process.

When the teacher is immersed in his *habitus* and there is no possibility of an external reflection or outlook on the *ethos* that develops in a certain a manner; then, a complex practice that allows a reflection on itself, in order to find the inherent relations between it and the conceptual schemes that sustain it becomes indispensable; A *sine qua non* condition for making the teaching task complex and requiring the consideration of the recursivity inherent in these two models and the need to question them in order to transform them.

Therefore, as De La Ossa (2009) puts it, "complexity must be addressed as a problem and not as a solution" (p. 34), because its *raison d'être* is to reveal the way in which the various phenomena are structured, shaped and proceeded. Therefore, in order to think and propose a complex education, despite what one might have in mind with regard to this subject, the teacher is not required to know everything; however, the teacher, as an important part of the educational process, requires to possess or, in its absence, to develop certain skills to promote complexity or a complex understanding of the phenomena in the students.

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Motta (2000) describes some of the characteristics that teachers must assume and learn in order to start having a complex teaching practice: the teacher must be well informed; it is not enough that he has some basic knowledge; he must have the capacity to contextualize knowledge and see the relationships between the different sciences. Only in this way can he build transversal knowledge that allows him to show the student the level of relationship existing between all things, between their being and the cosmos, between truth and error, between value and culture.

In addition, we must develop an education that enables the student to have relevant knowledge, as stated by Morin (2005), that allows him to better adapt to the world around him, meeting his basic needs in an appropriate manner, in order to be able to learn to solve different problems without continuing to do the same as before and, finally, to maintain viable relations with himself, with others and with the world that rolls him according to Motta (2000) and for this requires that:

> Knowledge must come out of the texts, they must become something living, changing, growing, developing. If we allow knowledge to be reduced to the sphere of data, we will be contributing to the anxiety and despair of those who cannot see a future, because they do not know how to create strategies that allow them to understand the inescapable uncertainty (p. 16).

This change is not only for the teacher; he is an essential part of the process and must be transformed in order to support it and raise it with his students. Similarly, there are other aspects that must also be modified in education to take on a complex practice:

- Education requires a modification of the management models to move from those that are pyramidal and centralized to a network operation; this implies increasing the process and reducing the structure. An interesting consequence of this is a decrease in the level of power of the one at the top, therefore it is one of the most complex aspects to achieve.
- Technology has undergone profound changes in recent years and has a great impact at all levels, both in terms of speed of processing and its involvement and participation in almost all areas of daily life and much more in education. However, information has become disconnected from its origin and its field of production, with free access to large amount of data, it is often unknown where they come from, making it increasingly impe-

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rative that people learn to distinguish between what is relevant and what is not, as Morin said (1999).

- The development of knowledge has been enhanced in recent years due to the Internet, making each person a part of a knowledge society that generates a series of fractures in existing relationships in various fields(industry and territory, source of production and labor, capital and production and, with it, market, education and production, culture and economy, society and financial system, power and management and many more).
- Increasing the anonymity of the subject in the virtual process and in society, in which it is submerged by production, propaganda, finance, science and technology, which generates a kind of loss of territory because it becomes a virtual territory.
- The production of profound transformations in the geopolitical field that align countries in the search for certain interests, sometimes hidden behind ideals.
- Emergence of new problems encompassing the entire earth. Climate change flies like a ghost over the entire globe and affects everything from the great droughts to the unparalleled tornadoes that cross the seas, destroying everything in their path. The human being still remains helpless in the face of these movements and is also affected by his perception of the planet on which he lives and his humanity itself, which becomes so temporary and fleeting.
- The development of a youth-centered culture. Images, music, shows promote younger and younger artists that favor the energy and life of that stage, often accompanied by little reflection on what happens and the desire to live to the fullest without measuring the consequences. This emergence brings the world closer to young people, but makes them more vulnerable to all situations of violence and so on, at all levels.

Challenges of educating from a complex perspective

Apart from thinking about the profound changes and modifications that education must undergo from a complex point of view, we must also consider some challenges for educating in complexity according to Motta (2000) and among which we can mention the following:

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- Understanding the complexity of the human condition, one of the most important features of which, apart from cognition and emotion, is language, which involves understanding human diversity in all its magnitude, for which there are no recipes. The only possible formula is the absence of recipes for working and educating people.
- Understand the systemic dynamics involved between the whole and the parts.
- To promote human development over technological development.
- To maintain hope, love and wisdom as the axes of education at all levels.
- To develop learning based on the complexity of the phenomena rather than their reduction to constants of cause and effect, since it becomes urgent, for teachers and students to be competent in order to face the complexity as articulated by Flores (2000). The human being is facing an increasingly dynamic world, which changes overnight, posing major challenges for teachers, students and educational institutions in making a harmonious synthesis between knowledge, truth and life.
- Development of multidisciplinary and interdisciplinary approaches as a means of comprehensively understanding phenomena.
- To develop a new philosophy of education, a complex philosophy that reflects on knowledge, the way to transmit it through the human being and the context in which these processes take place, which implies the development of relational ethics, as argued by Ortiz (2009), which concerns all human beings in the search for better days for present and future generations. The possible results of this bet (or of not making it), without doubt, are in the hands of each of the people who inhabit today, that little blue sphere called Earth.

Conclusions

Having argued the most interesting aspects of complexity and education from a complex perspective, there is only one conclusion: To accept the challenge that complexity proposes to develop new schemes that drive the evolution of every human being in all its potential and of the human species in its entirety. The whole and the part in synergistic conjunction to obtain fruitful transformations in favor of individual, family and social well-being.

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When education takes on a complex perspective, it must also reflect on the anthropological posture it upholds and defends. It is a question of rethinking the human being as a complex entity both in his individuality and in his social, educational and relational reality. This position can be presented as a general attitude of the philosophy of education, with the aim that the human being achieves his development in an integral way and not see him as if humans were beings that only consume; understanding us as total beings constituted not only by needs, but also of desire for transcendence and realization.

At the level of complexity, the teacher has to seek the integration of knowledge from an ethic that is not simply reduced to the subjective or that reaches a dogmatic position, because life is dynamic and, similarly, reality is. The ethical values that are becoming absolute today, tomorrow may no longer be so, so it is not possible to reduce everything to what the person wants, to his subjectivity; to do so would lead to ethical chaos and increase educational and social problems.

Hence the need to resignify education as a complex phenomenon and as an expression of consensus according to the thought of Habermas (2000); for example, consensus between the two realities at stake: the simple and the complex, the dogmatic and the subjective. This raises the question of how to achieve this, and several possibilities have been proposed at different levels throughout the text.

To this is added the possibility of a path that is constructed from an argumentation that uses dialogical philosophy and, more concretely, the relationship of I-you. This is fully in line with the approach of Habermas (2000) in reference to communicative reason; Both ways lead to an ethic manifesting itself from the desire for intersubjectivity; in this way, the ethics that is born from reason is not absolutized but rather opens up to new social circumstances and their phenomena.

If most educators came to understand the importance of teaching and learning from a complex perspective, they would consider such necessary fields as self-reflection, self-criticism, understanding of social phenomena, they would even come out of the constant and poisonous dose of teaching for teaching's sake. The problem that impedes the development of a complex perspective lies in the fact that educational institutions, like families, are frozen in a space of "comfort", in which the interest is to entertain and not to teach.

It is constantly observed that the responsibility to educate and train is reduced only to classrooms without considering the fundamental role of other actors linked to students such as their family, social networks and

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many other aspects. In this way, a complex education that stands out for being humane, in the first place, and also academic is not projected. The humane is not being considered in integral professional formation; which is the complexity of having the knowledge to teach and the desire to do so.

Therefore, the problem does not lie in the learner but in the motivator for the student to develop his potential; submerged in the multiple and enormous administrative demands, the educator no longer feels the desire to do research because he considers that everything is already done and said. This is the most trivial way of closing the door to the questions that students constantly ask: what I can research, how I can research and even why and what for do I do research. It is thought that this can only be answered by the educator, but it is false. The learner, as an agent of education, also participates in this process of knowledge.

In countries like Colombia and Ecuador, it is sad to experience the way the state itself turns educators into education administrators. The constant and stifling formats, the constant evaluations of ill-done measurement and the constant pressures from the war, take a lot of space away from what is expected in the field of education. This makes the education process really tedious. There are no relevant spaces to educate in life and in a complex manner: everything remains in a state of empty promises. The spaces of integral formation should be committed to the contextual reality of those who are being educated, as argued by Díaz y Camejo (2015):

> These consultative spaces should be made up of lay people, that is, men who are not familiar with scientific experience, who have to discuss and decide on issues such as what is being researched, how it is being researched and what it is being researched for. These spaces must control the course of the investigations, as well as decide what resources are allocated for them. On the one hand, the lay people will discuss the scientific research to be carried out, but also the consequences that this research has for society (p. 124).

If the educator succeeds in integrating into his or her experiential work what it means to educate from a complex perspective, the impact will not be simply social, but it will cross that boundary: it will be an integral human impact. It is not possible to educate in reason alone, one must also educate in the will to want to change in order to be and do better the small actions of daily living. The educator should not measure his impact by what he is capable of teaching and researching outside him but what he is capable of searching within himself, in his particular way of teaching, what he teaches and what he teaches it for.

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Reconfiguration of youth's religiosity in contemporary society and its relation to complex thought

Reconfiguración de la religiosidad del joven en la sociedad contemporánea y su relación con el pensamiento complejo

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Abstract

This research starts from the undoubted difficulty of analyzing in the young person of this time, the religious value for his participation in the liberal culture that the educational centers that bring him closer to scientific rationality provide him, through which he sees and analyzes the man, society and God. Secularization will be his method of contemplating and accepting religion, creating in it a youth culture that frees him in ways, imposed and authoritarian, discovering himself as the protagonist of his own religious culture. An ex post facto longitudinal research was carried out over five time periods. The objective was to describe the macrosociological factors involved in the dynamics and relationships between youth and religiosity. Using a quantitative approach, 167 subjects participated in a design of five equivalent groups based on the phenomenological experience of the Conference. It is concluded that the reconfiguration of religiosity proposed in this study; it takes the young person to a responsibility of himself in a massive and anonymous society. It commits you to being a transformer for the good of the youth themselves in a depressive society. He projects it into the future to achieve leadership in the destinies of the society in which he lives through becoming a complex thought of man-community-religion relations.

Keywords

Culture, rationality, secularization, religion, reconfiguration, thought.

Resumen

La presente investigación parte de la indudable dificultad de analizar en el joven de esta época, el valor religioso por su participación en la cultura liberal que le proporcionan los centros educativos que lo acercan a la racionalidad científica, a través de la cual ve y analiza al hombre, a la sociedad y a Dios. La secularización será su método para contemplar y aceptar la religión, crear en ello una cultura juvenil que lo libere de formas, impuestas y autoritarias, descubriéndose como protagonista de su propia cultura religiosa. Se realizó una investigación ex post facto de alcance longitudinal a través de cinco periodos de tiempo. El objetivo consistió en describir los factores macrosociológicos involucrados en la dinámica y las relaciones entre los jóvenes y la religiosidad. Con un enfoque cuantitativo, participaron 167 sujetos en un diseño de cinco grupos equivalentes por la experiencia fenomenológica de la Jornada. Se concluye que la reconfiguración de la religiosidad propuesta en este estudio; lleva al joven a una responsabilidad de sí mismo en una sociedad masificada y anónima. Lo compromete a ser transformador en bien de los mismos jóvenes en una sociedad depresiva. Lo proyecta hacia el futuro para alcanzar un liderazgo en los destinos de la sociedad en la que vive a través del devenir en un pensamiento complejo de las relaciones hombre-comunidad-religión.

Palabras clave

Cultura, racionalidad, secularización, religión, reconfiguración, pensamiento.

Introduction

In the context of modernity, postmodernity and hypermodernity, the schemes, paradigms and much of the cultural content have changed. The most sensitive factor and exposed to this dynamic are the young people for education in scientific rationality, for the freedom and responsibility with which they live from the early years of their youth. This has even led them to generate their own culture, from which they protest against esta-

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blished social forms and contracting their own; with them at the center. It is interesting to analyze the repercussions of the relationship between youth and religion in this age.

It is important to clarify that the coverage of a decade is time that measures the stability and maturity of a project in itself and in the consequences on the people who live it. *La Jornada* is a project born in the sixties, a time of cultural paradigm shifts, especially in the youth population. Profound and complex changes that have left behind projects that initially promised great achievements and permanence. The project of *The Days* is still legitimized in itself and in the witnesses, who have lived it despite the changes and the passage of time.

The Days in any time, region, socio-cultural condition, and even religious, seeks the development of the person supported by Christian values and those of youth cultures. The first level of the project; precisely is to work with the person. The dimensions of the project: affect marital status, the degree of professionalism, vocational definition, sexual identity, family ties, religious decision and commitment, as well as political participation in a democratic society. The specific objective of *The Days* is to prove that has form the young person, throughout the decades, without altering the project, despite cultural changes. This objective is considered to be the basis of the project *The Days* which gives it its specificity as an integral project in a society characterized by a high degree of personalization, responsibility and freedom. *The Days*, based on its long history, its experience, its culture (science), its service to the young man, its psychology, its vision of man and life, aims to respond to the objective, which is based on the complexity of the ecclesial, personal, social and family dimensions, in order to be able to describe them scientifically and to determine their relation with the experience of the project. In theory, *The Days* should have had an effect on one or more dimensions.

The Days Movement was born in contemporary society at the Second Vatican Council, an event that sought to place it at the heart of the modern world: in urban culture, in community-democratic politics, in the economy of justice social and in secularized religion. *The Days* are born with this challenge in the most significant human area of modernity: young people, university students and in equivalent age. They are an experiential proposal of integral youth evangelization (pastoral): personal-social-cultural-religious. Given the characteristics of youth thought, it can be said that at the heart of the world there is youth as the cell of contemporary culture in its applications. In order to preserve religiosity in young people, it is necessary to free them from customs, from autho-

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ritarian doctrinal and disciplinary impositions. This could only be achieved with the help of the scientists of religion and the scientists of personal development. Both factors are fundamental parts of youth cultures that, in religiosity, lead to a secularization of both religion and conscience. Because of the secularization proposed by scientists in modern society, both university and national youth give an interesting place to religion in their cultures, considering it a new and appropriate form through *The Days*. It is indisputable that the resources and discourse of social scientists represent a new element in modernity so that young people do not regard religion as a simple devotion, imposed custom or alienation and do not reject it all together. Dietz et al. (2011) in a study with young Spaniards on religion within schools with mechanisms such as religious subjects and acts, shows that these acts are not against progress and modernity; because they represent traditions of the society to which they belong. The position of young people does not come from society or from political or religious institutions, but from young people themselves, when they initiate their own cultural expressions and social practices that accredit them as protagonists of their history.

Luengo's research work (1993); has aroused and interest for the relationship of young people with religion in any aspect of it; especially in culture (university) and in education (pastoral). It can be said that, in investigating this youth phenomenon, religion was given a considerable place, and its work in contemporary society in the direction of the culture with which the youth identifies. The second reference document in the research work is that of Dr. Eduardo Sota García, researcher and teacher at the Universidad Iberoamericana, in Mexico, *Religión por la libre*. A study on the religiosity of young people. Sota (2010), 17 years after Dr. Luengo's work, takes up the same scheme with the same approach and the same recipients.

Urteaga (2004) states that these are drastic transformations in social and cultural conditions that made possible the emergence-existence of youth in modern Mexican society. It is accepted that youth is born as a subject, in the considerable changes of society and requires the construction of new frameworks of interpretation of the current complexity of youth; therefore, it can be said, that the youth phenomenon is constructed in history and only has meaning in the contexts of the society in which it interacts to define itself, especially over the last five decades. It is necessary to follow this approach: youth and socio-cultural contexts; where young people are actors in the culture that defines them as such.

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Max Weber (1976) is the sociologist of scientific rationality, of the values of culture and of the religious phenomenon in modernity. In a way, it is an obligatory reference in the sociology of religion, because of the sharpness and location of his proposals. Scientific rationality is the most important point in his analysis of the religious phenomenon. Weber (1976) considers that, because of this rationality, religion is placed in its proper place in the face of the autonomy of the laws of science, which enjoy their own methodology. By the application of scientific rationality, the religious phenomenon must be relocated in the forces and factors of the new secular and plural society, to compete for its place in the institutions of society itself. According to Weber (1976), the impact or consequences of this application to the religious phenomenon has been a disillusionment that inserts its followers into a process of desacralization and secularization. Magic is considered something that does not achieve explanatory legitimacy, in other words, what is not explained by scientific rationality.

Durkheim (1982) in the search for the objectivity of the religious phenomenon, starts from the social. No phenomenon could be explained outside of it. He does not question the supernatural origin of religion, but with his methodological capacity, he also demands its objectivity from the social, as the source of all knowledge and analysis of reality. In Durkheim (1982) religious representations have are collective, expressing collective realities. Rituals are ways of acting that arise only within groups that are brought together and are designed to create, maintain or remake certain mental situations in that group. But then, if the categories are of religious origin, they must therefore participate in the common nature of all religious facts, they must also be the product of collective thought.

For Durkheim (1982), there is a causal determinant relationship between society and religion, to affirm fundamentally that the latter is born of the most significant of society, which is the community. It is a bidirectional correspondence, the socio-cultural dynamics have an impact on the religious phenomenon, because if religion has engendered all that is essential in society, it is because the idea of society constitutes the soul of religion.

Marx's (2012) position on the religious phenomenon as against the capitalist system is more radical and totalizing. He does not anticipate the presence of religion in the future, but rather its total disappearance. This annihilation will take place as society frees the means of social production from private appropriation. Religion is the causal factor in this form of exploitation, so to give it space would be to accept that society would remain ill with institutional ties. From the philosophical point of view, religion is irrational because it is not explained by the paradigms

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of reason given its strange origin. According to Marx (2012) when the infrastructural part (economic laws) is free of dependencies, exploitations, alienations, fears, impotencies, enslavements, ideologies, the religious phenomenon (religion) will disappear, therefore; there is no point in secularization or cultural pluralism, which only find a new place for religion in modern society.

Youth is not a finished and homogeneous fact of yesterday, today and tomorrow, rather it is done and projected from the social reality. Applying the sociology of Berger (2006), the social construction of reality. Youth at first is a social construction, a product of the contexts of the present time. He accepts that cosmization has always been legitimized by the sacred, a place that it does not lose in modern society, but places the institutions of it within a cosmic and sacred frame of reference. However, placing himself in the line of Weber (1976), Durkheim (1982) and Marx (2012) scientists of religion, Berger (2006) also accepts a strong and resounding crisis in the legitimizing capacity of religion.

Luckmann (1973) like Peter Berger (2006), is one of the modern scientists of the religious phenomenon in contemporary society. He is recognized for his keen research; he forms his own direction and applies it to specific phenomena of his time. In his book *The Invisible Religion*, he recognizes the same thing as the aforementioned scientists: Contemporary society has undergone a change in, although supported by the approaches of the classics, its relationship with religion; it has become secularized, lives a cultural pluralism and relocates it in these contexts of the new epoch. In fact, the capacity to give meaning has manifested itself in different forms of social presence throughout history and is leading to new forms based on the facts of the emancipation of the various spheres of social and personal life and the resulting pluralism. The legitimacy of social phenomena now has a secularized and multiple institutional angle.

José María Mardones (1991) is a scientist of postmodern religion. In his work on the religious phenomenon in modern culture, which is certainly abundant, he touches on all the points that a secularized and plural society needs to be read in its interrelation with the religious phenomenon in this new epoch. With the passage of time the Puritan *ethos* was losing social relevance in the process of secularization, it is in a productive order that loses its legitimacy and is undermined in its foundations. For the same author, the key points from which this religious reality of postmodernity is analyzed are secularization and pluralism, and Western culture is fragmented into perspectives. For Mardones (1991), pluralism is one of the fundamental features of contemporary society. In its con-

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text, modernity is equivalent to a plurality of visions of reality, lifestyles, values and beliefs. Modernity breaks with this isolationism and cultural uniformity. The very process of modernity is the main cause of pluralism. The Christian religion will no longer be considered in the same way, nor will it perform the same functions it did in a culturally uniform society, in a pluralistic society. Mardones (1996) explains that the configuration of the religious takes the line of a personalization, addresses the convictions and responsibilities of the person, this reconfiguration of religion in modernity is a true reinterpretation of the thesis of secularization, in other words, it shows the form it currently takes, which is what seems to correspond to religion in the society of advanced modernity.

The times of the present epoch are hyper-modern, society is liberal and characterized by fluidity and flexibility, detached from the great principles of modernity such as: revolution, discipline, secularity, liberation, science, market, technology, organization, institutionalism, morality, commitment; which had to adapt to the hyper-modern step in order not to disappear. In relation to the religious phenomenon, while the scientists of modernity find it in the plural society due to secularization, Lipovetsky (2008) says:

> The return of the religious is not an appropriate expression because the phenomenon is presented essentially as post-traditional, rid of the heteronomic authority of an imposed tradition and based on the subjective commitment of individuals, with all that derives from it in terms of partial participation, bricolage of beliefs, conversations, neo-mysticism, sentimentalization of faith, of beliefs without integration or with the deinstitutionalization of religion the time has come for the individuation, dispersion, emotionalization of beliefs and practices (p.149).

After an extensive analysis of the causes and effects of the object of study, the following considerations are established as a research problem. In modern culture the religious phenomenon has entered into a dislocation of spaces and people, producing for itself a discomfort even in the most traditional areas where it had its most consistent support. Scientific rationality inaugurates modernity: a new epoch, that is, a change of epoch, which analyzes and interprets socio-cultural reality from its paradigms that influence even the religious, reevaluating its relationship with it. The theory of religion in modernity is called secularization, which in its soft tendency sees it as part of modern culture and not as an unquestionable and unchangeable force, but as historical and therefore analyzable by scientific methodology. Based in Sota (2015) in this new situation, religion (Church) has suffered a decline in participation, especially from young people for-

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med in secular modernity, accepting that the trends of contemporary secularization society, religious pluralism, are the same for young university and national students. It requires appropriate cultural and pastoral equipment, as well as agents who act with a proper mentality and location. The Days of Christian life with their levels and their testimonial participatory practice, are a project that the Church must adopt to occupy a place in the youth of contemporary society? Religion is in need of a dialogue with modernity via secularization, in order to resize itself in the culture of scientific rationality and thus to have rapprochement with youth.

If the Church's religion is interested in occupying a historical-personal-cultural-social-religious space in the youth of the secularized and plural society, it needs to be projected with the proposals and practices of the Youth Days of Christian Life. In this work, young people as subjects of their history, autonomous in their expressions, creators of their own forms, are a significant factor in their objectives and results. The analysis of a cultural phenomenon such as the reformulation of youth religiosity in contemporary society; cannot be carried out without an application of the logic of reason applied to science, to generate from there a method that guides the investigation to reliable results. Following the approach of Durkheim (1982) who asked that the research sociologist should be free of pre-knowledge, phantoms of representation, ideologies, preconceived conceptions; this research has the appropriate methodological rigor to free it from all this.

This is why the above is a frank representation of complex thought. Castrillón (2014) establishes a complex thought of the relationship between man-god and man-community, a thought that has bases in Kant and Hegel; and that also integrates the context by analyzing Hölderlin (1770-1884) on religion where man has basic needs, but one of the highest needs is the relationship with the religious implications. These implications are those that are translated into dimensions for this research, because they touch the everyday, that is, the ecclesial, personal, social and family.

This complex thought based on the mentioned philosophers, is based on reason, which in this study will be called rationality and which in the analysis is detailed as a condition of the historic time; and makes the research proposal consistent over many time periods. It has an impact on community participation, which is explicit and fundamental for the Days held. This is closely related to Morin's (1990) idea, where it is emphasized that, to be, it is necessary to learn a culture. The human being *per se* is complex, its dimensions do not exist independently, this makes valid the relationship of the reconfiguration of religiosity as a category that inte-

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grates four dimensions (ecclesial, personal, social and family) and which in turn makes young people's thinking more complex. At this point it is necessary to clarify the understanding of the reconfiguration, as the product of the incidence of the Days in the very life of young people, of their thoughts and of their actions *a posteriori*.

This research seeks corroborative answers over a long period of time and numerous generations in different sociocultural contexts, calls for an adequate conceptual resource, a research instrument or design, hypotheses to be tested, independent and dependent variables, indicators to be applied in the dimensions of the research project.

The theory gives a vision of reality, the hypotheses take advantage of part of it, to concretize in a certain aspect this reality, the variables operationalize the points to be investigated, the indicators shall organize the dimensions which, in an applied and practical way, define the phenomenon of application. All these elements form the methodology; therefore, it is not only necessary but also integral and applicable. The most important finding of this research is that it somehow brings together elements that seemed or had been irreconcilable.

- University youth with modern thinking, with religion
- The scientific rationality of modern society, with religion expressed by secularization in its soft form.
- The possibility and capacity of the Day to reconfigure the religiosity of youth in contemporary society.
- The help of the scientists of religion (Marx, Durkheim, Weber) so that the young people of contemporary society accepted the de-institutionalized, desacralized, and de-ecclesialized religion, to reach the secularization of even the youth consciousness of these modern times.

It is convenient to investigate the historical expressions of the church and the youth in the epoch of modernity, otherwise the social, cultural and religious phenomena will not be fully explained. Any research process must give society new knowledge in its recent phenomenology or aspect that claims an explanation of this level, so a recent phenomenon of this society is youth (young people) as a social substance, with their own profile (specific), with a transformative project based on the scientific rationality of modernity. They cease to be a simple physical force or a shock, as well as ideological plunder of political control and become, in this change of times, cultural and religious agents because they have the most secularized mind and consciousness.

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Young people, however, the complexity and heterogeneity of this modern society, are not a tangential or marginal subject of it, but a significant, dynamic and relevant subject that in all their expressions requires serious and current explanations, especially for this work in its relationship with the religious, in this secularized and plural society, but with a view towards the development of complex thought in the face of the complexity of the context.

If the Church establishes a dialogue with the secularized consciousness of youth, in contemporary society, it cooperates so that political parties, social institutions, economic institutions, do not ideologize, alienate, manipulate and massify youth. If society educates youth in the ethics of values: dignity, responsibility, sociability, participation, respect, civility, it cooperates so that the religious phenomenon is chosen by youth as a vocation and not received as a custom, imposition or simple doctrine. If society in the education of youth offers an adequate position in secularization and pluralism, a functional respect and a balanced application of the secular state, it helps the Church to do the same and thus avoid rejection and resentment of youth. For all this, the social benefit of research helps in co-creating social health through one of the strongest and most significant factors of modernity. Investigating the phenomenon of youth in their identity and their socio-religious, socio-cultural and socio-political behaviors will impact the educational and pastoral systems for a new projection in this modern society that has broken patterns, traditional models, customs and institutions in relation to young people.

Materials and methods

In carrying out scientific research, the sociological method involves defining the general objective of research as an epistemic objective that denotes the depth of the study. The present research is of a descriptive nature; therefore, the guiding objective remains as follows: To describe the macro-sociological factors involved in the dynamics and relations between the young and religiosity, through a longitudinal study of the experience within the Movement of Days. In particular, we seek to determine the relationship of young people to secularization in modern society, accepting that they are closer to scientific rationality and, on the other hand, whether this has separated them from Church religion.

Certainly, the social phenomena that belong to the complexity of reality subjected to the contexts of history that are changing and

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changeable, do not enjoy the stability of the phenomena of the natural sciences that are analyzed with the rigor and accuracy of scientific positivism. However, they have their specific objectivity that allows them to be investigated with their own laws and methodology. The objectivity of social phenomena is built on participation, interrelationship, interaction, community action, from which organizations, institutions, groups, social phenomena (social facts) emerge which in a complex society require research. Given the conditions, this research is of a basic type because it seeks to provide knowledge of the social phenomenon.

The method covers the direction of reasoning and the actions to be carried out in the previously determined path. Etymologically, the method' means the effort to reach an end, the path of research; it is the way to approach reality, the way to study the phenomena of nature and society. As Vélez (2014) states, it is important to leave the reductionist vision of the methodology as a simple set of methods, since the method stands with a global character of the activities to be carried out in the research process.

The quantitative methodology according to Tamayo (2007), consists in the contrast of existing theories from a series of hypotheses arising from it, being necessary to obtain a sample, either randomly or discriminated, but representative of a population or phenomenon under study. Rodríguez Peñuelas (2010) points out that the quantitative method focuses on the facts or causes of the social phenomenon, with little interest for the subjective states of the individual.

The typology of our research, due to its breath, can be described as macro-sociological. Because of its depth it is a descriptive research because it presents the reality as it was appropriated by the instrument and analyses the fundamentals of the problem. As a special study we present an expost-facto research, structured design of equivalent groups, which correspond to five periods in the time of application of the Days for 50 years. The above makes it an investigation by temporal scope, of longitudinal type. A stratified sampling from 10-year periods was used, starting in 1969, where, for each period, a random sample was used, given the macrosociology of the subjects, considering the time and geographic space of the Days, which included participants of Mexican, Cuban and American nationalities. The number of subjects participating per period or equivalent group was as follows: Period 1 with 26, period 2 with 34, period 3 with 26, period 4 with 31 and period 5 with 30. Therefore, the overall sample size was 167 participants in the research as key informants.

The working hypothesis was selected as a relation between the variables, where it was stablished that the Youth Days had an impact on the

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dimensions of youth. The detected variables were operationalized through four indicators, namely: existence, relevance, strength and impact. The dimensions considered in the specific were: personal dimension, family dimension, social dimension and ecclesial dimension. This provided as a product, an instrument with 59 measuring items considered as ordinal variables. The nominal variables needed to reinforce the measurements were age, sex, year of the Day, current family role and current work role.

The validity of the instrument and, therefore, of the research was focused on the type of validity of content issued by a group of doctors and post-doctors in Education Sciences. The construct validity was based on the choice of dimensions and the operationalization with indicators. As for the reliability of the research, the Cronbach Alpha coefficient was used for each test stratum, for which the following results were obtained: Period 1, alpha equals 0.95, period 2, alpha equals 0.967, period 3, alpha equals 0.978, period 4, alpha equals 0.971, period 5, alpha equals 0.821. It is confirmed with the alpha values, that the research has reliability criteria, since the range of this factor must be between 0.7 and 1.0 to guarantee the scientificity of the study.

Results

Consistently with the approach of the five equivalent groups, which are subdivided into the time periods described below in nominal form. The first group consists of a sample of participants from 1969 to 1979. The current average age is 57 years, 50% female and 50% male. The current family role of 100 % is that of parents, with a work role of 85 % for professionals and 15 % for various jobs. The second group represents the participants between 1980 and 1989. The current average age is 52 years, 50% female and 50% male. The current family role of 100% is of parents. In terms of the work role, 62% are professionals, 12% employees and 26% merchants. The third group is integrated by participants in the period 1990-1999. The current average age is 43 years. The sex is distributed in 60% female and 40% male. 100% have family roles of parents. The labor role changes significantly to 80% employed, 10% unemployed and 10% professionals. The fourth group consists of participants from 2000 to 2009. The current average age is 33 years. The sex of the participants is 65% female and 35% male. The family role also changes dramatically to 10% parents and 90% living with their parents. With regard to employment, 12 % were professionals, 85 % were employed in various jobs and 3% were unemployed.

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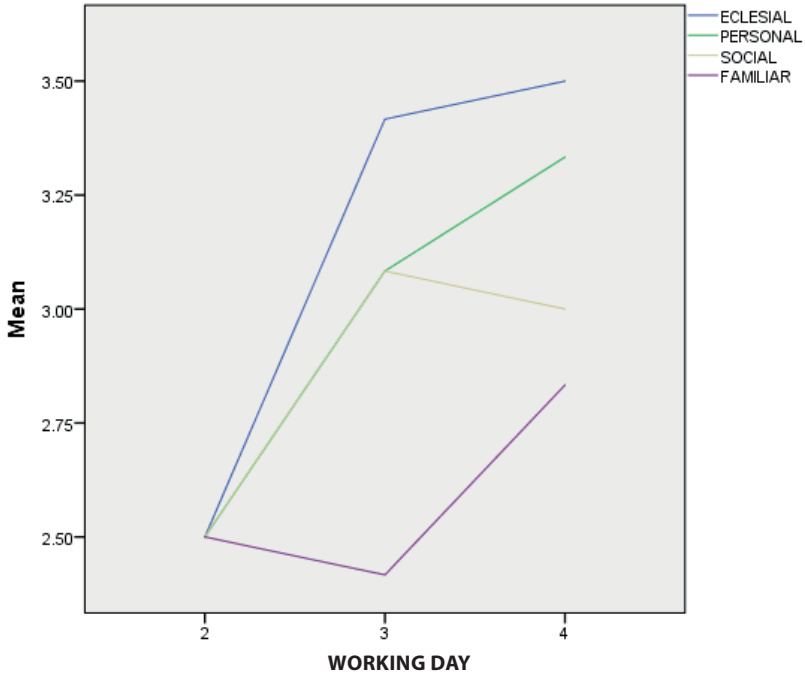
In the fifth group corresponding to the period from 2010 to 2019, participants have an average age of 22 years; 55% of the female sex and 45% of the male sex. 5% are parents and 95% live with their parents. The work role shows that 52% are employed and 48% are unemployed.

The dimensions were ordinally analyzed based on the Likert scale, according to the equivalence: 4=Too much, 3=Much, 2=not much and 1=Nothing. The statistical software package for analysis in the social sciences was used for processing.

Figure 1
Reconfiguration Day 1969-1979



Source: Own elaboration

The general analysis of the Reconfiguration Day 1969-1979 of Figure 1 shows the impact of the Day with the greatest tendency towards the ecclesial dimension. The statistical averages of the dimensions were distributed as follows: ecclesial 3.38, personal 3.15, social 3.0 and family 2.62. Inferentially, the Pearson r test was applied with significance from 0.05 to two sizes; for this period, a positive correlation of 0.524 was found

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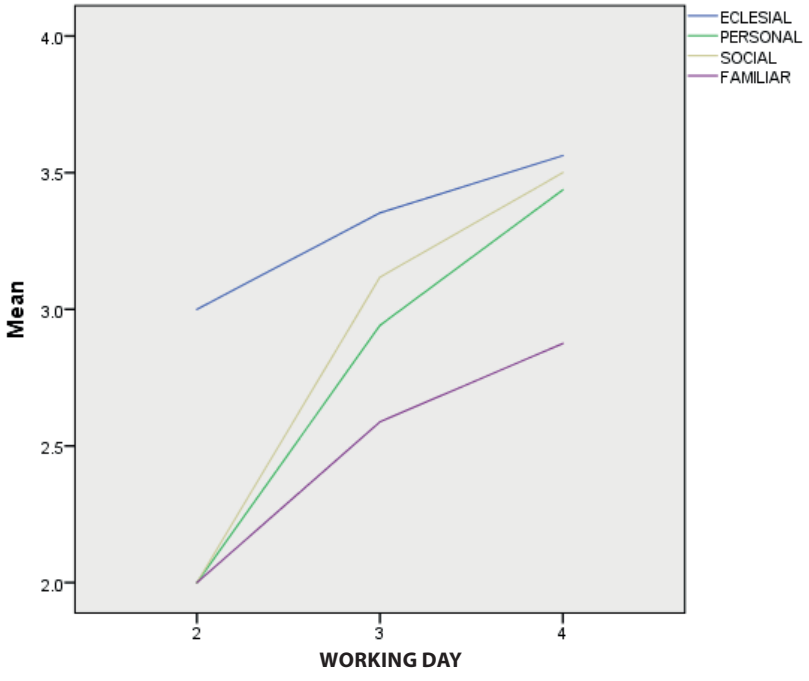
between the social dimension and the personal dimension. These results are consistent given the youth movements of the decade under study.

Figure 2
Reconfiguration Day 1980-1989



Source: Own elaboration

As for the general analysis of the Reconfiguration Day 1980-1989 of Figure 2 shows the impact of the day with the greatest tendency, again, is towards the ecclesial dimension. The statistical averages of the dimensions were distributed as follows: ecclesial 3.44, personal 3.15, social 3.26 and family 2.71. Inferentially, the Pearson test was applied with significance of 0.05 to two sizes; where, for this period, a higher positive correlation of 0.625 was found between the ecclesial dimension and the personal dimension. Followed by 0.561 between the base variable that is the Day and the personal dimension. Also outstanding is the correlation value of 0.517 between the ecclesial and family dimensions, 0.473 personal and family, 0.466 social and family. These results are indicative of the fact that in this period the dimensions pointed towards the family environment.

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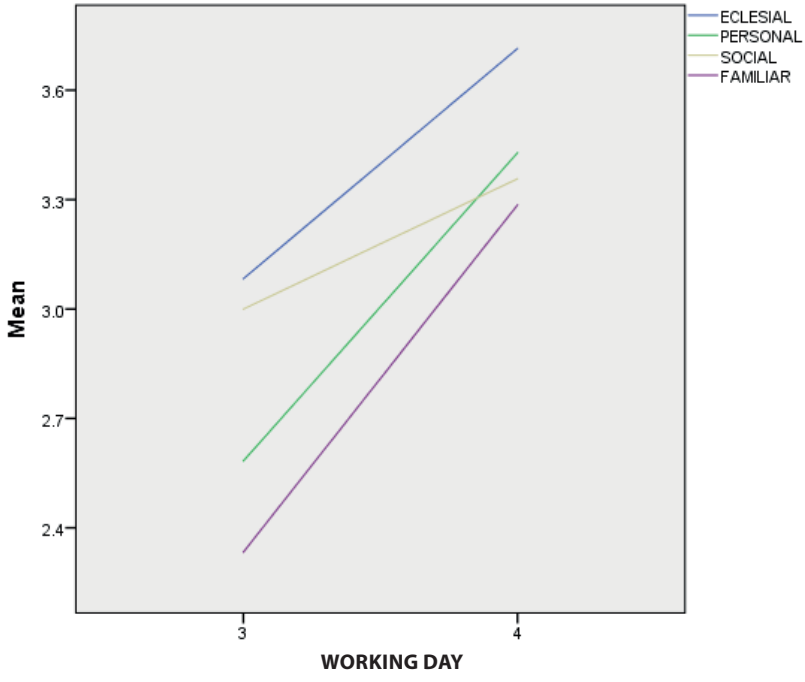
Figure 3
Reconfiguration Day 1990-1999



Source: Own elaboration

With respect to the general analysis of the Reconfiguration Day 1990-1999 of Figure 3 again shows that the impact of the day with the greatest tendency is the ecclesial dimension. The statistical averages of the dimensions were distributed as follows: ecclesial 3.42, personal 3.04, social 3.19 and family 2.85. Inferentially, the Pearson test was applied with significance of 0.05 to two sizes; where, for this period, a high positive correlation of 0.720 was found between the ecclesial dimension and the personal dimension. The day gained importance with 0.550 regarding the family dimension and 0.469 with the personal dimension. Greater impact of the ecclesial dimension on the family dimension with 0.497. The above emanates from a period of interesting reconfigurations in view of what represented the beginning of the century.

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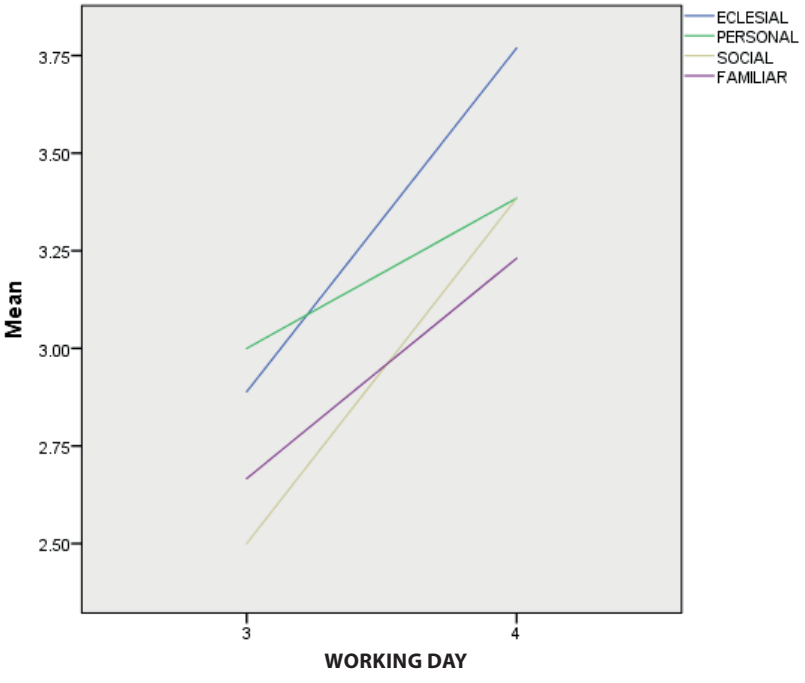
Figure 4
Reconfiguration Day 2000-2009



Source: Own elaboration

According to the general analysis of the Reconfiguration Day 2000-2009 in Figure 4, the impact of the day with the greatest tendency was reaffirmed towards the ecclesial dimension. The statistical averages of the dimensions were distributed as follows: ecclesial 3.26, personal 3.16, social 2.87 and family 2.90. Inferentially, the Pearson test was applied with significance of 0.05 to two sizes; where, for this period was found positive correlation of the day's relation with 0.581 to the social dimension and 0.571 to the ecclesial dimension. Followed by 0.454 between the ecclesial dimension and the personal and social dimensions in the same value. The family dimension reduces its coefficients with the other dimensions compared to the previous period.

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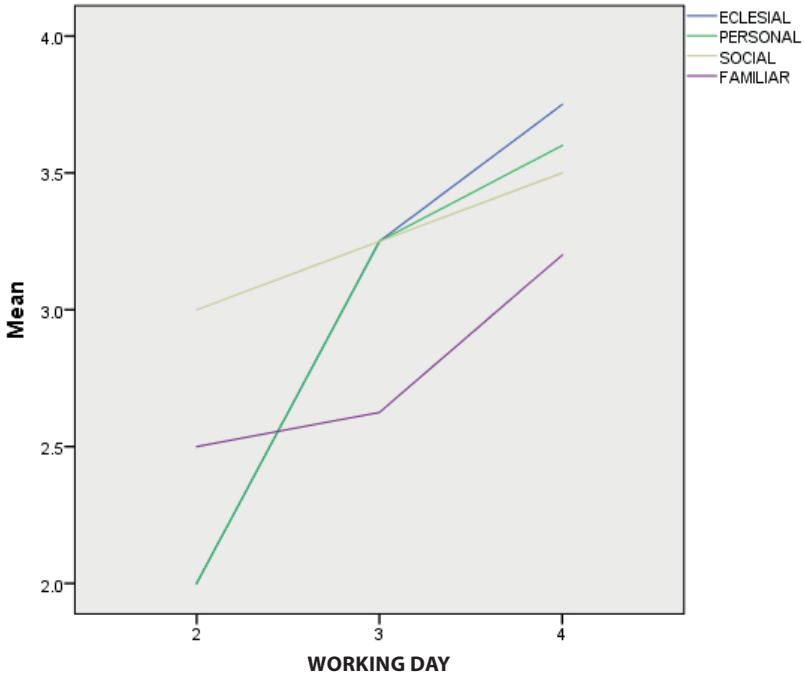
Figure 5
Reconfiguration Day 2010-2019



Source: Own elaboration

Finally, the general analysis of the Reconfiguration Day 2010-2019 of Figure 5 reaffirms, as in previous periods, the greatest tendency towards the ecclesial dimension. The statistical averages of the dimensions were distributed as follows: ecclesial 3.50, personal 3.40, social 3.40 and family 3.0. These results, contrary to what the most recent social dynamics represent, are maintained or increased compared to the previous averages. Inferentially, the Pearson test was applied with significance of 0.05 to two sizes; where, for this period, a high positive correlation of 0.705 was found between the variable day and the ecclesial dimension; this vindicates and reinforces the religiosity aspect The day gained importance when it obtained 0.521 regarding the personal dimension, in the same way, the ecclesial dimension influences the personal dimension with 0.529. There is a correlation of the personal dimension on the social dimension with 0.497. These results show that the Days are still a valid proposal among the young people of this period.

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Discussion

As can be seen from the results, there are many aspects that shape the discussion. The period of change, between the sixties and seventies, marked the great socio-cultural, socio-political and socio-religious changes. From this time none of these lines will retain the same direction because both the subjects and their projects have been deeply questioned, to such a degree that these changes are already part of their projection and identity. Only when this happens can it be accepted that there has been a real change. The day does not have to question their project and identity because it was born at this time as a proposal in its genre. It is part of the socio-cultural-religious line that is presented as a hope in the integral formation of the young people of this decade.

Religion was not left out of this paradigm shift, and its effort and interest were an example to the institutional world. The paradigm was no longer directed towards the hierarchy, but towards the people. Without methodology, it ceased to be deductive in order to start from the reality of the man who sought God from everyday life. He freed himself from theology in order to address the culture that, in contact with it, fostered secularization as the presence of religion in modernity. This opening opened up possibilities for young people to relate to religion which, by changing its paradigmatic direction, made it less moralizing, institutional and authoritarian, made it humble and accepted that culture was not ethnocentric but plural. Young people also occupied a place with their cultures in this new era.

However, not all the forces that form it advanced in this paradigm. The encounter with modern culture frightened them, confused them and displaced them in these new contexts. Even on the various events of this fifty-year trajectory, it can be seen that a strategy such as the Youth Days, demonstrate their impact on the dimensions that make thought complex, the ecclesial, the personal, the social and the family. The results place a greater relationship between the ecclesial and personal, although the importance of the familiar is not diluted.

The impact of the Day on society equips the young person to live his social life in ethics, justice, co-responsibility, participation and leadership in order to serve his society. The impact of the Day on the Church helps the young person to place his person in the religious experience and thus to have a more personal, free and responsible relationship without denying himself. It is a suitable medium for the religiosity of the young person to manifest in the hyper-modern society.

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The most significant contributions of researchers of youth cultures are as follows: First, a position of protest against established and imposed adult socio-cultural forms. Secondly, the young person must be the protagonist of his own culture, thus begins the youth's agency on it. The young person must be a student (thinker). He must be transformative (innovative). With a sense of justice. In relation to the people (common good). Leaders who in the future will direct the destinies of society with a sense of service. All this framework as a reflection of a complex thought.

With the support of these approaches and the research, the Day as a project is youth culture, leading the young person to have responsibility for himself in a massively anonymous society. It commits him to being a transformative agent for the benefit of the young people themselves in a depressed society. It awakens a sense of community based on family. It projects him to the future to achieve leadership in the destinies of the society in which he lives.

The results are convincing when establishing the relationship of the Day with some of the dimensions measured in the different periods of time. The ecclesial dimension is unquestionably the most impacted, the purpose of religiosity is achieved in young people without neglecting the personal, social and family dimensions, in that order of ideas, they are significantly present in the results; understanding that the youth's complexity itself can be encompassing of these dimensions regardless of the distractors and movements of modern life.

Youth cultures are an indispensable chapter in the youth analysis of this time, where young people are not only a social force but also a cultural and religious one. It was obligatory in a multicultural and multidirectional society that young people established and worked their own profile as subjects of themselves. Otherwise, they would not be young and would be at the mercy of the movements of the society that defined them as passive or minors. In earlier days, there was talk of young people, but not of youth culture, of students, of artists, of athletes, of children, of the baptized, but not of agents of themselves.

The identity of the young man is manifested in his proposals, in his protests, in his languages, and in his cultural expressions and social practices. While this was not done, society considered young people according to their needs and political and economic circumstances. The breakdown of adult cultural forms has been a youthful conquest in a society of continuous and complex changes that demands an identity to live in. In this process of youth cultures, there were pronouncements that did not reach this identity because they were not based on them or were

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satisfied with a weak relationship with them. The Days Movement has occupied an important place in the youth of these modern times. That place is located in the personhood of the young person, in the family, in religion, economically, socially, politically, through a timespan of fifty years. Analyzing the history of young people in Mexico and that of the Days movement, it is proposed as the appropriate instrument for the comprehensive education of young people in contemporary society, the most problematic issues for modern youth has been that of religion, especially regarding morality and, within it, sexuality. No youth movement of those recorded in history has considered it an important part of their cultural expressions and social practices.

In young people, this distance from religion was not due to the liberalism that in Mexico took an anticlerical direction, but to the closeness of scientific rationality that, as already mentioned, led to secularization, there were routes and youth scenarios, but they didn't work on this relationship: youth-religion in contemporary society. Neither did the Church, perhaps due to prejudice against scientific rationality, laicism, and secularization. From the research carried out, it is concluded that the Days are proposal that, without denying scientific rationality and the secularization of consciousness, achieves an acceptance of religion. In its project, it creates a Church capable of dialoguing with the young person without denying his personal meaning. A Church capable of dialogue with science, recognizing its autonomy, with the ethics and morals of the young, recognizing its responsibility towards youth cultures without ignoring its protests against forms made of traditional religion.

Conclusions

This research concludes that the Youth Days Movement that was born precisely at this time of changes at a distance of more than fifty years, continues to be present, however, the phenomena of secularization, cultural pluralism, inculturation, institutional weakening, religious disenchantment with the scientific rationality, moral tolerance in sexuality that tends towards ungovernability and sometimes debauchery.

If the Church did not fully advance with the paradigm of the Second Vatican Council, the Days with its project, its Church, its culture, its family, its sociality, to remain present in the contexts of modern society. If the religion (Church) wishes to be present in modern culture, in which

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young people are protagonists of scientific rationality, the Days are an appropriate instrument for this.

The Church recognizes that the sciences, especially the human and social sciences, also have their vision of religion. Furthermore, they help it to legitimize itself before the men of this time. This scientific thought will be contributed to the religious phenomenon by Max Weber, Durkheim, Karl Marx. P. Berger, Luckmann, José María Mardones, and Lipovetsky. Far from being a disadvantage or delegitimization, they helped religion to resize itself due to the secularization of modern society. In religious analyzes or studies, the reference to this resource is almost nil due to the lack of knowledge or prejudice about it.

All of them agree that religion is necessary for society because it is a generator of culture in a very important aspect of it, which makes it irreplaceable. By the contributions especially of Weber, Durkheim, Berger, Luckmann, Mardones, and Lipovetsky, religion keeps legitimacy in modern society due to the secularization that gives it presence in the new generations. It can be said that secularization is the result of the scientists of religion in modern times, especially Weber for scientific rationality, Durkheim for the objectivity of the social, Marx for the laws of historical materialism, Luckmann for the value of the conscience and determination of the individual, P. Berger for the construction of social objectivity, Mardones for the de-institutionalization and de-ecclesialization.

The research concludes that young people are helped more by scientists of religion than by theologians of institutions because they are closer to scientific rationality. It is recognized that, due to secularization, some Church groups and movements did not resist scientific rationality in religion and were unable to live it in modern times. Still, other groups were even more troubled and, instead, started going backwards to an older status.

Certainly, not all the approaches of the aforementioned scientists are applicable to the project of the Days, because in some way they were also from their time and therefore have their ideology. However; they are related regarding the importance of religion and in the secularization of it, to continue living in contemporary society. The Days on the first level of the project defines the human person with the values of youth culture: protest, proposal, change, the liberation from established and adult structures.

At the Christian level, the youth is guided more by the scientists of religion to free themselves from traditional thought and thus live their project of secularization in contemporary culture. For youth cultures and scientists of religion, it remains a valid instrument for the religiosity of the young in modernity, as it is proven by the research carried out. At

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the ecclesial level, both scientific rationalities, the construction of social reality, the laws of history, especially deinstitutionalization and de-ecclesialization, allows the youth to create another type of Church to preserve their project in these hyper-modern times and to continue this, so far proven, proposal.

Another theoretical-methodological resource of this research is the contribution of social scientists from youth culture to support the Days from science applied to young people of our time. The Days to remain as a formative process for the youth of this time requires scientific knowledge of reality, which had not previously been developed and much less applied in the pastoral work of the new generations.

The Days, if it is not the only one, it is one of the most appropriate instruments for the religiosity of young people in contemporary society that is defined by secularization, cultural pluralism, social diversity, and globalization. The vast majority of young people who usually attend the Day, usually do so without any relation to the Church that baptized them, took them to their first communion, and even confirmed them.

Undoubtedly, contact with scientific rationality as part of the educational system, the environment of secularization that is increasingly taking place, especially at the youth level, tolerance of modern behavior, the loss of religious strength in the family, have caused young people to distance themselves from the Church. From the research carried out in the five decades of the Days, it is concluded that this is an appropriate instrument to relate the youth to the Church and the latter to the youth.

The instrument of the Days is a comprehensive project like no other youth pronouncement has had, precisely what forms its specificity and identity. It is not only a social protest for the youth to free themselves from the masses, a political protest to take part in the administration of the common good, a cultural protest to be the agents of their destinies, a protest to the unjust distribution of social opportunities for youth realization. The Day starts from the person as a connecting and integrating thread of all its fundamental dimensions that make it unique in the axiological formation of the young person. It accepts in the phenomenon of culture the autonomy of the temporal sciences such as psychology, anthropology, the social sciences, history, mathematics with such a disposition that it considers them as an aid to better understand the man of urban culture. It awakens a sense of community based on family. It is in these aspects that the reconfiguration of common thinking into complex thinking is required, which dimensions and resizes the young person in terms of the ecclesial, personal, social, and family aspects.

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Cultural and social phenomena are not one-way but multi-directional due to the complexity of reality that requires interdisciplinarity and integration for their analysis and understanding. The religious education of the youth before the Days had been in one line, that of indoctrination, without taking into account the person, the family, society and even the Church as a community of life. It was verified in the generations of the studied decades, that the impact on the person of the young person helps him to be responsible in his studies, at work, in the family, in society, and in the Church.

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The high school student movement in Chile an approach from complexity

El movimiento estudiantil secundario en Chile abordado desde la complejidad

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Abstract

This article aims to analyze the high school student movement in Chile from a transdisciplinary approach, as a complex phenomenon insufficiently investigated and reflected on by the social sciences and humanities. The general problem in which this objective is inscribed is that of the crisis in the institutions of liberal democracy, and more specifically, that of the relations between the concepts of citizenship and complexity, for the interpretation of the high school student movement. Starting from the distinction between that citizen participation that takes shape under institutionalized forms of delegation of power in a political elite; and a participative, critical and transforming citizenship, which promotes and is carried out in forms of egalitarian association and political organization, in the exercise of sovereignty as praxis committed to the construction of the public and the common good. The information has been analyzed using hermeneutic-comprehensive methods typical of the social sciences and humanities, the foundations of which dialogue with the tradition of complex thought, converging in the critique of positivist reductionism of knowledge. It concludes by establishing the existence of a trend or transition within the high school student movement, which goes from forms of association and organization typical of the liberal model, which delegates the sovereignty of citizenship to elected representatives, towards the preeminence of another current, Counter-hegemonic in character: a democratic model of direct and equal participation in community self-government.

Keywords

Complex thinking, high school student movement, republican democratic tradition, education, citizenship, neoliberalism.

Resumen

Este artículo tiene por objetivo analizar el movimiento estudiantil secundario de Chile desde un abordaje transdisciplinar, como fenómeno complejo insuficientemente investigado y reflexionado por parte de las ciencias sociales y las humanidades. El problema general en el que se inscribe este objetivo es el de la crisis de las instituciones de la democracia liberal, y más específicamente, el de las relaciones entre los conceptos de ciudadanía y complejidad, para la interpretación del movimiento estudiantil secundario. Partiendo de la distinción entre aquella participación ciudadana que se concreta bajo formas institucionalizadas de delegación del poder en una elite política; y una ciudadanía participativa, crítica y transformadora, que promueve y se realiza en formas de asociación y organización política igualitarias, en el ejercicio de una soberanía como praxis comprometida con la construcción de lo público y del bien común. La información ha sido analizada recurriendo a métodos hermenéutico-comprensivos propios de las ciencias sociales y las humanidades, cuyos fundamentos dialogan con la tradición del pensamiento complejo, convergiendo en la crítica al reduccionismo positivista del conocimiento. Se concluye estableciendo la existencia de una tendencia o transición al interior del movimiento estudiantil secundario, que va desde formas de asociatividad y organizaciones propias del modelo liberal, que delega la soberanía de la ciudadanía en representantes electos o electas, hacia la preeminencia de otra corriente, de carácter contra hegemónico: un modelo democrático de participación directa e igualitaria en el autogobierno comunitario.

Palabras clave

Pensamiento complejo, movimiento estudiantil secundario, tradición republicana democrática, educación, ciudadanía, neoliberalismo.

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Introduction

Hope now lies in South America. The hope lies in a thought from the South that integrates the positive contributions of the North, but rejects the hegemony of the calculation, of the quantifiable, of a vision of the world in which mechanization and profit dominate

(Edgar Morin).

We live in times when, following Castells (2017), the liberal democratic institutionality is no longer able to channel the conflicts caused by the expansion of the ideology of equality in dignity and rights of human beings, and the survival of privileges, subordinations and exclusions of different order, inherited or engendered by contemporary societies.

The social movements that have emerged throughout the planet during the twenty-first century are the protagonists of a convulsive political scene of a humanity that, subsumed by the logic of the permanent increase in the rate of profit of capital, sees the ecological limits of an increasing production and consumption of goods, which today threatens our own well-being and survival.

We believe that the concept of citizenship, in Chilean reality, makes it possible to formulate a critique of the existing neoliberal democracy, based on concrete historical experiences of its exercise, such as that of the high school student movement itself. This approach means looking into the episteme that underlies the movement during its historical appearances, diving into its discursive depths, following the inner currents that traverse it and the waves that provoke when they emerge to the surface. An issue that reconfigures complex relationships, as well as multiple interactions between the student movement and other social and institutional actors.

Complementing the argument put forward by Rodríguez, Betancourt and Varas (2018), regarding the process of re-politicizing the student issue, aimed at the democratization of society and the re-evaluation of education as a human right, we situate this work. We will now argue that the Chilean high school student movement transits from forms of association and organization typical of the liberal model, which delegates popular sovereignty to representatives via elections, towards the preeminence of a democratic republican model based on direct and equal participation in community self-government.

Given the high complexity of this conflictive process for the construction of socio-political projects alternative to neoliberalism, this work

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aims to analyze the Chilean high school student movement from a transdisciplinary perspective, through the analysis of relevant documentary and bibliographical sources. This analysis points to the reconceptualization of this movement as a complex phenomenon, which has not been sufficiently reflected on by the social and human sciences. At the same time, we consider that this work has significant critical potential for the formation of a new political institutionality in Chile, capable of guaranteeing the right to participation of civil society in the construction of the public and the common good.

The socio-political relevance that the high school student movement in Chile has acquired in this century is becoming increasingly evident. It has been society, before the academy, that has recognized its role as the driving force behind different popular demonstrations, including the recent popular uprising of October 2019. Today, in circumstances in which the people of Chile have opened the possibility of an unprecedented constituent process, it becomes vital to know the episteme that structures the knowledge of the high school student movement and its potential contribution.

The analysis begins by establishing the theoretical-methodological distinction between, on the one hand, citizen participation, which takes the form of institutionalized forms of delegation of power (of sovereignty) to a political elite, and, on the other, participatory citizenship, autonomous, critical and transformative, which promotes and carries out egalitarian forms of political association and organization, exercising sovereignty as a praxis committed to the construction of the public and the common good. Following these distinctions around the concept of citizenship, the historical eruptions of the high school student movement from the 1970s onwards are characterized. Such a historical reconstruction deepens its complexity, linking external contextual factors with internal factors that determine it and on which it has influence.

The information collected has been analyzed using hermeneutic-comprehensive methods characteristic of the social sciences and humanities, whose foundations are in dialogue with the tradition of complex thought, converging in the critique of the positivist reductionism of knowledge. In this sense, a divergent theoretical-methodological distinction is introduced, which separates episteme from complex thought, and episteme from the sciences of complexity, bringing the former closer to hermeneutic-comprehensive presuppositions. We conclude by establishing the existence of a trend or transition within the high school student

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movement, towards the preeminence of a current of a counter-hegemonic, participatory, and community nature.

Confronting positivist rationalist metaphysics, complex thinking relates to counter-hegemonic projects, which according to Morin (2004), pose alternative proposals to organize a new science and a new civilizational era, open to chance, to the multiplicity of causal links existing between different phenomena and their potential developments. The interpretation of complex thought carried out in this article is a conceptual framework that does not pretend to be exhaustive or innovative in theoretical terms, and seeks to articulate epistemological, methodological, ethical and political criticism and self-criticism with which the high school student movement is problematized and analyzed. This formulation seeks to establish a logic and provisional principles, to be debated, that allow us to interpret the emergence of the high school student movement as a complex empirical phenomenon. In this sense, the conclusions of this communication include a brief reflection on the contributions of complex thinking to the development of knowledge on the proposed research problem.

The high school student movement in the 21st century

Since the 1990s, there has been a crisis of legitimacy in the Chilean institutional system, characterized by a disaffected attitude of young people towards electoral participation. This disaffection then gives way to a series of more or less isolated social mobilizations. Its turning point is 2006, with the *Penguin* Revolution (OPECH, 2010), which triggers successive demonstrations, linked to environmental, local and student issues, and which will be stronger in 2011. In Chile today, as a result of demonstrations by high school students, according to Soto (2014), a much more massive and extensive social and political movement can be identified, which gathers around criticism of the institutional system, demanding its structural change.

The highest point of popular mobilizations related to education took place in 2011. The worldwide dissemination of the ideas and actions of the Chilean student movement gave international visibility to student leaders, such as the university student Camila Vallejo, who was qualified by the magazine *The Guardian* as a person of the year. At that time, high school students occupied up to a thousand educational establishments throughout the country between June and October. The occupation of

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establishments was accompanied by multiple internal activities and interventions in various public spaces.

The students expressed local demands for the most urgent needs in each school and high school, and proposed reforms to the national education. They thus succeeded in establishing an extraordinarily broad debate, which ended up linking the school system, based on competence and profit, with institutional responses, or lack thereof, in view of the needs and aspirations of citizens in other areas of human life, such as health, social welfare and political participation. According to Araujo (2019), criticism of the commodification of rights spread in the population, to the point that various social movements and political organizations converged in the demand for a Constituent Assembly.

The growing mobilization and the permanent public debate ended up positioning different sectors of civil society in the demand to put an end to a neoliberal order protected by the 1980 Constitution that was imposed by the civic-military dictatorship of Pinochet. This made Chile, according to Ulloa (2013), the only country in the world that inherited a constitution from a dictatorial period, without repealing it and creating a new one.

The activities and proposals of the mobilized high school students, emerged from assemblies where they deliberated and sanctioned each of their demands, positions and actions, with their ideas and decisions being exposed to society through multiple day-to-day exchanges with people who, either, expressed solidarity with them or rejected them. Also, before other social actors, in meetings organized for discussion, deliberation and/or coordination of actions, before the political authorities or through the mass media, through spokespersons elected to fulfill this function in a contingent and revocable manner.

According to Arrué (2012), in barricades, marches, artistic-cultural events, marathons, performances, as well as in occupations of public offices, of official political parties, of international organizations, or during hunger strikes; The students' spokespersons stated that their struggle was not for personal gain. They were aware that they would not be able to enjoy the changes they demanded in education, rather the new generations of boy and girls that would be able to enjoy their rights.[1]

This is how the students and their demands won the general support of the population. Free education and the end to profiteering in education, so that it could be realized as a right, were the most striking demands of the social movement from 2011. At the same time, the participation of all the actors who made up the educational community in the administrative and pedagogical management of each school or high

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school, and the right of the citizenry to influence the formulation of educational policies, were demanded.

With this, the students argued that they would overcome the mercantilization and authoritarianism prevailing in education and in Chilean society, which was manifested in the disregard of student approaches within high schools and their exclusion from political citizenship, granted to the population over the age of 18 through the right to vote.

During the social unrest, which began in October 2019 in Santiago, it is the high school student movement itself that, in the face of the unjustified increase in subway fares, organized massive evasions to access the urban train without paying for its use. After five days, the students gained the sympathy of the citizenry and generated adherence to the practice of evasion among urban workers. The massive evasion made possible by high school students opened the way to a social rebellion against the injustices caused by a ferocious hegemonic neoliberal policy. This creates a situation of massive social manifestations of various kinds, which bring with them new forms of territorial organization. In this process, the promulgation of a new constitution quickly became the unifying element of social protest.

In this context, from the tradition of complex thought, it is interesting to ask the question: where does this ideal of education, as a public good that must be defended and exercised collectively as a universal right guaranteed by the State, argued by the mobilized high school students, come from?

Delimitation of the issue at hand

The descriptive and reflective reconstruction of the high school student movement, from the perspective of complex thought, allows it to be characterized as the manifestation of a renewed citizenship. Taking into account that the concept of citizenship, as well as those of education, society, politics, democracy, sovereignty and participation, function as normative principles that organize and give meaning to human action, are used here to interpret the thought and praxis of diverse subjects. Subjects who, in turn, incorporate them into their frameworks of action as tools to understand the reality that surrounds them and to evaluate, justify or criticize their own and other's situations and actions.

These are concepts associated with heterogeneous systems of action and interaction that precede the subjects, and that they adjust, introducing innovations to adapt them with a greater or lesser degree of ratio-

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nality to the particular circumstances in which they develop and adapting them to their wishes, purposes and interests. The understanding of the meaning of such concepts requires the reconstruction of the meaning attributed to it by the subjects who appropriate them in their historical emergence. The meaning of the world and his work within it become the prism through which the individual observes his own history, interpreting it with the categories with which he organizes or prioritizes its attributes. The meanings, organized in a symbolic field, allow to order the individual and social world through discourses, messages and representations. This organization constructs its own ideology. That is why, according to Betancourt (2019), when talking about meanings, it is necessary to make an approach to the ideologies of the investigated subjects, based on the stories, reflections, and actions of the individuals who use them.

The activities of the high school student movement to defend and promote the right to education can be understood as processes of subjectivation, which are reconstructed, as praxis of interactions and everyday experiences full of meaning with which they give life to the collective subject they constitute.

In this process, and according to Bourdieu (2013), people's behavior has a symbolic function, which is interpreted with the same system of symbols that, as an instrument of communication, is conventionally used to formulate it. This becomes an agreement on the meaning of the world, as a logical and social integration of collective representations that have the capacity to produce relationships of meaning. Then, the social individual who relates to social institutions and structures, obtains a particular configuration of meanings that gives him access to his culture. This individual being, in turn, is a social being, as conceived by Martucelli and Araujo (2010), since the meanings that construct the individual being, the future, the past, the present, come from his culture, collectively constructed. Thus, the individual becomes a subject in the simultaneous action of his ideal and his social experience.

The comprehensive social sciences make it possible to highlight the structural aspects of the social whole of which the particular phenomenon of the high school student movement is part, conditioned and interpellated to its members, towards its reproduction and/or transformation of the current status quo.

In this context, one of the axes of analysis established in this article refers to the principles of associativity and organization of the high school student movement, as well as to the social and political projects that support it. This axis of analysis needs to characterize the forms of struggle

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or repertoires of action that give them public visibility, but, above all, its positions in the face of the contingencies and/or structural aspects of the educational system, their demands and the proposals that give meaning and unity to their action in favor of the right to education. But, above all, it must describe the ethical-political principles, and the moral norms that incite and regulate the interactions between its members, which can be called, following Fauré (2015), the inner dimension of the movement. It is this dimension that endows the movement with identity and uniqueness, in its internal diversity and in its relations with other subjects. It also provides the meanings with which "us" is defined, who we are and who we should be, and therefore how we should act, what we should do to remain who we are and/or to become who we want or should be.

Congruence between the norms of sociability promoted by the high school student movement, its forms of association and organization based on the principles of freedom, equal rights and democratic participation; support the hypothesis that the development of the high school student subject is a praxis linked to complex thinking itself, recognizing a collective subject that actualizes the republican, democratic and socialist tradition. Following the reflection of Coutinho (2011), it is a praxis that is defined as such not only because it symbolically articulates in a whole human situation and actions, but also because it has an emancipatory and counterhegemonic orientation or character. A character that gives it specificity and allows a better understanding of its existence and the type of citizenship that its members exercise by mobilizing for the right to education.

The right to education and freedom as self-government

The system of ideas that, hypothetically, encourages the high school student movement in Chile, has as a key concept in its articulation, the notion of the right to education. It is essential to consider the critical position of the high school student movement in situations where the right to education has been violated and in relation to alternative forms of restitution or guarantee of that or other rights, that arise from the governmental sphere or from the popular sphere.

This concept of education as a universal human right, present among high school students mobilized in Chile, links the subjects of research with the principles of dignity, freedom, equality and fraternity, to which, from a republican perspective, education should contribute, forming autonomous citizens responsible for their community. The idea of

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democracy, from this republican perspective and as a social and political regime that makes possible the realization of human rights, is inseparable from the idea of education as a right, both in the light of this article and of the international standards established by the United Nations.

Article 13 of the 1948 Declaration of Human Rights and article 13 of the International Covenant on Economic, Social and Cultural Rights (ICESCR, 1966) are devoted to education. In 1999, the Committee on Economic, Social and Cultural Rights of the UN Economic and Social Council (hereinafter referred to as the Committee) issued General Observation 13.Which today it is the most precise international normative reference in the definition of the standards that the exercise of the right to education must meet, linking it in an indivisible way with the right to participation.

La Observación del Comité comienza reafirmando lo manifestado en el artículo 13 del PIDESC: "La educación es un derecho humano intrínseco y un medio indispensable de realizar otros derechos humanos" (p. 1). It then specifies its normative contents, in terms of purposes and objectives, and its four interrelated characteristics: availability, accessibility, acceptability and adaptability, with references to different levels and educational modalities. Finally, it identifies "special topics of broad application" (p. 8), including non-discrimination and equal treatment, discipline in schools and "academic freedom and autonomy of educational institutions" (p. 9). With regard to the latter, the Committee states that "the right to education may be enjoyed only if it is accompanied by academic freedom of faculty and students" (p. 9). This was not expressly included in the Declaration of Human Rights or in the ICESCR. This emphasizes that its content is valid for "teaching staff and pupils throughout the education sector" (p. 9), and is therefore generally applicable, and not exclusively for higher education.

This definition of academic freedom is supplemented by the Committee's assumption that the autonomy of institutions, understood as "the degree of self-government necessary for effective decisions by educational institutions" (p. 9). This democratic and participatory approach, formulated by the Committee, links the concept of self-government with academic work, the establishment of living standards, administrative management and other related activities. Forms of self-government of educational institutions which, in addition to being open to the scrutiny of their communities, must be compatible with the systems of control of State funding.

The movement of high school students can be interpreted as an experience of struggle, even if partial, for this ideal of self-government. The

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ideal considered by the Committee to be the condition and expression of academic freedom and an essential aspect of the right to education.

In this sense, complex thinking is observed in the demand for protection of the right to education that the high school movement defends in Chile, criticizing the simplification that neoliberalism makes of education, transforming it into a commodity, an object of personal consumption, and reducing the human being to its individual dimension. Thus, the ideal of complex thought, of a civilization open to the complexity of the Universe, becomes evident in the demand for the right to education, by claiming a sense of academic freedom and assuming its many implications for the organization of educational institutions and community life.

It is precisely in the appreciation of freedom that the high school student movement is linked to the idea of a community-type government for educational institutions, which can overcome the relations of subordination that characterize education today.

Epistemological, methodological, political and ethical dimensions

Complex thought cannot be synthesized into a few phrases, and its systematic characterization seems to have no limits. Not surprisingly the paradigmatic exponent of this approach, Edgar Morin, has formulated 6 volumes of his *La Méthode* to outline the meaning of complex thought. As Martínez (2018) affirms, the notion of complexity is constantly being developed and involves dozens of ideas, principles, terms and properties in increasing transdisciplinary conceptual hybridization.

In the perspective of the exercise of analyzing the high school student movement, it is necessary to articulate the concept of complexity with that of science, being able to organize its meanings in a schematic way, around the following distinctions:

a) Epistemological: Complex thought emerges as a critique of the simplifying thought of nature and human existence that sustained modern positivist and enlightened philosophy and science. The simplifying thought of modern science is based on Cartesian metaphysics, today in crisis, but still hegemonic. Complex thinking is situated on the margins of contemporary scientific practice.

b) As Morin (2004) points out, for Descartes and Newton the world is perfect because its origin is divine. Consequently, reality for them is characterized by possessing an order (mathematically formalizable), re-

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gulated by general laws that govern all its parts through external, linear, mechanical, simple and stable relations of causality, which explain the phenomenal regularities and reiterations. Discontinuity, error, deviation, and uncertainty are interpreted by simplifying thought as reflections of our ignorance of what, like the new, science still fails to explain through a general law.

c) The classical science of modernity, as Morin argues (2004), is governed by a simplifying thought that only recognizes the general properties of the objects or phenomena it studies, inscribed within a previously known systemic order, without contradicting or exploring their interactions with objects or phenomena of other systems, or with their environment. Simplifying thought that also separates the object that is known from the subject that knows, pretending that any individual can experiment with it in different contexts, under a sequence of standardized and controlled actions.

d) Generated in the midst of the European imperial prosperity of the sixteenth and seventeenth centuries, the simplifying thought carries the idea of an inevitable progress, necessary and guaranteed by a legality inscribed in nature, appreciating the new and positive character that it attributes to the future. For this kind of thought, in the words of Morin (2004):

> The role of knowledge is to explain the visible complex by the invisible simple. Beyond agitation, dispersion, diversity, there are laws. Thus, the principle of classical science is, of course, to legislate, to propose the laws that govern the fundamental elements of matter, of life; and to legislate, it must disunite, that is, effectively isolate objects subject to laws. Legislating, disuniting, reducing, these are the fundamental principles of classical thought (p. 1).

It is in criticism of this tradition of the simplifying thought of modern classical science that the tradition of complex thought is constructed. Najmanovich (2018) indicates that the simplifying tradition conceives man confronted with a nature that he must know in order to dominate, while the tradition of complex thought understands knowledge as an encounter between nature and the human being, in a common universe, both unique and infinitely diverse. As this author points out, to overcome the simplifying stage of thought and move to a complex one, a change of attitude is required first of all: to shorten the gap between us and that which we are to know (the transcendent gaze) recognizing the relationships of mutual interdependence with the totality of which we

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are a part, taking as a starting point the interaction between objects and subjects (an immanent and implied look).

From the perspective of that which dies, what is born is disorder, deviation, disarticulation of your being. From the perspective of that which is born, the disorder that disorganizes what dies is only part of the order that enables the existence of the new. Everything depends on the system, the moment and the segments of the same that you want to know with greater detention. Any system, as Morin (2004) indicates, "can be considered as part of a poly-system and surrounded by an ecosystem" (p. 21).

The dialectic of life and death, which requires making explicit the level of organization of life that will be analyzed in a simple or complex way, implies that the high school student movement cannot be understood except by situating its praxis in the educational and social system that it integrates. At each level, the totality that contains the system is in some manner present in its parts: the part is in the whole and the whole in the part (hologram principle). The parts are possible to distinguish, that is the requirement from the everyday life, the interaction of the human being with nature and of knowledge. But, according to Morin (2004), the parts should not be separated by science without being united again to know the relations that they establish among themselves at a necessary moment of their concretion, of their cosmic existence, of their understanding and eventually of their life.

We perceive the parts of a whole through mental schemes with which we cut out the undetermined reality, a segment organized under a paradigmatic principle that must be assumed and that a science, open to complexity, should know and reflect on taking into account the practical, ethical and political dimensions and implications of the knowledge that originates or regenerates. By interacting with it, we cannot separate the world we inhabit from the structures of our knowledge.

A first source of complexity emerges from the recognition that each object or phenomenon we know is part of a whole that is, ultimately, unknowable, as it would require considering at the same time its unity and that of each of its parts, with all its internal processes and interactions.

Every time we intuit or know a new determinant of an object, we make our understanding of it complex. Morin (2004) proposes to explore the complexity involved in complementing or contradicting the determining and random aspects of any phenomenon, taking into account the order-disorder-interaction-organization tetragram.

In this sense, the high school student movement can be perceived as part of the order or disorder of the Chilean educational and social sys-

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tem, attributing a hegemonic or anti-hegemonic character to its struggle for the right to education. Organization and disorganization are constitutive moments of the cosmos and of life. Life, living beings and their ecosystems are a particular order, because, on the one hand, they have the capacity and the need to produce themselves, and on the other, they tolerate certain degrees of disorder. This also applies to the systems of ideas that guide the action of individual and collective agents.

Moreover, as Luengo (2018) points out, in complex thinking it is fundamental to consider that, in any living organization, including social or political reality, there are no unilinear causalities, but rather multicausal and recursive dynamics. This causal multiplicity and dynamism of living systems incorporates a complexity that can only be known by the circular and uninterrupted movement of thought. At the same time, Morin (2004) says that "the parts are known, which allows us to know the whole better, but the whole allows us to know the parts better. Thus, knowledge has a starting point when it is set in motion, but it has no ending" (p. 6).

The dialectical movement, which sustains contradiction without its synthesis implying the overcoming of conflicting terms, is called dialogical according to Morin (2004). It is homologous to the circular movement of knowledge produced by complex thought. The dialogic includes the fragmentation of reality for the study of its parts separately, which then confronts and complements, with the knowledge of the existing relations between them and with the totality that they make up. A combination of disjunction and relinkage of portions of reality that relate within a totality that is also part of one or more systems.

Methodological: The dialogic and the theory of complexity constitute a method of thinking that can, and intends, to base a method of research to know empirical phenomena articulated as complex social problems, that is able to advance towards the articulation of the parts with the whole. However, this is still an emerging task. In order to produce knowledge about complex problems, it is not enough to take an ecological view, which expands the number of its potential determinations. Strategies and instruments, research methods, consistent with the postulates of complex thought, must be developed and implemented to overcome the simplifying perspective in the construction of knowledge that broadens our understanding of the studied realities.

The method of complex thought does not correspond to the methodologies of the sciences of complexity, as these, ultimately, adhere to the thought of simplification (Rodríguez 2018). So where to find

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the keys for developing strategies and research instruments consistent with the precepts of complex thought? The research methodologies that correspond to complex thinking are those of the comprehensive social sciences or qualitative method.

In the absence of explicit methodological proposals to develop empirical research consistent with the perspective of complex thought, Rodríguez (2018) proposes five principles of method for empirical paradigm research, which in turn come from the tradition of the comprehensive method in the social sciences, namely:

- Analyze a system of networks or heterogeneous practices to infer the organizing principles that connect them, their modes of organization.
- Mapping the multiple processes and constructing observables. Here the plurality of sources and techniques for producing quantitative, but, above all, qualitative and empirical information acquires special relevance.
- Specify the short, medium or long duration of the timescale.
- To specify the temporal dimension of processes: the past, the present and the future of the paradigm.
- Stratified levels of organization (micro, meso, macro), the elements and processes that make up each level depend on the leading question and the adopted scale of observation.

These principles were followed and applied in the production and interpretation of fragmentary information on some features of the movement of high school students, that allow glimpses of the totality that it constitutes as a collective subject and which serves as the context with which it interacts.

Along the lines of the ideas presented, from the point of view of the methodological approach, the historical reconstruction of the concept of citizenship and of the collective subject that constitutes the high school student movement in Chile, was approached from a qualitative research design, as it incorporates in the investigation the meanings that the actors attribute to their action, elements that constitute the object of knowledge. This object of study acquires specificity in the forms of association and organization of the mobilized high school students, and in the social and political projects they support.

The analysis processed these distinctions as components of a praxis of struggle for the right to education, in which all these elements are merged. In view of the length of time covered by the historical reconstruction

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of the student movement, secondary sources of information were used to search and review bibliographic and related documentary material.

In the absence of previous studies addressing the research problem from the theoretical perspective, the objectives and the historical breadth tested here, the present analysis acquires an exploratory character, seeking to identify historical recurrences and novelties in the praxis of the high school student movement since the 1970s, which can be interpreted and described as forms of citizen participation and/or participatory citizenship, in the terms proposed by Paredes (2011). A distinction is made between the empirical manifestations of citizenship that serve to explore the predominant or alternative system of ideas and actions, and to detect and characterize the presence of the republican democratic tradition, in its liberal or socialist version.

The partial reconstruction of the history of the concept of citizenship, based on the references present in different analyzed works, allowed through the systematization of the convergences and divergences of the data provided, describe or explain one or more aspects of the object or problem under investigation (triangulation), which in this way was reformulated to become the one elaborated here: the high school student movement as a counter-hegemonic movement that in its complexity articulates democratic republican traditions, in a context of a crisis of legitimacy of liberal democracy.

In this sense, the knowledge generated is descriptive. The revision of the categories used by researchers in their reports, and by the subjects investigated in their testimonies, positions, projects and proposals, allowed the characterization of the practices and the constitutive meanings of the associative and organizational forms of high school students. Descriptive knowledge of these elements was privileged over identifying causal relationships and offering explanations about their situation and behavior. Without testing hypotheses about the incidence of one element of the movement on another, or the effects of external variables on internal factors of the movement or vice versa, it was rather to generate a type of comprehensive understanding of the actions and meanings that, articulated, make up a praxis located in a complex context where, in a conflictive and controversial manner, the existence of the movement and its tasks makes sense.

In the hermeneutical exercise of interpreting the discourses, actions and experiences lived by the members of the student movement, the first-hand documentary information and that contained in interviews and conversations held with mobilized students, carried out by various

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journalists and researchers, is addressed by recognizing the complexity of the subject of study and in the understanding of the researcher as a social being that participates in the processes of citizenship.

In the collection and analysis of empirical and theoretical information, we proceeded by identifying and interpreting the native and scientific categories with which the analysts and subjects involved in the research problem give meaning to the investigated reality. In a transdisciplinary effort, the classification of the obtained information began by distinguishing that relating to the internal dimension of the student movement, in its different categories, from that relating to the external dimension of the movement, to then establish new analytical and conceptual distinctions emerging, product of the advance in documentary and bibliographic exploration (transdisciplinary).

In this way, the methodological approach that made possible the analysis provides an understanding of the multiplicity of the components of the movement, which are articulated in a whole, which interact with each other, but also with entities of other systems, within a larger organization, being part of the internal diversity and plurality of connections existing between its parts and those of other subjects or systems.

The principles of method proposed by Rodríguez (2018) to empirically investigate paradigms, are useful for the analytical (distinguish), synthetic (reflexive-dialogical-integrator) and practical exercise proposed here. To this end, the practice of the high school student movement distinguishes a system of ideas and practices that in the daily life of human experience are fused and organized under a perceptual, conceptual and interactive paradigm that organizes the world of life.

Politics: The problematization of the paradigmatic principles that organize modern scientific thought, its possibilities and limitations, allows the high school student movement to be placed on the horizon of an epochal change (Morin, 2004). Change that tends to overcome simplifications in the understanding of their world, opening itself to complexity, including overcoming the crisis of liberal democracy, wondering about its significance as a historical event the form of organization that is becoming extinct and the one emerging.

The current crisis of the mercantilist civilizing paradigm is part of the horizon of multiple crises, of different order, that appear in the contemporary world, of global character, threatening the well-being and survival of humanity. This epochal shift is a reflection of the inadequacies of the simplifying thought system and the modern world, as indicated by Morin (2004).

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Thus thought becomes both an intellectual and a political problem. The consideration of the political dimension of epistemological criticism implies a reform of thought and institutions, in a need to learn to think and act differently in order to contribute to a civilizing change. In this sense, and according to Morin (2004), the political distinction of complex thought is linked to an ethical perspective, involved in learning a new way of thinking, knowing and acting, a new way of living.

The experience of the planetary age, with the multiplicity of interconnections between the parts of the whole that it makes possible, makes inevitable the transformation of knowledge and the organization of life. This experience and transformation is not carried out by an individual isolated in his solitude, but by a group, education being one of the main tools for managing change.

Thus, the activity of the movement, being part of a social whole, can be recognized from a paradigm where the cosmos and life are complex totalities produced by an entanglement of actions, interactions and retroactions of an incalculable multiplicity, of unassailable ongoing processes and random phenomena indeterminable by human consciousness. In this sense, insists Morín (2004), everything that can happen in one point of the globe can generate repercussions in other points. The political approach of the high school movement takes on meaning from complex thinking, as a detonator of a political dimension enriched with forms of participation, in a kind of unravelling of the complex problem, in the link with the community.

d) Ethics: It implies the reaffirmation of life as the responsibility of humanity. Morin (2004) places the evolution of life in a cosmos traversed by forces that tend to regenerate or degrade the ways in which humanity organizes itself. The evidence of the negative planetary effects of a science based on a self-concept that denies the active role of the cognitive subject, in the conformation of the object that researches, demands its responsibility for the unintended consequences that the use of the knowledge it produces entails. In this context, complex thinking brings a reflection on the scientific knowledge of the world, in the perspective of incorporating the ethical dimension in science and the evaluation of the consequences of its thinking in action.

In this direction, as Morin (2004) argues, the challenge of complexity is not limited to the scientific field, but calls for ethics, politics, education and other fields of reflection and human action. In line with what Ricouer (2002) points out, at the intersections between ethics and politics, the commitment of the citizenry becomes meaningful. The respon-

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sibility of the high school student movement and the rest of the national community in defense of the right to education and participation can be interpreted as a form of citizenship. An innovation in the social bond, an experience of participation, even a test of civilizing change.

The transformation of the Student Movement as a Collective Subject

References to the origins of the high school student movement in Chile tend to place it at the beginning of the process of expanding the coverage of public high schools beyond the oligarch and aristocrat circle of the Chilean elite and a nascent middle class, who welcomed them until the first half of the 20th century. This expansive policy will increasingly involve the popular sectors in high school education.

In this context, "la chaucha revolution", in the 1950s, is recognized as the first spontaneous mass demonstration, from the organizational point of view, that was carried out by high school students. The protest was against the increase in the price of public transport in the city of Santiago (in an action similar to what gave rise to the social unrest of October 2019). Demonstrations that gave the high school student movement indelible birthmarks, always visible in its later developments: the occupation of the streets and police repression. The participation of high school students in those revolts is a reality to be explored. At least from the theoretical and historical perspective offered here.

As Azocar (2014) points out, numerous studies on high school student mobilizations focus on the external dimension of the movement, seeking, for example, to characterize the communication actions in which the student movement in 2006, and especially in 2011, installed its positions in the public space. Some of these works conclude with praise for the innovative nature of the movement's communication strategies, both through digital networks and through mass media. Among these analyses, several point to the high degree of adhesion generated by the students with their communication strategies, with adherence levels close to 90% of the adult population.

In another sense, there are studies that delved into the forms of struggle or repertoire of action of the student movement, and/or into the content of its demands, to the point of linking them with the social discontent that is transversal to Chilean society, as described by Lechner (1998) and criticisms of neoliberalism and the cracks in the model, ac-

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cording to Gaudichaud (2015). In turn, there are those who relate the student demonstrations to the challenge of influencing the political system and educational policy, where studies show more failures than successes, according to Azocar (2014). Finally, there are the minority perspectives that investigate the internal dimension of the movement, as proposed by Fauré (2015) in its forms of association and organization, and in the historical projects that sustain them.

Through the analysis of the praxis of social movements and what is anticipated in it from the social order they propose, the New Social History in Chile developed by Salazar (2012) has revealed the recreation that these collective subjects make of popular struggles and political projects of the past, which are appropriated and adapted with autonomy in every situation. Through practices and processes of self-education, especially in the emergency cycles of social movements, the popular sectors would bring knowledge of past struggles, constantly increasing their pool of community, productive and libertarian innovations, that they raise as alternatives to those established in the current system of production-domination.

It is on the subject of this historical and theoretical problematization of the emancipatory meaning and potential of social movements, positioned from the point of view of complex thinking, that an overview of the high school student movement is constructed. This reconstruction combines different moments of public emergence with periods of latency, which in its complexity shows the survival of a collective memory that keeps alive the knowledge about concrete struggles and social projects conceived in the past.

Part of what remains alive in popular culture and is present in the high school student movement refers to the values and ethical and political principles of action of the republican socialist democratic tradition. This is a key element for understanding the particularities of the high school student movement in Chile. The movement, as a collective subject, organizes its identity and political activity supported by a critical and supportive popular culture that is not found in the official curriculum. These elements of popular culture remain in the collective memory, available yesterday and today to those who choose to confront an unequal educational, political and social order. At the same time, greater complexity is being added, renewing new meanings and forms of exercise of citizenship.

However, the relevance of the political dimension in the task of the student movement, linking the problems of education with the logic of the functioning of a broader social order, generated studies focused on

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its relationship with government political institutions. This perspective does not largely explore their associative practices and forms of organization, their positions in the face of the reality they face, their educational proposals and the social projects they carry out. That is to say, they don't recognize its complexity. Rather, the interest is placed in the collective processes of youth subjectivation of the high school student movement, characterized by a strong political identity and plurality. This, according to Zarzuri (2018), in the understanding that the complex subjects that constitute the movement are young people whom society usually positions as lacking in commitment or without links with the citizenry.

However, the ideological and social heterogeneity of the high school student movement is a fact. It is present from its origins. The forms of association and organization acquired, in the 21st century, an extensive and strong fraternal and assembleistic character. Sociability relations, articulation and coordination practices, feelings of belonging and dynamics of participation. All elements based on the idea of equality in dignity and rights, and loaded with a strong political significance that challenges the absence of a participatory democracy in the relations between government, society and education.

The high school student movement was constituted as a collective subject through interactions conveyed by friendship, union, ideological identity. This struggle emerged from specific community contexts, where the main injustices that, due to the very complexity of the neoliberal model, expressed themselves in a multidimensional way were problematized. This was experienced as social spaces that sought greater democratic legitimacy in the increase of dialogue, promoting numerous assemblies and occupations of high schools. Each educational establishment was transformed into deliberative spaces and opened to the adjacent social and community space. All this was an expression of forms of self-government, which were articulated under the notion of the whole system, since their struggle went beyond the educational establishment itself. Discussions were taking place on principles to be appropriated in the practice of society as a whole. This is what we can call a new militancy, where young people, leaving behind the idea that the only form of participation is in the traditional political parties, create new spaces of affiliation with militant discipline and real commitment. Militancy, according to Zarzuri (2018), is a disciplined adherence to a cause that in this case moves away from the traditional representative hegemony, with the figure of the assembly articulating the social and the political.

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Final considerations

The dynamism and relative continuity in the time of the high school student movement, characteristic of its systemic organization, authorizes the interpretive use of theoretical categories such as the emergence and latency of a popular social subject, as indicated by Salazar (2012). The ruptures and continuities with which this subject manifests itself in the different moments when it breaks out and acquires visibility on the public scene, can be recognized from the perspective of complex thought, as those that attribute to temporality a central place when it comes to reconstructing, analyzing and interpreting the political senses. Even in the struggles that give life to social movements in general, and to student ones, in particular.

To face this task, the categories of latency and emergence, together with those of the internal and external dimensions of the student movement, must be complemented with others that are capable of describing the political subjectivity that accompanies associative practices. It is about articulating the forms of organization and struggle, and the political projects that the high school student movement creates and/or recreates, when it breaks into the public arena, as what unites and organizes it.

At this point is introduced the use of the concept of socialist democratic republicanism to account for a set of principles, positions and procedures that characterize the high school student movement, in an incipient way in the 80's and 90's of last century, and more markedly in the 21st century; although rooted in the political traditions present in Chile since the 19th century.

This analytical exercise allows us to highlight specific contributions that complex thinking can make to the development of strategies of empirical knowledge of the high school student movement. These contributions can be synthesized following part of the conceptual proposal explained by Luengo (2018) to advance the knowledge of a complex reality. In this sense, complex thinking allows us to recognize the object analyzed by this article as a living organism, formed by the multiple interactions that are established between its components and the unity that it configures in the act of knowledge with the subject that investigates it. This unity, determined by the question about the potential contribution that the high school student movement makes to social change, demands a dialogue that, from an inter and transdisciplinary perspective, approximates the horizons of meaning in which researcher and researched subjects inscribe their work, overcoming the simplifications and reconstructing, in this case, their praxis as an expression of an innovative citizen.

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Empirical knowledge that complex thought teaches us that we should never consider as complete and definitive, that we should always consider partial and provisional, and that, if we maintain interest, it is possible to broaden and update.

Note

1 Some of these references have been extracted from two documentaries that we recommend watching. These can be viewed at: https://bit.ly/3h0UVEa; https://bit.ly/3gZUgD2

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Didactic strategies for the development of competences and complex thinking in university students

Estrategias didácticas para el desarrollo de competencias y pensamiento complejo en estudiantes universitarios

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Abstract

The present investigation starts from the logical and theoretical framework of the development of competences and complex thinking in the world university system. In this sense, the research aimed to demonstrate the effects of the application of didactic strategies for the development of competences and complex thinking in the Systems Engineering degree at a public university in Lima provinces. The research was of an applied type, explanatory level, we worked with a pre-experimental design. The population was made up of 325 students from the professional career of Systems Engineering, and the sample was taken non-probabilistically by 23 students of the X cycle. The level of development of competences was 74% in percentage terms and 64,25% in complex thinking. It is concluded based on the three didactic strategies used (problem-based strategy, collaborative learning strategies, and the incorporated strategy of information and communication technologies) with a significance level of 5% and a (p-value: 0,006 < 0,050) that competences and complex thinking have been favorably developed in the students of the Professional Career in Systems Engineering at the National University of Cañete, Lima, Peru.

Keywords

Didactic strategies, development of competences, complex thinking, problem-based strategy, collaborative strategy, incorporation of ICT.

Resumen

La presente investigación parte del marco lógico y teórico del desarrollo de competencias y el pensamiento complejo en el sistema universitario mundial, en ese sentido la investigación tuvo como objetivo demostrar los efectos de la aplicación de las estrategias didácticas para el desarrollo de competencias y pensamiento complejo en la carrera de Ingeniería de Sistemas en una universidad pública de Lima provincias. La investigación fue de tipo aplicada, nivel explicativo, se trabajó con un diseño pre experimental. La población la conformaron por 325 estudiantes de la carrera profesional de Ingeniería de Sistemas, y la muestra fue tomada no probabilísticamente por 23 estudiantes del X ciclo. El nivel de desarrollo de competencias fue porcentualmente del 74% y del pensamiento complejo el 64,25%. Se concluye en base a las tres estrategias didácticas utilizadas (estrategia basada en problemas, estrategias de aprendizaje colaborativo, y la estrategia incorporada de las tecnologías de información y comunicación) con un nivel de significancia del 5% y un (p-valor: 0,006<0,050) que se ha desarrollado favorablemente las competencias y el pensamiento complejo en los estudiantes de la Carrera Profesional de Ingeniería de Sistemas en la Universidad Nacional de Cañete-Lima, Perú.

Palabras clave

Estrategias didácticas, desarrollo de competencias, pensamiento complejo, estrategia basada en problemas, estrategia colaborativa, incorporación de las TIC.

Introduction

The excessive and massive expansion of university higher education in the world and specifically in Peru according to Brooks, Waters and Pimlott-Wilson (2012); Yeom (2016) have made the offer of graduates in all professional careers increasingly broad and diversified, and thus there is greater competition in applying for a job.

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This definitely has an impact on employability, according to Figuereido, Biscaia, Rocha, and Teixeira (2017), as it has been evidenced in certain mismatches in the skills, abilities, and competences required by the labor market, as well as by those formed in the university.

In this perspective as pointed out by Guzzomi, Male and Miller (2015); and Medland (2016) to become a good professional it is not only necessary to have mastery of the cognitive component and the technical/operational skills of the specialty, but also, nowadays, is required to develop the social skills, soft skills and complex thinking skills needed in the workplace.

In the occupational market, for Kalyuga, Renkl and Pass (2010); and Oliveri and Markle (2017) "The ability to solve problems, to think critically and to communicate properly are some of the skills most needed by employers who are becoming increasingly selective and restricted in their choices. Morales and Zambrano (2016) argue that, while these skills are part of the declared graduate profiles of most universities, they do not have adequate tracking of trajectories and achievements of the graduates in a properly systematized in an information system".

Likewise, today due to the accreditation and licensing policies of the universities and professional careers in the country, in large part of both public and private universities, undergraduate programs have moved towards a competence-based model, as said by Knight (2011); Manzanares and Santamaría (2016). Although their advantages are related to more dynamic and practical educational processes, for Pavié (2011); and Tobón (2013) they seek the integral formation of students and the evaluation of learning at the time of their graduation, it has been found that among the main difficulties of its implementation is the limited modification of the evaluation processes.

On the one hand, according to Ampuero y Casas (2013), there is no coherence between higher education institutions around what competency assessment involves and, on the other hand, according to Möller and Gómez (2014), there is a lack of coherent and relevant assessment tools to measure complex thinking.

From this point of view the research problem is formulated:

What are the effects of the application of didactic strategies on the development of competences and complex thinking in students of the Systems Engineering Degree at the National University of Cañete?

The investigation is justified in so far as it was not possible to know its justification in the following components:

- Convenience, this aspect is fundamental, since addressing the topic of research study is convenient for this time and space, as

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it was useful to know the levels of attainment of competences and complex thinking in the study sample.

- Social relevance, research is justified to the extent that managers, teachers and students improve their social and moral conscience, and this serves as a starting point for the subsequent accreditation of the professional career, which will result in a better society.
- Practical implications, such as the development of competences and complex thinking of university students was measured in two moments before and after the implementation of teaching strategies; this application has been favorable for students of the professional career of Systems Engineering.
- Theoretical value, the information gathered and processed within the university system, will serve as theoretical support for this and other research purposes, as it will enrich the theoretical framework and/or body of knowledge that exists on the subject in question.
- Methodological utility, because all the stages and/or phases of the scientific method were followed in its achievement.

Regarding the literature review, we have the contributions of Villarroel and Bruna (2019) who propose an authentic evaluation in university higher education. Learning assessment tools, traditionally used at university, have major weaknesses in measuring students' in-depth knowledge. On the other hand, authentic evaluation provides relevance by linking what happens in the classroom with real and working life, measuring knowledge in real contexts.

Also, Tapia and Luna (2010) presented the Research "Validation of a Thought Skills Test for Fourth and Fifth High School and First Year College Students", where they conclude that the process of validation of the test involved an analysis of the validity of content through evaluation by judges and psychometric evaluation carried out in two phases, the first with a pilot sample of validation to determine the reliability of the test through the analysis of difficulty of the items, the correlation item-test and the estimation of the Cronbach coefficient. As a result of this analysis thirteen items were invalidated, of which four were definitely deleted. The second phase consisted of re-evaluating the nine invalid items, after review and improvement, in a sample of the student group for standardization. A fundamental aspect of the psychometric evaluation was the Factor Analysis that allowed to base the theory on which the instrument

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is based. Three underlying factors were identified: deductive and inductive logical inference, analog classification, generalization and reasoning.

Barberousse (2007) in his research "Theoretical Foundations of Edgar Morin's Complex Thinking", concludes that in the face of what he considered the crisis of the western paradigm of simplification and disjunction, based on the reduction and separation of knowledge, Morin posed the emergence of a new paradigm of complexity, which would attempt to articulate and contextualize scientific cultures, humanities cultures and artistic cultures. To further this purpose, it was based on the integration of ideas, concepts and notions from various theoretical sources.

And Gonzáles (2002) in his research "The Educational Loop: Learning, Complex Thinking and Transdisciplinarity", where he concludes that learning as a complex system denotes various facets and ways of presenting itself in educational metacomplexity. A student, before learning as a unique moment in his life, must face an intersubjective spiral where detachment and re-learning are two components of learning individually and socially. Learning is the complexity of what the subject wants to "learn".

In the theoretical-scientific bases, we will first analyze the independent variable referring to didactic strategies. According to Ordóñez et al. (2011) the structure proposed in the different works seeks to modify the process that is regularly carried out in a classroom in order to achieve the development of complex competences and thought of students. The reformulation of teaching strategies under the approach of competence development and complex thinking consists of reviewing those that we have already used as they are: problem-based learning, collaborative learning and the incorporation of ICT in the learning process of university students.

The most pertinent is that, once the complex competences and learning to be achieved have been defined, it is necessary to design the teaching-learning process for its development and achievement. Educational research has proposed that complex learning and competences are achieved when students face situations that require their application.

Various authors have proposed and demonstrated the importance of working with problems, cases, projects and integrative tasks. Based on the review of specialized literature, we have the support of three didactic strategies to work with, considered as dimensions of the independent variable:

- The Problem Based Learning Strategy (PBL).
- The collaborative learning strategy (CLS).
- The incorporation of Information and Communication Technologies (ICT).

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It will begin by analyzing the first strategy, which was initiated at the University of Mcmaster Ontario, Canada, introducing problem-based learning (PBL) at the School of Medicine in 1969. Its purpose was to improve the quality of medical education, to transform the curriculum from a set of topics to an organization around real-life problems that requires the integration of different areas of knowledge to solve problems.

For Ordóñez et al. (2011) the problem-based strategy is a an instructional and curricular student-centred approach that encourages them to research, integrate theory with practice, and apply their knowledge, skills and attitudes to develop a solution to a specific problem. However, this proposal has been complemented by contributions made by different researchers on instructional design, such as Gagné, which shows the importance of motivating students, informing learning objectives, recovering previous learning, present content, provide learning guides, practice application or implementation, provide feedback, evaluate performance and promote retention and transfer; Merrill also emphasizes that learning is achieved by solving real-life problems, when previous learning is activated to generate new knowledge and learning, when new learning is shown to the student, when the student can apply the new knowledge and learning, and can integrate new knowledge and learning into his real world.

The Murray Problem Based Learning Strategy (1995) is one of the most widely used strategies for integrating knowledge, skills and attitudes and developing and transferring skills for problem solving. One of the most important contributions to this strategy is McMaster's problem-solving heuristics, which is summed up in six steps: committing, defining, exploring, planning, doing and evaluating.

The problem-based learning proposal also emphasizes the development of group skills learning, the proposition of alternatives and presentations. Students are faced with the search for alternative solutions and the theoretical support for them.

Problem-based learning according to Ordóñez et al. (2011) allows students to discover for themselves the relationship of theory with the proposed problematic situation and the teacher coordinates, clarifies and emphasizes the important aspects of these relationships. The challenge of solving a problem and the difficulties they overcome strengthen the learning, participation and leadership of the "teams".

The design of a subject with a problem-based teaching strategy will allow all theoretical topics to be covered through practical application. Problem-based learning, according to Ordóñez et al. (2011) includes several phases:

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- Problem Statement. "The problem is proposed by the teacher and discussed with the students. A deadline is given to complete said work".
- Appropriation of the problem. "The problem is open, can be solved by different approaches and students must make assumptions, selection of parameters to justify. The application of independent criteria leads to different solutions".
- Planning. "Students can organize themselves into groups to investigate the theoretical aspects that support the solution of the problem and solve it with the appropriate tools and techniques for the problem".
- Solution of the problem. "The solution includes the evaluation and discussion of the obtained results, which are compared with previously determined criteria and communicated to the students".
- Preparation of "a report, which can be presented individually or in groups. "The following sections are generally included: introduction, general and specific objectives, problem approach and solution methodology, obtained results and their discussion, conclusions and recommendations, bibliography".
- Presentation of results to the group. "The purpose is for students to enhance the competence of group work, so that they can clarify their doubts in their own language, that they themselves are their own guides in the group and that they internalize the studied subject. The competence to publicly present the results, defend and discuss them and present them in written form as is customary in an investigation report is also encouraged".

This type of strategy according to Ordóñez et al. (2011) promotes:

- "The learning of knowledge in the subjects covered by the course, its integration with the general theme and its application to particular cases of problems in engineering majors and professions at the end".
- The development of "group working competence and the written presentation of the results of both basic and applied research".
- The development of the "oral presentation, defense of results and public speaking" competency.
- Problem-based learning under the complexity approach can be reformulated by considering the implications of solutions in social, economic, environmental and ethical contexts. The

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arguments and criteria for selecting the best alternative are included in the "defense of the results".

The second proposal, the collaborative learning strategy CLS), according to Ordóñez et al. (2011) the CLS favours the development of skills, not only in the specific field of the subject, but also in the ethical field (responsibility and solidarity), communicative (debates, support and argumentation), emotional (positive interdependence, interaction leading to results, support, mutual help, overcoming weaknesses, achieving results, etc.) and attitudinal (sharing knowledge, continuous improvement, permanent self-assessment, etc.).

For a methodology to acquire the connotation of collaborative it is essential that five basic principles are met according to Ordónez et al. (2011):

- The "first principle, is positive interdependence, considered as the strategy in which students assimilate that they are intertwined with others in the sense that, if any member of the group is harmed, the group is damaged and if each member of the group reaches a goal is the achievement of the whole group, that is, either everyone wins or everyone loses".
- The "second principle is that face-to-face interaction between students is promoted. This face-to-face interaction occurs when students help each other, assist each other, motivate and collaborate in each other's efforts to learn. Students can promote the learning of each other through oral explanation of how to solve problems, discussing among themselves the nature of the concepts and strategies learned, sharing their knowledge and explaining the connections between past and present learning".
- The "third principle, is individual responsibility, exercised when evaluating the performance of each member of the group and the obtained results allow feedback to the group and the individual. It is essential that the members of the group know who needs the most assistance to complete the assigned work and harm the work of others. A common method of structuring individual responsibility is to assign tasks to the group or an individual task to each student and to randomly select one student to represent the efforts of the whole group".
- The "fourth principle is social formation, groups cannot function effectively if students do not have or exercise leadership, decision-making, truth-building, communication and

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conflict management. These elements of formation should be taken entirely as academic purposes".

- The "fifth principle is the group process, determined by ensuring that the groups work as such, achieving their goals and maintaining an effective working relationship among their members".

And the third didactic proposal was the incorporation of Information and Communication Technologies (ICT) in teaching and learning processes, for Ordóñez et al. (2011) With the introduction of ICT into training programs, the transformation of content-based training into broad-based concepts and the strengthening of basic principles has been envisaged, which requires new pedagogical strategies for the learning process.

ICTs contribute to the implementation of third-generation education supported by the use of new methods, techniques, strategies and means for comprehensive training. ICTs provide tools and resources through learning objects, which provide an enabling environment for collaborative learning and enhance the development of self-learning attitudes and information search, selection, assessment and organization skills. University training institutions are using these technologies as a teaching resource for the development of the contents of each subject, and as a tool for making learning-teaching environments more flexible.

In the pedagogical activities, according to Ordóñez et al. (2011) ICTs offer a broad spectrum of resources, which seek to facilitate the meaningful and personalized learning of complex concepts, as well as the construction and confrontation of knowledge, in interactive, dynamic and highly eye-catching environments. According to Trigos (2001), there are three criteria to consider in order to achieve online learning processes:

- It must be "networked, allowing the immediate updating, storage, retrieval and distribution of content and information"
- It should be "delivered through a computer using Internet technological standards".
- "It should focus on the broader vision of learning solutions that go beyond traditional training paradigms".

The incorporation of ICT into teaching and learning processes allows, *inter alia*, the following activities:

- Establishment of "a permanent channel of communication with students through a virtual platform".

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- Development of "subject support materials by teachers and their placement on a platform".
- Review of "support tools for the learning process developed in other universities for online use by the student".
- Development of "learning objects for virtual environments that allow students to conduct online learning activities without the presence of teachers".
- Design "of online self-assessment and evaluation systems".
- Design "of materials and tools for the independent study of students with different levels of learning".
- Provision "of alternatives for flexible learning in time and route".

The dependent variable called competence development and complex thinking will now be analyzed.

The concept of competence has been so thoroughly adapted the professional world that it has been incorporated into the university horizon as a catalyst for curricular models since the 1990s, taking on different names: competence-based training, curricula based on the competence-based approach, educational proposals based on competences, all with a view to becoming an academic training option.

There is considerable consensus in justifying this decision, which can be summed up mainly in the main characteristic of the time we lived in. For Manríquez (2012) this is a time of exponential changes of all order and magnitude, which is causing a shift in the center of gravity of university education, historically charged with training professionals for the labor market, whose structure is increasingly oriented towards the tertiary level. As a result, the content of various occupations is changing rapidly, creating new demands for skills and knowledge.

All this in the context of globalisation and the new information technologies that are constantly evolving, according to Brunner (2003).

One of the problems with the assessment of competences is that they are necessarily the product of a sequenced process; the assessment should aim at establishing the achievement or not of a competence, which can hardly be determined by a single method. To set out ideas, we will refer to the so-called Miller's Pyramid, a model for assessing competences proposed since the 1990s by Miller (1990) in the field of university education and presented in Figure 1:

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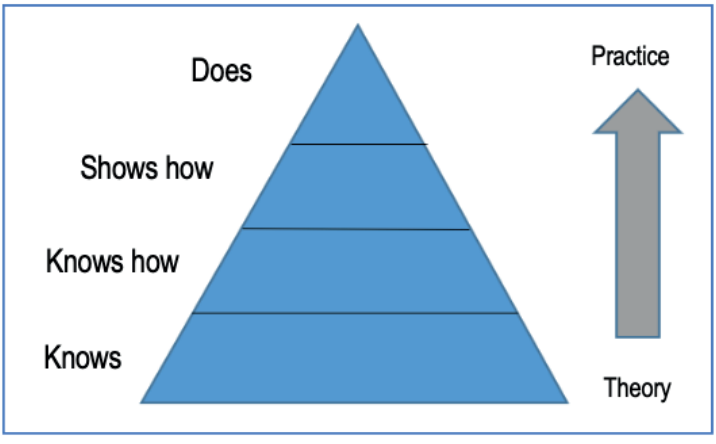
Figure 1
Miller's Pyramid



The figure clearly shows the stages that must be scaled in order to develop a competence. The first two stages (base) are obviously related to the cognitive and the two upper ones to the behavior. It is relatively obvious that the levels called knowing and know how, could be evaluated through traditional instruments in the context of a model that tries to certify the mastery of topics treated by the teacher in classes, with emphasis on paper and pencil tests and that in some manner reinforce converging thinking.

For Manríquez (2012) in a competences approach, this practice would correspond to the scope of what is defined as capacity -a specific component that is part of a competence- defined in terms of actions on content carried out around tasks that make sense as long as they are within a context of the very capacity that is intended to be demonstrated. This implies the restriction that the constructs, in this scenario, measure generic knowledge, that is, they would point towards general competences and not necessarily in an appropriate context. The latter is not minor: let us suppose that the task is being evaluated to *measure height*; this task should be in the context of an action that is connected with professional competence, beyond the experimental application of scientific method in general.

Regarding the complex thinking Peña (2018) considers that, the theory of complexity and complex thought tries to articulate disciplinary domains in favor of the teacher of the future, broken by the divisive thinking and who aspires to multidimensional knowledge.

Hence Morín (2003) indicates that complex thinking "is the ability to interconnect different dimensions of the real. It promotes a transdis-

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ciplinary and holistic approach, without abandoning the notion of the constituent parts of the whole" (p. 5).

The theory of complexity captures reality as a complex system, in its various connections, mediations and conditionings. That is why it does not establish antithetical relations between order and chaos, uncertainty and certainty, between the parts and the whole. If it does not assume it with awareness that they are antithetical, each separately, but at the same time unifies them, without making them a whole, each element retains its identity and unity.

University training towards transformation, however, requires specialized approval, possibly of a pedagogical nature. Since institutional policies, quality assurance that enhances those that promote professional development in universities, throughout their career, given that universities must now develop a scenario aimed at enhancing pedagogical training and professional development as a key strategy for improving the quality of education. The teacher in his daily practice, integrates different knowledge from this perspective, the teaching knowledge is formed by a more or less coherent mix of curricular and experiential knowledge.

These considerations, according to researchers such as García (2007), point out that "Teaching practice is not only an object of the knowledge of the sciences of education but also an activity that theorizes various forms of knowledge that can be called pedagogical, which are presented as doctrines by educational practice" (p. 57). Broadening the term, personal and normative reflections lead to the system, more or less coherent in pedagogical knowledge representing educational activity in the university system.

Based on the review of specialized literature, the investigation has had as objective to demonstrate the effects of the application of didactic strategies for the development of competences and complex thought in the students of the Major in Systems Engineering in a public university of Lima. And the hypothesis the application of didactic strategies produces significant effects in the development of competences and complex thinking in students of the Systems Engineering Major at the National University of Cañete.

Materials and method

The research was of the applied type and explanatory level. As a general research method, we used the scientific method and as specific methods, the experimental method, the statistical method and the hypothetical deductive method.

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In this regard, Ávila (2001) states that "applied research is interested in the application of knowledge to the solution of an immediate practical problem, seeks to know how to do, to act, to build, to modify, is concerned about the immediate application on a concrete reality" (p. 38).

According to Pardinas (2004), "the scientific method consists of the succession of steps we must take to discover new knowledge or, in other words, to test hypotheses that explain or predict behaviors of hitherto unknown phenomena" (p.72).

The study population consisted of 325 students duly enrolled in the 2019-II cycle, all of them belonging to the Professional Career of Systems Engineering of the National University of Cañete.

The study sample was not taken probabilistically and was made up of 23 students from the 10th cycle of the university.

After having selected the appropriate research design that was the pre-experimental according to the study problem and objectives, the scheme is shown below:

GE: 0_1 X 0_2
Where:
GE: unique experimental group.
0_1: Application of the Pre-test.
0_2: Application of the Post-test.
X: Manipulation of the independent variable.

Various research instruments have been designed, which were objective/essay-type pedagogical tests to measure the cognitive component of competences, a rubric to measure the procedural component and an attitude scale to measure the attitudinal component, as well as the inventory to measure complex thinking, the same ones that previously passed the Reliability criteria (Cronbach's Alpha = 0.964) and Construct Validation (Confirmatory Factor Analysis = 0.992) Then we proceeded to collect data, for this we first proceeded with the letters of informed consent to the members of the specified study sample to proceed with the practical execution of the research. Pablo (2007).

Analysis and results

Before implementing the three didactic strategies mentioned above (problem-based strategy, collaborative learning strategies, and the embedded ICT strategy), the following results were achieved:

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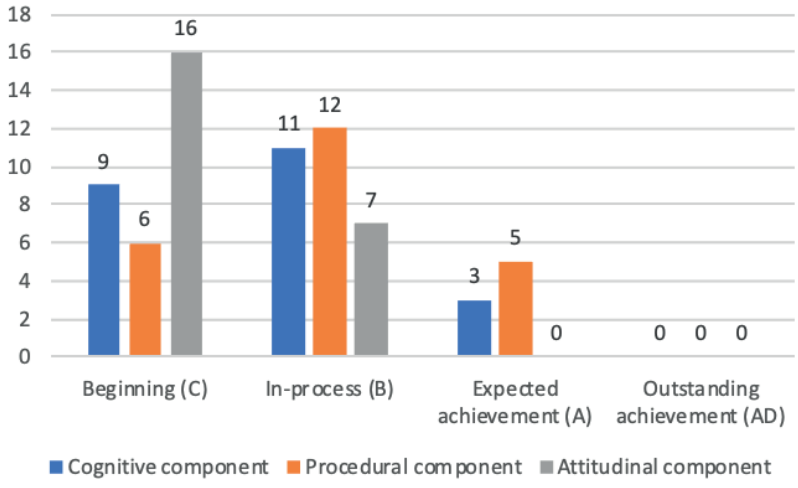
Figure 1
Pre-test development of competences



Source: Database of researchers.

Regarding the achievement of competences, in the pre-test, of the 23 students of the Systems Engineering Major, in the cognitive component, there are 9 students at the beginning level (C), 11 at the level of process (B), and 3 in the expected achievement level (A), in the outstanding achievement level (AD) there were no students. In the procedural component, there are 6 students at the beginning level (C), 12 at the in-process level (B), and 5 at the expected achievement level (A), and at the outstanding achievement level (AD) there were no students. And finally, in the attitudinal component, the scores are even lower, since there were 16 students at the beginning level (C), 7 at the in-process level (B), and no student at the expected achievement level (A) or Outstanding Achievement (AD), which was very concerning.

Now, the results will be appreciated in the dimension complex thinking.

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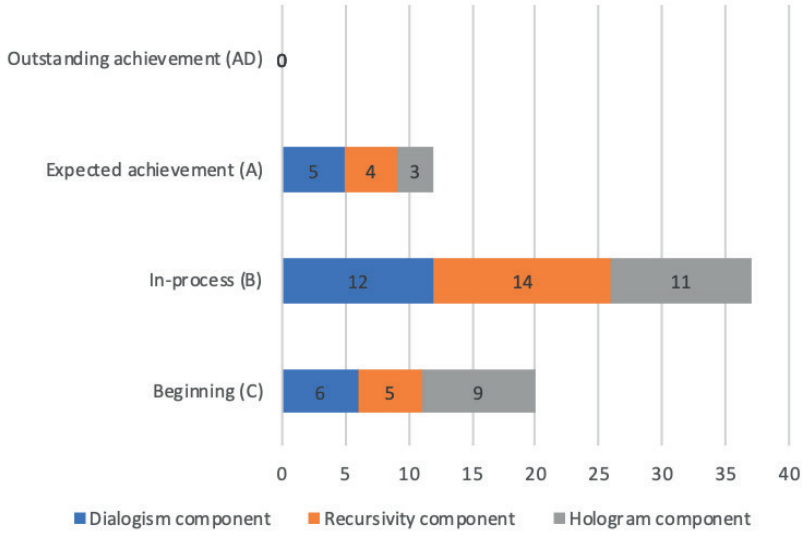
Figure 2
Pre-test development of complex thinking



Source: Database of researchers.

Regarding the levels of achievement of complex thinking, also in the pre-test before the application of the three didactic strategies, it was found that, of the 23 students of the Systems Engineering Major, in the dialogism component, there were 6 students in the beginning level (C), 12 in the in-process level (B), and 5 in the expected achievement level (A), in the outstanding achievement level (AD) there were no students. In the recursivity component, we had 5 students in the beginning level (C), 14 in the in-process level (B), and 4 in the expected achievement level (A), and in the outstanding achievement level (AD) we did not have any students. And finally, in the hologram component we had 9 students at the beginning level (C), 11 at the in-process level (B), and at the expected achievement level 3 students, and at the outstanding achievement level (AD) no students.

Let us now look at the results of the post-test, after the implementation of the three didactic strategies (problem-based strategy, collaborative learning strategies, and the strategy of incorporating information and communication technologies), planned in 15 learning sessions during the 2019-II cycle, the results of which are shown below:

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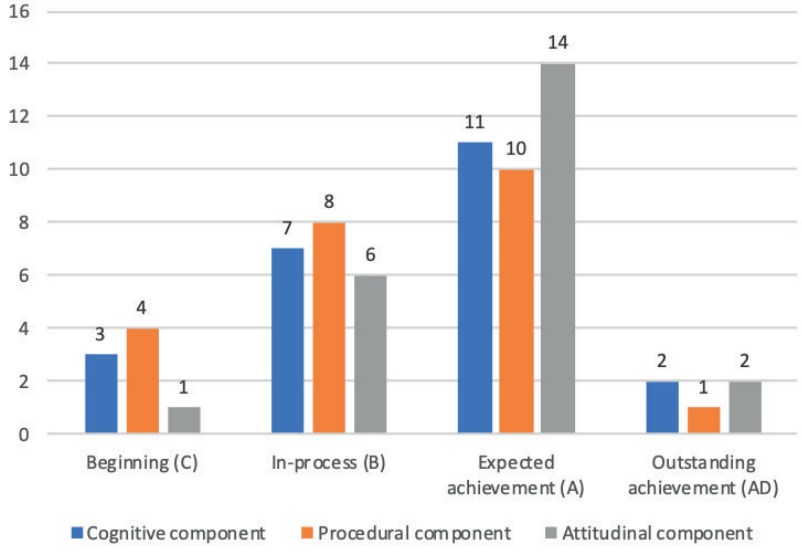
Figure 3
Post-test development of competences



Source: Database of the researchers

Regarding the achievement of the development of the competences, in the post-test, we got that form the 23 students of the Systems Engineering Major, in the cognitive component, there are 3 students in the beginning level (C), 7 in the in-process level (B), and 11 at the expected achievement level (A), and 2 students at the outstanding achievement level (AD), this being a good indicator of achievement. In the procedural component, there were 4 students at the beginning level (C), 8 at the in-process level (B), 10 at the expected achievement level (A), and at the outstanding achievement level (AD), only one student. And finally, in the attitudinal component, it is now even better, since there was 1 student in the beginning level (C), 6 in the in-process level (B), 14 students in the expected achievement level (A) and 2 students in the Outstanding Achievement Level (AD).

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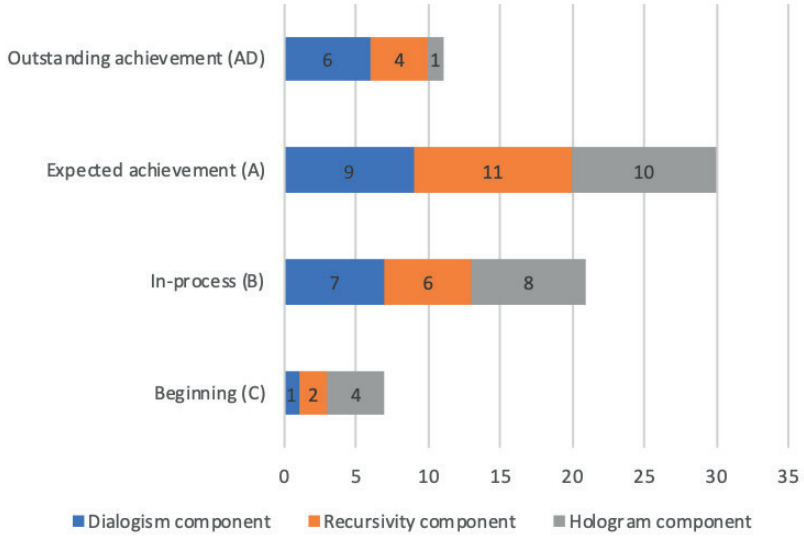
Figure 4
Post-test development of complex thinking



Source: Database of the researchers

Regarding the levels of achievement of complex thinking, also in the post-test after the application of the three didactic strategies, it was found that, of the 23 students of the Systems Engineering Major, in the dialogism component, there was 1 student in the starting level (C), 7 at the in-process level (B), 9 at the expected achievement level (A), and at the outstanding achievement level (AD) there were 6 students, which is very favorable. In the recursivity component, we had 2 students in the beginning level (C), 6 in the in-process level (B), 11 in the expected achievement level (A), and in the outstanding achievement level (AD) we had 4 students. And finally, in the hologram component we had 4 students in the beginning level (C), 8 in the process level (B), in the expected achievement level 10 students, and in the outstanding achievement level (AD) a single student.

However, with regard to the general hypothesis test, the Wilcoxon statistic was used.

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Table 1
Mann-Whitney Test. Ranks

	Group	N	Mean Rank	Sum of Ranks
Evaluation	Pre-test	23	90.64	16315.50
	Post-test	23	270.36	48664.50
	Total	46		

Test Statistics

	Evaluation
Mann-Whitney U	25.500
Wilcoxon W	1315.500
Z	-16.476
Asymp. Sig. (2-tailed)	.006

a Grouping Variable: Group

The contrast of general hypothesis.

Null hypothesis: H_o: The application of didactic strategies does not produce significant effects on the development of competences and complex thinking in students of the Systems Engineering Major at the National University of Cañete.

Alternate hypothesis: H_1: The application of didactic strategies produces significant effects in the development of competences and complex thinking in students of the Systems Engineering Major at the National University of Cañete.

Level of significance or risk: $\alpha = 0.05$ or 5%

Test statistic calculation: N = 23, Wilcoxon W = 1350

Statistical decision: Since (p-value: 0.006 <0.050), consequently, the null hypothesis (H_o) is rejected and the alternative hypothesis (H_i) is accepted.

Statistical conclusion: It is concluded that the application of the didactic strategies has produced favorable and significant effects in the development of competences and complex thinking in the students of the Systems Engineering Major at the National University of Cañete.

Discussion and conclusions

As can be seen from the statistical tables, three teaching strategies have been used as a independent variable (problem-based strategy, collabo-

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rative learning strategies, and the embedding ICT strategy), it has thus been possible to demonstrate its results in the dependent variable which is the development of competences and complex thinking, the results of which are favorable by comparing the pre and post-test respectively. In this sense, the assessment of learning for Villarroel and Bruna (2019) "is one of the teaching practices that has shown the greatest impact on students' learning. The way in which they are evaluated shapes the quality of the results, skills and competences that apprentices will achieve (p. 501).

Likewise, learning is related to making use of knowledge for something. This can be the understanding of a social phenomenon, the resolution of a disciplinary problem, or the evaluation of the quality or effectiveness of a product.

Definitively, according to Manzanares and Santamaría (2016) the way in which one evaluates students is crucial at the moment of measuring, making an assessment and making decisions, as mentioned.

According to Kerlinger and Lee (2002), in the experience of measuring competence development, the pedagogical test was first used to measure the cognitive component, then a rubric was used for the procedural component, and, finally for the attitudinal component the attitude scale was used. And for the complex thinking sub variable, an inventory was used, all of which compulsorily passed through the reliability and validity criteria prior to their application.

Now, as there was a significant improvement, according to Barberousse (2007), "theoretical production is never an attempt at finished achievement, but rather a process that, in its very transformation, marks a cognitive course in which we are invited to participate" (p. 9). His work must therefore be understood not only in terms of its content, but also of its production process.

From this point of view, there is an urgent need to innovate the evaluation process, but with theoretical support that demands a holistic activity involving all educational actors, which in our case is the National University of Cañete.

Now, while it is true for Murray (1995) "in teaching, the teacher must not develop an intervention characterized by its one-way relationship in which the only voice" to be heard is that of the teacher himself, but must give rise to the student's voice (p.154). This is nothing other than the manifestation of his ability to think and construct meanings, just as in the process of evaluation, the pupil must find a place to express meanings from his own perspective.

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Taking into account this complex process of education and the classroom-mind-social vision as a central element of a new didactic vision of education, which breaks with traditional teaching and learning models, it incorporated a new element, the *educational loop*, that is, the back and forth element of any learning and teaching process. There are processes of variable educational change that lead the student to learn, unlearn and relearn knowledge.

For Gonzales (2002) the classroom-mind-social is in itself a loop, which in educational complexity allows the setting of models of meta complex classroom planning with spiral forms, iconic, circular, double icon, and others. Beyond the simple or reductionist model of conducting a conventional class.

Based on the statistical data there is sufficient evidence to affirm that the use of didactic strategies, have been favorable to promote the development of competences and also complex thinking in the classroom, In this sense, Trigos (2011) concludes that these strategies correspond to the need for transversality in integral learning and formation. Thus, at present, the University of Rosario has common competence programs in the areas of language, logic-mathematics and ethics, which are taught in the first semesters of undergraduate studies through the Rosarist Training Core and Basic Core.

However, it is expected that the subjects that students take throughout their careers will promote and strengthen these initial competences, so that the student will gain in complexity and dexterity over time in the higher cycles. Something similar happened at the beginning, in the Professional Career of Systems Engineering of the National University of Cañete, where the subjects of the 2016 curriculum have promoted and strengthened the general competences of the career profile. In addition, they have helped students of the last cycle to consolidate in their training the complexity and skill with respect to the profile of the graduate in the last cycles of the career.

For Ordoñez, et al. (2011):

> Bringing to the classroom the advances of research on learning, the needs and challenges of current life and the professional field, the questions about the complexity of reality and the use of ICT are some of the elements that have been considered in this project, in addition to proposals for new approaches to evaluation. The contribution of teachers is their reflection on the impact that innovation on their teaching practices has had on the achievement of meaningful learning by tea-

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chers and, at the same time, the explicit process for transferring their experience (p. 205).

Problem-based strategies, cooperative learning and the use of ICT in the university classroom, specifically in the Systems Engineering Career, have had a positive impact, not only in terms of academic achievement, but also in skills and abilities specific to the profession, also without neglecting the attitudinal aspect, added to the holistic training of problem solving, through experimentation itself.

Conclusions

It has been demonstrated with a level of significance of 5%, that the didactic strategies have favored significantly (p-value: 0.0060,050) the development of the competences (74%) and the complex thought (64.25%) in the students of the Professional Career of Systems Engineering of the National University of Cañete in Lima-Peru.

It has been determined that the problem-based teaching strategy has benefited significantly (p-value: 0.0080,050) the development of competences and complex thinking in students of the Professional Career in Systems Engineering of the National University of Cañete in Lima-Peru.

It has also been determined that the collaborative learning strategy has benefited significantly (p-value: 0.0000.010) the development of competences and complex thinking in students of the Professional Career in Systems Engineering of the National University of Cañete in Lima-Peru.

And finally, it has also been determined that, the incorporation of information and communication technologies has favored significantly (p-value: 0.0000,010) the development of the competences and complex thinking of the students of the Professional Career in Systems Engineering of the National University of Cañete in Lima-Peru.

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Philosophical dialogue as adventure and experience that heals

El diálogo filosófico como aventura y experiencia que cura

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"For man, when is one thing important? Undoubtedly,
when it may hurt him. Our body shows us its
importance when it hurts us; and a friendship
or a love is worth when it can be cause of pain, and only then"
(Lain Entralgo, Pedro, 1969).

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Abstract

The problem to be solved in this text is the contribution of philosophical dialogue as an adventure and experience that heals. The text is justified every time that in the face of a philosophical experience in which fundamental questions seem to be the source of philosophical work, dialogue appears as an excellent opportunity to transform existence and cure the ills that afflict postmodern man. The objective of the text is framed in the life experience of the philosopher who has dedicated his entire life to answering existential concerns but who at present is betting on dialogue as the best way to cure the ills that afflict us. The curative experience from philosophizing transforms the human being and prepares him to face the great problems of his daily work. The used methodology was of descriptive approach in which the sources allowed to approach the dialogical argumentation of philosophizing. The intimate experience of philosophy occurs thanks to the philosophical dialogue that, more than a method, is an experience that enables the relationship with myself, with others and with things through the word, reason and feeling that arises in the becoming of dialogue itself; this is what leads us to understand dialogue as an experience that heals and transforms. Through philosophical dialogue, self-knowledge is achieved that has the power to heal, heal, repair and transform the human person, the "man of flesh and blood".

Keywords

Philosophy, dialogue, philosopher, advice, transformation, relief.

Resumen

El problema que se pretende resolver en este texto es el aporte del diálogo filosófico como una aventura y experiencia que cura. El texto se justifica toda vez que ante una experiencia filosófica en la que las preguntas fundamentales parecen ser la fuente del quehacer filosófico, aparece el diálogo como una excelente oportunidad de transformar la existencia y curar los males que aquejan al hombre postmoderno. El objetivo del texto se enmarca en la experiencia vital del filósofo que se ha dedicado toda su vida a dar respuesta a inquietudes existenciales pero que en los actuales momentos le apuesta al diálogo como la mejor manera de curar los males que nos aquejan. La experiencia curativa desde el filosofar transforma al ser humano y lo prepara para enfrentar las grandes problemáticas de su quehacer cotidiano. La metodología utilizada fue de enfoque descriptivo en la que las fuentes permitieron acercarse a la argumentación dialógica del filosofar. La experiencia intima de la filosofía se da gracias al diálogo filosófico que, más que método, es una experiencia que posibilita la relación conmigo mismo, con los otros y con las cosas a través de la palabra, la razón y la sensación que surge en el devenir mismo del diálogo; esto es lo que lleva a entender el diálogo como una experiencia que cura y transforma. Por medio del diálogo filosófico, se logra un autoconocimiento que tiene el poder de curar, sanar, reparar y transformar a la persona humana, al "hombre de carne y hueso".

Palabras clave

Filosofía, diálogo, filósofo, asesoramiento, transformación, alivio.

Introduction

The twenty-first century is characterized by multiple circumstances and phenomena involving a particular type of human behavior. Man, in the midst of so many possibilities that the current culture presents to him, enters an apparent crisis that many call a disease or that is morally cate-

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gorized as something bad or harmful, but is the human person of today really sick? Does the diversity in which he lives and the possibilities of all kinds make him sick? These are recurring questions to which timely answers are hard to find.

In the cultural context, phenomena such as pluralism, nihilism, dynamism, neoliberalism, spiritualism, scientism, among others, occur. These phenomena are evidence of a complex and heterogeneous historical moment, where everything flows rapidly and in synchrony. The coexistence of different ideologies, creeds, philosophies and methods has placed the human person in a labyrinth from which it is difficult to emerge, causing people's intimacy to develop profound contradictions that are understood as unhealthy, divergent, insane, bad or grotesque.

This experience of a "labyrinth" makes us feel the "flesh-and-blood man" concept employed by the Spanish philosopher Miguel de Unamuno (1986) -at a crossroads, where existence becomes totally paradoxical because of the multiplicity of options, ways and experiences that this historical context offers, because they put man in contradictory situations and lead him to an intimate conflict between different instances of his being. So much diversity has made some think that this era is in 'crisis'. An affirmation that is given since, when such diversity arises, there is a tendency to think that the solidity of tradition is directed at the deepest nadirs of cultural memory and that chaos is imposed as a new cultural *ethos*. These conceptions lead, in a natural way, to understand the man of the twentieth and twenty-first centuries as a sick being.

In this context man lives circumstances such as loneliness, connectivity, social networks, voracious consumerism, pragmatism, utilitarianism, spirituality, science, technology, progress, etc.; phenomena that have led the person -each person- to an apparent disenchantment from life, from his acts, from his thoughts, from his feelings, even from his projects. The man of flesh and blood discovers the need to look for tools, techniques, ideas, methods that will serve him to get out of the seeming nonsense of all these named circumstances.

In the midst of this panorama, philosophy emerges as an alternative and a proposal to address these issues, thus it is pertinent to elucidate some questions: Has philosophy contributed to this disease or sickly context? Could philosophy cure? Is it possible to speak of therapy or accompaniment to refer to the effects that philosophy has on the one who appropriates it? What is the method that philosophy has for this? Philosophy has had an important influence on the development and conceptualization of the world because thanks to the questions raised

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and formulated in the relationship of man with the world, to the answers emerging from this relationship, the philosopher has been able to propose categories and abstractions necessary to understand, name and do in the world, this being the great service that philosophy renders to humanity. However, there also appears a second natural service of the being and the philosophical task, which is the therapy of the soul through advice, accompaniment and thought; as Sánchez says (2011):

> We must return to the original sources of philosophical thought, for only when philosophy recovers its strength and self-confidence; only when thought resurfaces with vigor can humanity be rendered the service that philosophy owes it (p. 32).

This text addresses, in an exploratory way, the problem of whether philosophy can, as an advisor on the way to a healing experience, serve in a cultural context of such ample possibilities for people to address and 'resolve' those circumstances that represent problems or difficulties in their lives. For this, a method that for philosophy is as old and familiar as humankind itself will be investigated and proposed: dialogue.

The proposal will be presented in three moments. At first, some considerations are made about anguish and suffering as phenomena that occur in the intimacy of man of flesh and blood. Secondly, with philosophy understood as a healing experience of the one who, in the midst of his circumstances, is distressed and hurting and in a third moment with philosophy as a dialogue that facilitates the process of knowledge in the ways of oneself, of others and things and therefore of healing.

The human being: anguish, pain and life

Today's culture has presented two interesting concepts that seek to describe the circumstances in which man lives today, which flow in the multiplicity and plurality of possibilities that surround man in his life. All this puts man, the philosopher, in the face of routine, that is, to see and make his life an infinite circularity of actions that begin -in time- to lose meaning and that the person loses his own meaning -of life-. About this Carmona (2019) explains:

> The routine is configured as the great danger. Tired of the same, human beings often feel even pleasure as a penalty and eternal happiness as a punishment. The Stoic[1] affirms that, moreover, wanting to change, they

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> arrive at the same thing and feel the absurdity of existence, a weight that they seek to alleviate with death (p. 121).

In this perspective, is the human person sick or only living in the circumstances presented to him by his history and culture? It is a question whose difficulty lies in the syncretism that mixes thoughts, creeds and particular circumstances that, despite their differences, seeks to harmonize and generate comfort and ease of living. The person is not to be considered a sick person; he should only be considered a radical living being in pluralistic cultural circumstances. In this sense it is pertinent to use, as has already been done at the beginning of this text, the concept put forward by Unamuno (1986) in his work: the tragic feeling of life: «a man of flesh and blood».

The person is presented with innumerable possibilities that, surprisingly, lead him to contradict himself. Apparently, it may be a manifestation of a disease, but it is only the most radical way to live. Unamuno (2003) expresses it as:

> Someone will see a background of contradiction in everything I say (…). Contradiction? I think so! The one in my heart that says yes, and my head that says no! Contradiction, naturally (…). Contradiction! naturally! As we live only by contradictions, and for it; as life is tragedy, and tragedy is perpetual struggle, without victory or hope of it; it is contradiction (p. 11).

This contradiction generates, in those who live these paradoxes, a pain that is not easy to assimilate and understand, when it appears there is the "false conception" of illness, which becomes questions that point to the knowledge or ignorance of oneself.

Under this horizon, man is not a sick or abnormal, he is only a living person, someone who inhabits, builds, seeks and experiences himself in and from the paradox, the anguish, the pain and, therefore, the lived life.

The difference in doing, thinking, saying, believing, creating, solving becomes abnormal, but this is nothing more than the possibility of bringing the person to the deepest and most sublime of himself. On this same horizon, human life is dynamic, dialectical and paradoxical. There is a Heraclitean dialectic where, according to Cárdenas y Fallas (2006):

> Nature does not miss statism, its otherness, plurality and unity are consented to in the eternal mutability, in that wave that takes everything and brings it, in that way up and down that they are one and the same (p. 23).

Like nature, the whole universe, the life of the person and, therefore, culture and society are inexorably characterized by dynamics, dialec-

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tics and paradox. In this regard, Unamuno (2007) states that "The man of today is not the man of yesterday or tomorrow, and as you change, change the ideal that you forge from yourself" (p. 315).

The contradiction is natural to the very fact of living. When the contradiction emerges, the paradox does so from within, from intimacy, making us think that what emerges is deposited in a trunk that, in many moments is the trunk of oblivion and, in others, the chest of treasures, this will be called the trunk of intimacy. And is the contradiction actually facilitating or leading to the knowledge of the person himself, leading to the opening of the intimacy trunk? Also, how to penetrate or open the intimacy trunk?

This metaphor leads to think of the trunk as an object that contains other objects, but the meaning of the trunk is multiple; objects that may be a treasure, or objects that are intended to be forgotten or are useless or have lost the value people give them are placed there; any of the meanings referred to makes one think that the object contained there was or is an important or fundamental part of a person, also they are or were known by the one who has deposited them there, even if time takes, possibly, implacable towards oblivion. If the contents of the trunk are treasure, it becomes imperative to search for them. So, what is the treasure that a person can keep or search for so vehemently? It is, of course, your intimacy, your being, your "self"[2]. Therefore, the intimate treasure has always been there, inside, but philosophy has, or may have, the right tools for searching and opening of that trunk.

The contradictions that, in many occasions, assault life generate an intimate struggle in the flesh of man, mediated by the questions that lead to the recognition of knowledge or ignorance about something or about himself, according to Carmona (2008):

> Questions, paradoxes and eternal contradictions, that is man, an enigma for himself; a assiduous inhabitant of caves and labyrinths (…) for Seneca man has as his mission to construct himself, we proceed from the premise that man is an incomplete being and thus must face his existence from the first moments; he must then commit his forces with the aim of achieving meaning, which will be based on the practice of virtue, or in the imperative tasks of accomplishing them (p. 67).

Thus things, the contradictions or paradoxes of life lead to the process of self-knowledge, and questions are the means to achieve this goal. But there is a goal: intimacy, the "inside", as explained by Unamuno (2007):

> Instead of saying, go ahead! or up! say: inside! Concentrate yourself to radiate; Let it fill you so you can overflow, conserving the spring. Collect

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> unto yourself to better give yourself to others, as whole and undivided. I give what I have, 'says the generous one; 'I give what I worth', says the self-sacrificing one; 'I give what I am', says the hero; 'I give myself', says the saint; and you said with him, and by giving yourself: 'I give with me the whole universe'. For this you have to become a universe, looking for it within you. Inside! (p. 320)

Intimacy appears as that trunk which is and contains in itself the riches of the person. But the question remains: What is intimate life? It should not be understood as something that is hidden or flees from the person, on the contrary, it is the most obvious phenomenon[3], that is, its humanity itself, understood as the body, the thoughts, the history, the space, the spirit, the acts, the feelings, emotions, decisions, consequences, others. In this sense, the intimate is the whole man. When man doubts, thinks, feels, does so with his whole being; Unamuno (2003) expresses it like this: "This other doubt is a doubt of passion, it is the eternal conflict between reason and feeling, science and life, logic and biotics" (p. 78). The author does not speak of intimacy as something superhuman, alien, distant, enigmatic, abnormal, rather it is named and described as the closest and most constitutive of the human person.

All this experience described as the paradox of intimate life appears as something painful, that is, as an uncomfortable sensation that has repercussions in thought and therefore in language; the reality of anguish and pain becomes an awareness of life, for it is only when pain and anguish emerge that one feels and thinks of life -lived and to live- it is in suffering -in anguish -that a process of conscience begins that is sick, because "conscience is a disease" (Unamuno, 2003, p.14). On this same point Linares Huertas (2019) in his doctoral thesis states:

> The anguish, it shakes, it attacks, but it reveals to the individual his being free to choose himself, his lack of essence or destiny determining his life. It is an experience in which the world shows itself to be lacking in determination for the subject, forcing him to take the reins of himself (p. 22).

The question, arising from pain and anguish, awakens the conscience, therefore, to ask is the calling and the task of philosophy and the philosopher. An approximation to this could be the one proposed by Unamuno (1986):

> My endeavor has been, is and will be for those who read me to think and meditate on the fundamental things, and it has never been to give them thoughts made. I have always sought to agitate, and at best suggest, rather

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> than instruct (…). I declare myself incapable of it and claim my freedom, my holy freedom, even to contradict myself, if it comes to that (p. 259).

The philosopher's task is not to provide ready-made answers but to formulate problems and to accompany and facilitate the construction of answers. Philosophy is a living knowledge, which beats in systole and diastole, that is, it has a reflective and transforming character.

Philosophy as a life experience that transforms and heals

In the relationship that man has built with the world that surrounds and inhabits him, he has been forced to know, know it and know himself. The human person has developed the possibility of forming a community to protect himself from other beings of nature that are potential predators and threaten the permanence of human individuals in the world; also to defend themselves from their fellow humans therefore, in interaction and relationship, conflict and differences lead to genocidal and fratricidal attitudes.

In community life, the human person has a direct or indirect encounter with himself, due to the encounter with others and with things; in this encounter, questions arise that provoke in people and societies uncomfortable feelings that seem to make them sick.

In this way, the question 'who am I?' emerges from the dialectic between the self and the other, both in equal conditions of discovery and construction; 'I', is an interaction that, in many cases, does not manage to be dimensioned, it is only in the relationship and in the dialogue that we can start to go deeper within it (the self). It is at this point that philosophy appears as a possibility in the process and the way of entering into the unknown identity of self; then, the philosopher asks and must ask the questions that are sickening, sickening because they worry, cause discomfort, cause deep anguish and arouse the sleeping curiosity to know oneself. On this point, Rafael Sánchez (2011) states:

> Philosophy has the function, in our modest opinion, of clearing the pond of human life to see clearly and, in a way, to appreciate the meaning of things and their scope. Philosophy has to clarify (purify, oxygenate and diaphanize) realities of human experience such as ontology, nature, knowledge, bodily existence, intersubjectivity, articulated language, aesthetics, religious experience (phenomenology of religion), axiology-ethics, etc. In other words, it is necessary to 'remove the veil', to reveal that reality which is incomprehensible, blurred and incomplete (pp. 108-109).

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To know oneself in a process of self-awareness, of contemplating the circumstances that I inhabit and inhabit me; circumstances engendered by the culture that we constantly face but that, in many moments, we feel that we are getting sick.

In this context the relationship that the person establishes with himself is one of consumption, that is, it is considered important or more human to the extent that it is approved by another in groups or small communities, the person easily loses the sense of himself to the extent that he does not visualize himself as a human person but as something that must be consumed; thus, being and living are a privilege that few enjoy. We spend our lives trying to please others who forget to live our own lives, lest when we realize that it is too late. At some point in life and thanks to others, we must return to those questions that are sickening because of how disturbing they are: Where did I come from? Where am I going? What can I know? And the most important: Who am I?

Underlying this question are other equally stormy and possibly distressing and painful questions: What do I want? What do I have? What do I feel? Why do I do what I do? Why do I do it? What will happen to me when I die? Will death be the absolute end? When these questions assail deep intimacy[4] and we struggle to find the answer; on these questions and answers appears the rational or moral judgment of insanity-illness a logical result of that which logic does not manage to encompass. When these questions emerge from the lived intimacy, they lead the person to know himself in the relationship with others.

It is often said that man is the only being who knows he is going to die. Carmona (2019) makes an interesting allusion on this point: "Death is the limit of all our vanities; in it, all eagerness, all desire, and all desire for power converge" (p. 110). It's true, we're finite, our time is counted. But it's not just that, it's not just a fear of dying, as an event that eventually has to happen at some point in our future; much less is it the uncertainty of not knowing what's going to happen next; or even the certainty of knowing what's not going to happen. The finitude of man, the experience of one's own death is lived, not as a psychology of fear nor as a problem of knowledge, our finitude is experienced every day, when we find in ourselves an imprint of the infinite.

It is precisely in this confrontation between finitude and infinity that man becomes finite in a more inescapable way. Because that violent discordance that man is, refers him incessantly to the power that bases him. To put it another way: from the inside of his own being man relates

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to the Other that he is not, but to which he is necessarily linked. About this Jaramillo (2006) in his philosophy as a medicine, states:

> What is thought as an answer to our questioning will hardly become a universal work. For this reason, some and most of them assume their own response. Thus, men speak to themselves without the desire to transmit. They feel safe in their cave. However, it must be borne in mind that, if we exist, we do so not only and exclusively by ourselves, but by our relationship with the other and with the other, by the gallop of otherness (p.15).

The relationship becomes a dialogue that will be characterized by mutual listening, by the question as the access key to mutual knowledge and dialogue as a transformative element. In this way philosophy emerges as a medicine that transforms -sick- ignorance or knowledge into wisdom.

The question is uncomfortable because, as Socrates understood and practiced, it presupposes a vital disposition to seek without boastful assumptions a true and absolute knowledge of oenself, of others and of things; about this Mantovani (2011) refers to by saying: "Dealing with philosophy means, therefore, transmitting a passion that stimulates deepening, does not settle for superficiality, does not hide the problems behind easy conciliations" (p. 77). This Socratic attitude and practice was considered in his time madness and crime, and today this attitude is taken into account, as Professor Carmona (2002) states: "The question keeps us awake at night, does not allow the tranquility of what has already been conceived and mastered, it is an uneasy and destabilizing path" (p. 98).

These questions make us sick and distressed in the traditional language of modern rationality because they make us aware of what we are, what happens to us, what we want, what we lack; thus, as said by Unamuno (2003), man is "(…) a sick animal" (p. 14), if man, in this sense, is sick, he needs a cure[5]. Philosophy must be seen as a contemplative, meditative and transforming knowledge:

> Philosophy, as an exercise of meditation on inner life, does not free us from real human misery, but allows us to understand it as possible or real life at that particular moment, but proposes to put ourselves above this reality and take the path of inner life, of the Sui priest, winking at fortune, taking advantage of time and turning it into an ex pression of being. Do not worry about outside circumstances that we cannot change, take care of yourself, as we strengthen understanding and acceptance of the nature of things. This activity does not eliminate the pain or tragedy of living, it seeks to make it an aesthetic of living, as long as it

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> accepts it with irony and strength. The end of the life of Socrates and Seneca is proof of this (Carmona, 2019, p. 111).

The path of contemplation and meditation, leading to the transformation of inner life, is the philosophical question. The human person constitutively possesses and has developed the question; it appears as a substantial and constitutive element of the human person to make himself to the world and to make his world. In philosophy, the question has a special disposition and character; in philosophy the question can have two ends -that, although they seem different, aim at the same thing and are science and self-knowledge; in both, knowledge is the goal; the question is not an instrument, is the path.

Man asks for everything, the material and the immaterial, the necessary, the not so necessary, for others and for himself… for everything. The human person, in his interaction with what surrounds him, is assailed by the curiosity that always mobilizes him to knowledge and its deepening; the questions are inherent to the human being.

As tradition shows, philosophy asks questions that lead to the knowledge of the reality that surrounds the human person and with which he or she relates. The Greeks wondered about the 'physis', that is, that which was their all and in which was all (heaven, earth, gods, men, arts, laws, nothing, etc.), then they wondered about man; also philosophy asked about God, power, beauty, knowledge…; as can be seen, man -the philosopher- asks for all that is worthy of thought and knowledge. Philosophy has also asked itself about the man of flesh and blood, as Miguel de Unamuno (2003) puts it: "and this concrete man, of flesh and bone, is the subject and the supreme object of all philosophy, whether he likes it or not" (p. 3).

In both cases, the philosophical question is and must be objective and rigorous in order to achieve both ends (science and self-knowledge); however, the philosophical question, not only possesses these two characteristics, also enjoys others, the philosophical question is ironic and critical. About this, Tinajero (2011) states:

> So it is important that the spirit does not lose itself in vain abstractions or allow itself to be imprisoned by the ghosts of the imagination, and understand that every inner monologue -or "dialogue" with itself, if you will- is always the internalization of a social dialogue; if we are not clear, we end up getting the self to tell the conscience what it wants to hear beforehand (p. 49).

Socrates, Nietzsche and Unamuno understood and made of the question a vital experience in practice, that is, they made way to enter

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into intimacy, to achieve a goal more sublime than the mere knowledge of the "physis" or "ideas", the 'knowledge of self'. On this Carmona (2002), speaking of the strength of the dialectical method, says:

> It does not establish truths, it undoes opinions and beliefs, it staggers everything that has no firm argumentative support, it brings out doubt in front of knowledge that was believed solid because it is rooted in tradition. The question has that effect, it does not claim truth as an answer, it wants to undo ideological assumptions and show the weakness of its arguments and their unsustainability. The next question wounds pride, betrays ignorance, strips, disarms; later it tries to build a path of reasons, of everyday evidences, simple but forceful (p. 98).

One can clearly see the approach of a method based on reason, but in speaking and asking for the human person, arguments are not just a rational or logical matter. The question must lead the 'flesh-and-blood man' to feel and think from the concrete of his life. The philosophical question, rather than a method, must be an inner experience of oneself and of the world that is inexorably given.

The philosophical question is ironic because it leads each person to identify his own ignorance -that of himself and of the world- because it reveals the truth of 'the made truths',[6] 'is ironic because it shows, without modesty and rightly, that which science or the person does not want or cannot clearly see, because it is a question that takes us away from the comfort zone, from the automatism, from the knowledge elaborated and structured of ourselves, of the others and of the things generating a discomfort that is natural at the moment of having come out of the darkness of a cave in which it has been for a long time. In the text In *Dialogue with the Greeks*, Fallas (2006) states about the first Socrates presented by Plato:

> Socrates here shows his apparent irony, that more than a cruel attitude towards the disciple, it is only a gesture of confidence in the possibilities of his discernment. There is no mockery, as is evident in Eutropism, where, more than a dramatic dialogue, there is a perfect comic representation of two street children, as we say by their coarse and rude art of pancreaty, stuck to doctors of thought. No, the ironic capacity of Socrates overcomes mockery, translating it into a feeling of surmountable impotence in the disciple, and even in the possible opponent.
>
> All that remains is to resume the discourse that is managed and to see its weaknesses from within, knowing that we are in search of a truth and that what we had assured was partial, made us insufficient. Refute, but as a synonym of arguing.

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> To be able to be ironic with oneself may be the mission: to know myself in front of the universe of understanding in front of me, and perhaps to know that in the end I make a fool of myself with it, because being an old man I could not offer him an alternative -taken from Lysis- (p. 82).

The question has an ironic mood that leads those who ask and those who are asked the question to enter into the intimacy of the world and to bring the world into their intimate lives; the scientific question about the world also leads to the intimate question about the life of those who ask. Two examples of this are the two great scientists of the twentieth century, Einstein and Hawking, who, from their questions and answers for science, generated other reflections on the environment, happiness, politics, god, life, death, time; these are produced by the intimate relationship of these with their questions, that is, that when formulated presents an object that must be thought, felt, analyzed, created and believed, as says Gadamer (1997), not only asks to know, but to feel life, thinking about life and living life:

> To ask means to open. The opening of the question consists in that an answer is not fixed. The question remains open with regard to any decision-making and confirmatory judgment. The meaning of the question consists precisely in exposing the questionability of what is asked (...). The real question requires an opening, and when it is missing it is basically only an apparent question that does not have the real meaning of the question (...). The same applies to the rhetorical question, in which not only is there no one, but there is not even anything really asked (p. 440).

The question does not in itself contain an answer; rather, it seeks the answers as it articulates the relationship of the person asking with the object asked, that is, it opens the possibilities of knowledge that naturally result from the question. Those who ask do so from the openness to seek, therefore, the question endows the capacity to transcend the instant, to contemplate multiple possibilities, not to be content with the apparent and to deepen constantly.

The question is an externalization of the doubt that assails and emerges from the philosopher's internality in his relationship with the environment; thus, the question manifests the natural desire to know, as Carmona (2002) expresses it: Doubt has led him to the desire to know, has put him on the path of inquiry; it is then demonstrated that knowledge is a conquest through a process, in the case of Plato, dialogical-conceptual […]" (p.105).

The philosophical question is critical because it leads to the knowledge of oneself; philosophy has used the question as a principle that points to a deep, concrete and living goal; on this Unamuno (1986), in his *Intimate Diary*, states:

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> ¡Know yourself! Repeat this constantly, since worldly wisdom has it as a principle of philosophy. But understand by them to study oneself as if were a strange being, as just a specimen of humanity, as a scientific matter, psychologically. Know your self is reduced to a cold formula of purely intellectual knowledge, to anatomic science and nothing more. But not knowing oneself a concrete and alive individual, as the individual and concrete self, a vessel of miseries and sins, of greatness and of smallness (p. 50).

Philosophy is presented as a transforming experience because in the relationship of the 'flesh-and-blood man' with philosophy begins a path of self-knowledge that transforms ignorance into the principle of wisdom; where so-called ignorance is the initial stage of a costly and painful process of intimacy that empties, breaks and deconstructs to walk towards something' that could turn out to be unknown and uncertain for the philosopher and his companion. The transformative possibility of philosophy does not lie in the achievements or responses, which possibly occur in the process, it is the process itself that transforms.

All this dialogical experience has or must have an end; this end does not remain in mere useless self-knowledge, Rather, this knowledge must lead to transformative actions and strategies-if in dialogue the accompanied person discovers the need to transform some of his convictions, ways of proceeding, ideas, etc.-.

Philosophical dialogue: an experience that heals and transforms

> "Only those who feel dissatisfied with the available possibilities of linguistic expression think philosophically, and only think in common when the indigence of those who take root in formulating statements that have to be credited for themselves is truly shared"
>
> (Gadamer, 2006, p. 88).

In referring to philosophical dialogue, one can first think of an analysis of language as the basis of the very fact of dialogue; but it is not necessary in this text to delve into reflections or studies elaborated by philosophers such as Plato, Aristotle, Saint Augustine, Wittgenstein, Heidegger, Gadamer, among others; the dialogue here is not the subject of a reflection from the field of language, is a reflection from the understanding of it as a philosophical experience and as a possibility of cure or transformation.

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However, from the structural analysis of the conversation, made by Juan A. González de Requena Farré (2012), it is pertinent to consider and identify, in the process of the dialogue, the discursive structures that occur naturally in it. We distinguish the realized movement and its discursive function, so that each turn generates at least two categories: one relative to the conversational movements and their mode, as well as another referring to the discursive functions and their range. In any case, several movements and various functions may be performed in the same speaking time. Our categories of conversational analysis of philosophical dialogue are therefore as follows:

Table 1
Conversational movements and discursive functions contemplated in this conversational analysis (p. 118)

Movement	Mode		Function	Range
Interpellation	exclamative: Tell me what you think!		solicitude	Proposition: Describe the scene to me Attitudinal: Forgive me if I offend you Metadiscursive: Are you saying that what I say is not true?
	enunciative: I think it is necessary to analyze the concepts			
	interrogative	Open; what do you think?		
		Closed: Do you think the conceptual analysis is accurate?		
Answer	Congruent: You are right		expression	Proposition: That author wrote many books Attitudinal: I can't take it anymore! Metadiscursive: We can say that this statement has to be understood as an example.
	divergent	Rejection: On the contrary I disagree		
		Evasive: I don't know what to think of your approach		

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Looking at the table, we can identify some typologies of responses: congruent, divergent and evasive and divergent Rejection. They are all part of the natural mode and process that occurs in conversation and, therefore, in philosophical dialogue; not only should philosophical dialogue be thought of as the object of structural analysis, it can and should also be subject to a reflection from its nature to find that possible restorative experience of philosophy through dialogue.

Jaramillo (2006) makes an analysis on the transformation of dialogue into language -understand the language as an object of study- with some important questions:

> All this change in language that culminates in the return to "the normal" and to the discourses of power, leads to a question that so far has not been asked: Where has been left the function of dialogue in all the discourses of techno-power? Has dialogue been removed to give way to a new myth called language, public health and normalization? Dialogue has continued since the birth of philosophy; we cannot ignore the fact that language, speech and dialogue went their long way. But the dialogical dynamics have been abandoned in the course of a manifestation involving the being, to be a formulation of diagnosis and judgment that incapacitates the person on the level of his self, self-understanding and the action of self-knowledge that unveils its interior (pp. 34-35).

It is possible to contemplate that the dialogue has been established as a normalizing mechanism that loses its character on the way to intimacy to become a pragmatic tool -in its negative sense- that is, the dialogue can be used to diagnose, stereotyping and classifying the accompanied to prescribe formulas, this implies that the companion assumes the role of judge and therapist; In philosophical dialogue, the accompanist must not establish a role of judge over his companion; his role must not be that of power or of judgment; rather, his role must be a critical conscience that questions and accompanies the process of self-knowledge.

As can be seen, dealing with the problem of philosophical dialogue goes far beyond the merely epistemological field to be seen and experienced as an intimate and vital matter. However, it must be asked: how should philosophical dialogue be so as to lead the dialoguers to the goal of knowing themselves and, in this way, to be able to do intimate works of personal transformation or healing? For dialogue transforms and heals.

Dialogue must start from a phenomenal reality such as plurality, that is, from the simple observation of those who participate in dialogue as diverse from one another, and this supposes the first stage in proposed philosophical dialogue; the recognition, this is the first step for the dia-

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logue to flow in two directions namely: "from inside to outside and from outside to inside".

Referring to recognition implies that all those who participate in the dialogue are open to see, feel, believe, think, identify themselves in the very flow of the words that intersect as questions and answers, as theses and arguments, like sharing emotions and sensations, as intimate and vital fluid.

Recognition is the diagnostic phase in this dialogue that seeks to transform, but in order to do so one must begin by recognizing what the person is and what he has in himself. This recognition is given to the extent that the intimate and vital relationship is established between those who dialogue, because sharing the experience of the discovery of ignorance and the possibility that this generates to know(oneself), facilitates the construction of a prophetic scenario, pedagogical and therapeutic dialogue thanks to philosophy.

But the recognition is not limited to the "self" in a selfish way, it becomes the recognition that the person -I or himself- makes of the other as another and, in this mutual recognition it is possible to establish a philosophical dialogue that leads to the "knowledge of oneself". In this way, in the philosophical dialogue, Jaramillo (2006) insists that "we seek to move towards the opening of horizons and senses deposited in the person. Their attachment to language but not to the norm" (Jaramillo, 2006, p. 35).

But not only recognition is one of the stages of philosophical dialogue. The second moment is the common work employing questions and answers that lead to the knowledge of oneself, of others and of the other; a process that could be called surgical since with the questions goes, gradually, making incisions in the knowledge or preconceptions that people have about themselves and about the world; this is the path to wisdom in the intimate experience of Socrates by philosophy, as expressed by Carmona (2002), namely: "to do what is proper to us and to know oneself" (p. 102). Thus philosophical dialogue is not merely instructive, it is an experience that goes beyond the innocuous and linear transmission of knowledge, to be an intimate experience of oneself and of the other in dialogue.

In this way, philosophy ceases to be intellectual or scientific or poetic or conceptual talk, to be "flesh and blood" of the one who makes philosophical dialogue a living from oneself for the other. This suggests that, in addition to the recognition of the plurality of dialogues, philosophical dialogue requires solidarity that leads me to do something for the other. Thus, the prophetic, pedagogical and transforming function of philoso-

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phy leads the philosopher to immerse himself intimately in the use of the word as a tool for penetrating and allowing himself to be penetrated by the dialoguers into himself.

The question is an essential part of philosophical dialogue, because it opens, temporarily or permanently, the doors of the person who asks himself to knowledge as a sufficient and infinite possibility. Socrates emphasizes wisdom understood as virtue, but here dialogue is concerned with the person as the beginning and end of all dialogue. Carmona (2008) refers to this as follows:

> Philosophizing will be from Socrates a double exercise of inquiry and suspicion, an exercise that will require a new attitude in the philosopher, keeping open the question, sustaining the tension of the gaze on the things of the world, on the things that concern man, to the being human of man (…) (p. 14).

Later Carmona (2008) also affirms that "Socrates is aware of his task as a philosopher: to propose to the men of his time to take care of the soul and cultivate its attributes" (p. 15), as is evident, virtue is the transversal axis of the Socratic dialogical experience, but in the present reflection is the "flesh-and-blood man" the source and end, because naturally dialogue leads to the experience of caring for and cultivating the person, not the soul, of the whole human being.

Thus, philosophical dialogue as an experience that heals and transforms must be based on an axiological premise: solidarity; dialogue is and must be solidarity.

Solidarity starts, in this approach, not from the pursuit of virtue for itself and for other citizens, but from the person, the recognition that we make of ourselves and of the other, where this recognition becomes respect, responsibility and, finally, in solidarity, which ultimately validates philosophical dialogue as an experience of counselling that enables healing or transformation. The question is presented, then, as an evidence of the solidarity of those who accompany-the philosopher-and a correspondence of those who allow themselves to be accompanied; the question is the mechanism for deepening the knowledge of ourselves, a self that is me and that is another at the same time. For this reason, the philosopher becomes a surgeon, because his questions open the intimate life of all the dialoguers to see their "the flesh and bones" without conceptual euphemisms and theories without vital foundation; philosophical dialogue must be medicine.

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But the dialogue gives rise, thanks to the continuous questions and answers, to the painful process of seeing, criticizing and deconstructing those judgments and prejudices that the dialoguers have constructed on themselves, the others and the other; this is uncomfortable. For it is not easy to contemplate the possibility of ignorance and contradiction. The apparent certainty provided by the knowledge fact -as it has been called in the light of the thought of Miguel de Unamuno (1986) - is not easy to crumble, therefore, the philosophical question must be sharp and incisive, based on ignorance as a principle and not on the knowledge established as dogma or an unquestionable and irrefutable paradigm; in this way there can be a willingness to learn and this learning generates a healing and restorative transformation.

A third phase of philosophical dialogue emerges, this is transformation, rather than substantial change, it is a process, it is hard work that begins with the discoveries achieved through the solidarity exchange of questions and answers and continues to transgress that which has always been believed about oneself and others.

But what is the first thing to be transformed? The inability to listen to oneself and others while in dialogue, to transform the reluctance to be questioned and to respond from the truth -which recognizes ignorance- to such questions. The active listening and transformation of the discourses of power that are established on the presuppositions of knowledge and life, are issues that must be worked out during the philosophical dialogue. The urgent need to assume a skeptical, and not dogmatic attitude is established in philosophical dialogue since skeptical questions lead us to discover and learn, to deconstruct to reconstruct, to ask to continue asking about the given answers, while dogmatism naturally leads to judgment, moralization, and violence.

It is also necessary to transform the capacity to solve serenely the problems that arise in life; to be able to open or let open the intimate 'trunk' and to emerge as our authentic, healthy, serene self; or tormented but willing and open to dialogue, to inner search and mending. As Jaramillo (2006) states:

> The "normal" or the "pathological" should not be the problem of dialogue; that is, the exteriority of the discourses of power, should be unmasked to welcome a restorative dialogue that comes to mean more than them in the experience of life; that required by language (…) (p. 37).

The transformation does not start from a medical diagnosis, starts from the intimate and vital knowledge that is achieved in the dialogue;

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Epicurus[7] (2007), in one of its aphorisms considered in the Vatican sentences, reflects on the word of the philosopher saying:

> Vain is the word of that philosopher who does not remedy any ailment of man. For, just as there is no benefit from medicine that does not expel diseases from the body, there is no benefit from philosophy, if it does not expel sickness from the soul (p. 117).

What does philosophy intend? To heal, to help people to live. The philosophical dialogue brings the interlocutors (accompanied and accompanying) to an important opening of themselves that enables knowledge, and with it, to discover elements that must be worked out by the interlocutor in order to transform themselves and seek a fuller life; Therefore, philosophy cures because it transforms through the word that names, understands, embraces, builds, destroys, leads, misleads, clarifies, confuses, gets sick and healthy, among other things. It is pertinent to ask: how is this use done? And the answer is the "dialogue"; that, beyond being a dialogue between two or more people, becomes -from the foundation proposed and lived by Socrates- shared life experience.

With dialogue Socrates sought the knowledge of himself, but by observing in detail and making an analysis of the above, it is possible to trace that dialogue starts from the life -intimate experience- and arrives inexorably at it. About this Jaramillo (2006) points out:

> In dialogue aspects of life are recreated, but in words, the force of life is not contained, there is a lack of passion, sensation, the intuitive, in them is the empire of a simulacrum which in the discourses of all powers has been taken as truth only for convenience (p. 37).

Jaramillo (2006) has been carrying out studies and practices that start from dialogue as a therapeutic method from a hermeneutic horizon: "dialogical therapy is a comprehensive interaction of the relationships of our internality with the exercise of what the world presents to us" (p. 41); which goes beyond a merely hermeneutic matter, the word or philosophical dialogue. In order to heal the human person, it must be vital that due to the questions emanating from the intimate experience of the life of the philosopher and of those who dialogue with him, leads, not only to understand but to intimate with himself in his questions, possible responses, feelings, thoughts, beliefs, actions, words, emotions, contradictions, environment, etc.

Ruiz (2002) affirms that "When we speak of dialogue it is more a matter of an art than of a technique or an instrument, through which we

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exercise our natural capacity to speak" (p. 47). In approaching these words, it is possible to note that the nature of dialogue transcends the methodological to be something more intimate and personal. Lines later he adds:

> That it is a good means several things: the possibility of not exhausting the intimacy of the language in the noise of information; the opportunity for the representative world of the other to be meaningful to me; to be able to meet a shared sense of goods and things; widen our particularity and be aware of our limits, as well as be able to recognize others and recognize us in others (Ruiz, 2002, p. 47).

Thus, philosophical dialogue is and must be a "transforming force", as Gadamer affirms (1992, p. 206). Thus, dialogue cures because it teaches and transforms. Moreover, it has a healing power because it transforms into wisdom the ignorance of believing that something is known, and wisdom as a path of self-knowledge, a transforming knowledge.

In this way, it is possible to infer that the philosopher fulfils a role of accompanist in this transforming dialogical dynamic, which in some cases could serve as therapy for those who attend this -from this proposal- we can call counseling; Cavallé in his text *The Philosophical Counsel: An Alternative to Psychotherapy* (2004) makes an important characterization of these roles:

> The philosopher advisor, inspired by Socratic majeutics, tries to incite, invite, provoke, inspire..., but in no case gives prefabricated answers or transmits his particular way of thinking. Its purpose is to become expendable as a counsellor, to foster the autonomy and independence of the counsellor by providing him with the necessary keys to become his most solid and qualified consultant. The aim is to strengthen the consultant's ability to help himself, to encourage him to find within himself his main source of inspiration and clarification, to invite him to take responsibility for his own state and well-being by showing that he has full capacity to do so (p. 7).

Referring later to dialogue as the axis of philosophical counsel, she adds:

> The axis of philosophical advice is always dialogue, a free and open dialogue that at all times respects and promotes the sense of autonomy and total responsibility of the counsellor. This dialogue seeks to open up options that until now were unknown to us, to clarify ideas, to reveal to us higher dimensions of ourselves, to explain those beliefs that block us in achieving our objectives and, in general, to help us to live with more awareness, clarity and depth (Cavallé, 2004, p. 6).

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The philosophical counsel requires, on the part of the philosopher advisor, a double mobilization, to enter into his own personal "personal depth", that is, to commit to his own personal work; the second movement is the solidarity displayed in the dialogue, a dialogue characterized by freedom, autonomy, truth and transformation.

Conclusions

Philosophy has been an experience that transforms, because it has allowed humanity to think and feel; this is why philosophy naturally makes possible the transformation from a process of making oneself and making the world in an intimate relationship with it.

The intimate experience of philosophy is given due to the philosophical dialogue which, rather than method, is an experience that makes possible the relationship with myself, with others and with things through the word, reason and sensation that arises in the very nature of dialogue; this is what leads to the understanding of dialogue as an experience that heals and transforms.

Dialogue has been in philosophy, not only a tool for the elaboration of discourse or discourses, but philosophy itself; dialogue is the natural way that philosophy is and unfolds, it weaves and cures because it allows one to enter into the knowledge of oneself, to intimacy and thanks to it, is possible a transformation or a cure. Healing does not refer to physical health or the result of a psychological procedure, it refers to the possibility of knowing and opening oneself to knowledge, broadening and transforming the perception of oneself, others and things.

The philosopher in all these relations -and in the dialogue itself- has a role in two directions, namely, he/she who intimates with philosophy, with himself, with the other and with things in an open dialogue, without prejudice, or without judgment that bias their questions and the possibilities they open for themselves and for everyone who enters into dialogue with them; Philosophy for the philosopher has to be an honest and transforming intimate experience of himself and, at the same time, it impels him to solidarity; about this Rafael Sánchez (2011) states:

> The honest philosopher dedicates himself to philosophical activity not so much because of the "determining human impulse to knowledge", but rather because of the willingness to serve society. It is not for personal boasting, but for the benefit of humanity. Philosophy, in this sense, comes to be something like a ditch that carries the water of thought, without the

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> purpose of drowning the hopes of men of a better world, but to "give to drink" to those who thirst for the meaning of existence, of the world and of history, to water the parched land of identity, meaning, dynamism and direction. Reason, in harmony with faith, must bring light, where darkness breeds barbarism, desolation and suffering (pp. 113-114).

A second role is that of accompanist and advisor who in the dialogue proposes questions that lead his companion to that intimate transforming experience of himself that, in turn, leads him to a sapiential relationship with others and things. To transform is not to change radically, it refers to perceiving oneself and perceiving the possibilities and going into them to live them.

Philosophy more than a science, with an object and method, is an intimate experience of life. As an intimate experience, it is based on what we have called "an intimate trunk" but it also has it as its goal because, by penetrating through dialogue in it, we achieve self-knowledge that has the power to heal, cure, repair and transform the human person, to the 'man of flesh and blood', namely to the philosopher and to anyone who engages with him.

Notes

1 Carmona refers to Seneca.
2 The "Self" to which reference is made is presented to the philosopher as a paradoxical phenomenon for himself; since he is considered, at the same time, as an intimate trunk -the most proper and near- and as something alien and distant, lost in the past or in the making. The task is to find the way and the tool to open that trunk.
3 "Phenomenon", understood from the etymology of the word: φαινόμενν, which means "what is there, what is evident".
4 Understand the expression, deep intimacy, not from traditional connotations of foundation, substratum or essence; rather, as that which remains latent in the paradoxical life of each person or community.
5 The term cure is taken as the sensation resulting from the transformation that naturally results from the process of dialogue.
6 At this point, it must be considered that in referring to " made truths " it applies in the field of science, religion, art, philosophy and man himself; we therefore refer to tradition. The truths of science are refutable, falsifiable or debatable, how much more contingent are the truths that each person creates about himself? This question leads us to ask what is man? And we will simply say that he is an unfinished, finite and fallible being.
7 Epicurus, p. 55. Aphorism attributed to Epicurus by H. Usener [Epicurea, fr. 221; Porphyry, Ad Marcellam, 31, p. 294 7-8, A. Nauck (ed)]. According to H. Chadwick (The Sentences of Sextus, Cambridge, 1959, p. 178, n. 336) this sentence is Pythagorean.

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Reflections and perspectives on the evaluation of mathematics learning in mexican higher education

Reflexiones y perspectivas sobre la evaluación de los aprendizajes de matemáticas en la educación media superior mexicana

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Abstract

The evaluation of mathematics learning in Higher Secondary Education constitutes a great challenge for teachers due to the complexity of their task, in order to achieve meaningful learning from the point of view of the learning subject, where it is considered important to revitalize the formative dimension of evaluation to transform their practices in light of contemporary curricular demands. It emphasizes the importance of promoting a culture of evaluation that ensures the development of a systematic, rigorous, critical, reflective, and academic decision-making process. The study was structured in two moments, the first considers the theoretical foundations that support the teacher's understanding of the formative dimension of the evaluation of student learning, the objective of which is aimed at analyzing evaluation practices in the field of math subjects. In the second, interviews and focus groups were applied, where the diversity of criteria issued by the teachers was considered, on the problems that affect the learning results. In this interpretive framework, some conclusions and implications are offered related to the need to promote a methodological change, as a mechanism that allows redirecting teaching strategies, which support the significance of knowledge in EMS; It emphasizes the need to strengthen spaces for collegial interaction, from where an exchange of experiences on evaluation forms is generated, as a viable alternative that conditions the understanding and improvement of teaching in high school.

Keywords

Evaluation of learning, formative evaluation, mathematical learning, assessment culture, evaluation practices, Upper Middle Education.

Resumen

La evaluación de los aprendizajes de matemáticas en la Educación Media Superior, constituye un gran desafío para los docentes por la complejidad de su tarea, en función de lograr un aprendizaje significativo desde el punto de vista del sujeto que aprende, donde se considera importante revitalizar la dimensión formativa de la evaluación para transformar sus prácticas a la luz de las exigencias curriculares contemporáneas. Se enfatiza en la importancia de promover una cultura de la evaluación que asegure el desarrollo de un proceso sistemático, riguroso, crítico, reflexivo y orientado a la toma de decisiones académicas. El estudio se estructuró en dos momentos, el primero considera los fundamentos teóricos que sustenta la comprensión del docente, sobre la dimensión formativa de la evaluación de los aprendizajes de los estudiantes, cuyo objetivo está orientado a analizar las prácticas de evaluación en el ámbito de las asignaturas de matemáticas. En el segundo, se aplicaron entrevistas y grupos focales, donde se consideraron la diversidad de criterios emitidos por los docentes, sobre las problemáticas que inciden en los resultados de aprendizajes. En este marco interpretativo se ofrecen algunas conclusiones e implicaciones relacionadas con la necesidad de promover un cambio metodológico, como mecanismo que permite redireccionar las estrategias de enseñanza, que sustentan la significatividad del saber en la EMS; se enfatiza en la necesidad de fortalecer espacios de interacción colegiada, desde donde se genere un intercambio de experiencias sobre las formas evaluación, como alternativa viable que condiciona la comprensión y mejora de la docencia en el bachillerato.

Palabras clave

Evaluación de los aprendizajes, evaluación formativa, prácticas de evaluación, aprendizaje matemático, cultura de la evaluación, Educación Media Superior.

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Introduction

The evaluation of learning in the contemporary Mexican educational context must be critically understood for its contribution to the improvement and quality of learning, by providing the only guarantee that promotes the construction of knowledge and the intellectual growth of those who learn, in accordance with the intentions defined in the curriculum, where the teacher plays a fundamental role in integrating qualitative strategies in the teaching and learning process that support the understanding and construction of learning.

De acuerdo con Gimeno Sacristán (1992):

> Evaluating refers to any process by which some or several characteristics of a student, a group of students, an educational environment, educational objects, materials, teachers, programs, etc. receive the attention of the evaluator, their characteristics and conditions are analyzed and evaluated on the basis of criteria or benchmarks for making a judgement relevant to education (p. 338).

All this makes it possible to assert that, through the evaluation of learning, inferences are constructed by the teacher on the level of achievement of what the students have learned, in order to effectively feedback each case according to the expected standards, to enable them to advance in their learning, to know what they have learnt, what they have yet to learn and how they can proceed to solve their learning problems, which requires that assessment practices take on their formative dimension, becoming a tool in the self-regulation of learning and as a differentiated care strategy from where the understanding of the actors involved is promoted as a factor for the improvement of teaching and learning.

For its part, De la Orden (2001), understands that:

> The evaluation could be considered as the systematic collection process, analysis and interpretation of relevant and reliable information to describe any facet of education and to formulate a value judgement on its suitability for a criterion or pattern as a basis for decision-making on that facet (p. 16).

This means that the assessment of learning requires of the teacher a reflection exercise based on how to teach to learn and to evaluate, as a mechanism to redirect teaching strategies and activities or tasks, that sustain the significance of knowledge.

According to Álvarez Méndez (2003), through evaluation the teacher can change the complexity of his practice, in order to systematically

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meet the needs of students, in the field of the alignment of various teaching strategies favoring the integration of the mathematical knowledge defined in the curriculum; it also states that "to evaluate is to know, it is to contrast, it is to converse, to inquire, to argue, to deliberate, to reason, it is to learn [thus, such activity must be] at the service of those who learn, that help them to grow and develop intellectually, affectively, morally and socially" (p. 51). Thus, evaluation is assumed as a systematic, rigorous, critical, reflective, flexible, appreciative and academic decision-making process and involves a research process, encompassing positions, theories and practices.

In Mexico, since 2008, the Comprehensive Reform of Higher Secondary Education (RIEMS) has been carried out, one of the main purposes of which is to promote a qualitative change in the management of academic processes at the baccalaureate level, with an emphasis on the development of competences in students and teachers, as a support for the quality of learning, which entails assuming an academic culture, which promotes the understanding of learning assessment and learning, for which secretarial agreements and guidelines have been published setting out the different methodologies that teachers must carry out in the process of evaluating students in the different subjects that make up the curriculum, generally, without emphasis on the area of mathematics and other areas of knowledge.

Therefore, when analyzing the results of mathematical learning in the baccalaureate, it is considered to be a problem of urgent attention in the context of Higher Secondary Education (EMS) in Mexico, since the results issued by external evaluation bodies, according to the Ministry of Public Education of Mexico (2017), the national evaluation results (2017), it is evident that in mathematics 6 out of 10 students is located in level I (66%)which have difficulty in performing operations with fractions and operations combining unknowns or variables (represented by letters) and in establishing and analyzing relationships between two variables; almost 2 out of 10 are located at level II (23%) who express in a mathematical language situations where a value or proportionality relations between two variables is unknown, and solve problems involving proportions between quantities (for example, calculation of percentages).

Also according to the results issued by the Ministry of Public Education of Mexico (2017), in level III, only 8 out of 100 students (8%), use mathematical language to solve problems that require the calculation of unknown values, and to analyze situations of proportionality; at level IV, almost 3 students out of 100 (2.5%), master the rules for transforming and operating with mathematical language (for example, the laws

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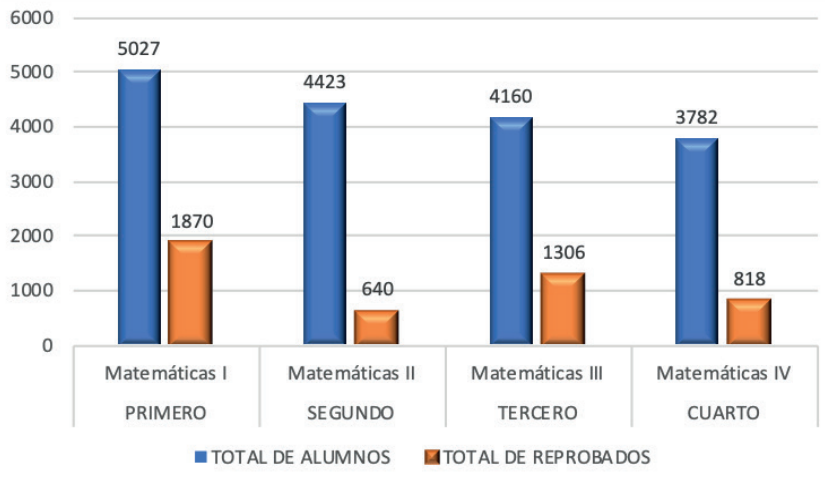
of signs); express in mathematical language the relationships that exist between two variables of a situation or phenomenon; and determine some of their characteristics (for example, they deduce the straight line equation from its graph) (2017).

Under these guidelines, the evaluation of learning constitutes the nucleus of the educational action from which "the learning needed to face the challenges of the 21st century" is based, as stated by the Mexican Ministry of Public Education (2017, p. 18). Which, as results of an external evaluation, allow to identify, prioritize and work with students in the field of the mathematics curriculum, since specific data are also generated by each of the students and school, which encourages differentiated academic decision-making.

Below is presented in Figure 1, the behavior of the failure in the subjects of Mathematics in the period July 2018, in the six high schools that support the study.

Figure 1
Behavior of the percentage of failure in mathematics
(July-December 2018)



Source: Compiled from the statistics from the studied higher secondary education institutions.

As can be seen in the statistics of the six schools under study, in the first semester 1870 students failed, in the second 640, in the third 1306 and in the fourth 818, the highest failure rate occurs in the first and third semester with 37% and 31% failure respectively, data that require the teacher to promote a learning evaluation process, with an emphasis

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on understanding the main knowledge gaps, and emphasize the training dimension, in order to consolidate the knowledge of basic disciplinary competencies, defined in secretarial agreements; 444, 486 and 656 (Mexico, Ministry of Public Education, 2008, 2009, 2012).

According to the Under-Secretariat of Higher Secondary Education of Mexico (2018), these intentionalities are defined in the curricula of subjects in this disciplinary field whose main objective is to develop logical-mathematical thinking, to interpret real hypothetical situations that allow the student, to propose alternative solutions from different approaches, prioritizing the skills of thought, such as the search for patterns or principles that underlie everyday phenomena, the generation of various alternatives for problem-solving, information management, decision-making based on critical analysis of mathematical information, interpretation of tables, graphs, diagrams, texts with mathematical symbols that are found in their context will allow both the argumentation of solution proposals and the prediction of the behavior of a phenomenon from the analysis of its variables; all this requires an analytical-reflexive assessment of teachers in terms of decision-making towards improving the quality of learning.

In this regard, in informal discussions with the mathematics teachers of these schools, they report that the main difficulties presented by students in the first semester are: understanding of knowledge in order to be able to translate problems into algebraic models, based on equations representing unknown quantities and other data of the problem, according to explicit or implicit relationships in the statement of the task, solve problems with equations of first and second degree, maximum common divisor, minimum common multiple, division of polynomials, factoring of trinomials of the form $ax^2 + b\,x + c$, and also present limitations in solving linear equations by different methods.

The teachers of the third semester also report that the main problems affecting the learning of geometry can be framed in; the deduction of the equation of the ellipse and hyperbola, solving ellipse and hyperbola equations with center in the origin and out of the origin, solving exercises using equations and varying parameters.

In this sense, it is inferred that the learning problems described by mathematics teachers and minimize the students' failure, should generate a culture of evaluation, the same as according to De la Orden Hoz (2001); Mateo (2006); Castro, Martínez and Figueroa (2009); Capó Vicedo, Pla Rodríguez, and Capó Vicedo (2011); Alsina (2016), ensures the understanding and improvement of students' learning based on obtai-

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ning, analyzing and interpreting evidence, which allow establishing the relationship between performance and the evaluation criteria established in the curriculum in mathematics courses at EMS, as a basis for decision-making in the face of the challenges of teaching to learn.

In considering the evaluation of learning and for learning, according to Moreno Olivos (2011, 2016); and Cáceres Mesa (2018), its formative understanding is resized as a process that compromises the learning of students. Problems in this area include: What theoretical references about the formative dimension of evaluation are present in the EMS curriculum? how to revitalize learning assessment practices in mathematics subjects in the EMS curriculum?

Theoretical references for the understanding of the evaluation of learning in the EMS

According to the contributions of Trillo Alonso and Porto Currás (2002), when teaching and evaluating mathematical learning in EMS students, a relevant line is generated in the study of educational quality, therefore, in the field of mathematics courses, this perspective should be analyzed in order to promote the development of logical, creative thinking, which stimulates operations, problem solving and data processing; all of them with an increasing character of the complexity of cognitive processes, in order to promote deep, meaningful and transferable learning in students, which implies that through the evaluation process the integration of knowledge is generated, as an educational response that directs the application of these to life situations.

Therefore, according to Jorba y Sanmartí (1993), the teacher of mathematics at this level of education must have didactic references that allow him to conceive evaluation as the axis, from which all the school work revolves, not only conditions what, when and how it is taught, but also the adjustments that must be made to meet the diversity of needs generated in the classroom, in order to promote differentiated care capable of meeting the needs and interests of all students.

From another perspective according to Godino (2013), the evaluation of learning can be seen as a process in cognitive suitability (Assessment of Didactic Suitability) of students, since it is a necessary indicator that measures achievement in the appropriation of the knowledge thought in the classroom. In other words, evaluation is the adaptation of the implemented and intended meanings with respect to the students'

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initial and final personal meanings, through the practices developed in the class, which conditions that the teacher reflexively values the didactic strategies that he applies during his practice, in the field of teaching and learning processes in mathematics.

Likewise, it is important to return to the contributions of Moreno Olivos (2009), when he argues that the evaluation of learning has a direct impact on the training of students. Therefore, teachers are required to professionally and rigorously carry out their practice in order to evaluate the learning of their students from a formative dimension, with the ethical commitment that this type of activity compromises, because throughout the experiences constructed in the scope of their practice, preconceptions are generated that allow them to place themselves in an effective theoretical-methodological framework for decision-making on evaluation strategies.

In this area, Jorba and Sanmartí (2000) argue that all the practices of evaluation of learning, must be immersed in an adequate articulation between the "how it is taught", "how it is learned" and "how it is evaluated", a space in which the subject who learns is recognized as the protagonist of this process, in which motivational elements that stimulate the achievement of the knowledge defined in the curriculum, where the strengths and weaknesses of learning are rescued, rather than merely considering what the results are; a scenario in which the role of the regulatory function of evaluation is valued, which allows each student to construct an autonomous, gradual and progressive personal learning system, which shapes and develops mental structures that favor logical-mathematical thinking.

In this same order of ideas, Moreno Olivos (2011) points out that it is desirable for teachers to become aware, as part of the culture of evaluation implicit in their practices, to assume formative evaluation, as a systematic discourse and action where a differentiated and group interaction with all the members of the class is revitalized, since self-regulation processes are activated in each subject that learns and the feedback is strengthened and systematized, whose impact is reflected in academic performance and the improvement of learning.

On the other hand, Moreno Olivos (2016) highlights the role of the evaluation of learning and for learning, basing, from different perspectives, the conception of the evaluation of learning from its formative dimension, as an inescapable process of contemporary educational practices, as these are immersed in reforms that condition the integration of knowledge aligned to the formation and development of competencies, as is the case of the curriculum of the current Mexican EMS. In this

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sense, the formative evaluation allows to understand and transform the teaching and learning processes, and to identify problems that limit the achievement of the expected knowledge, by participating in a constant change according to the demands and needs of the students.

For its part, Cáceres Mesa (2018) argues that formative evaluation should be considered as a process that activates the ways of teaching and learning, as it invites valuable reflection as a basis for academic decision-making in each class group, where the didactic work of the academies is resized, as a space for collegial interaction that allows to analyze the curricular requirements, the learning activities that must be designed and the methodological strategies that support the evaluation. Here is important the role of feedback, as an effective process that impacts on the nearby development zone in the subjects who learn, all in function of contributing to pedagogical regulation, the management of errors and the improvement of learnings during the learning journey of students.

In this area, Bordas and Cabrera (2001), emphasize the transition from training evaluation to formative evaluation, where reflection on one's own mistakes is considered as the starting point of the learning process, from where internal forces are generated in students to continue learning consciously, autonomously and independently, as it promotes a positive personal assessment towards learning. At the same time, they state that strategies should be used in which students:

> Feel active in their own assessment, learn to evaluate their own actions and learning, use self-assessment techniques and be able to transfer them in a variety of situations and contexts, be able to adapt and/or define self-assessment models based on values, contexts, social realities, moments, etc. (p. 36).

For which the formative evaluation promotes a space of reflection, feedback and permanent interaction between the teacher and the students, which favors a progressive understanding of the knowledge and differentiated supports as strategic reinforcements, to diversify different levels of support for students in the internalization and personalization of learning.

Evaluation of Learning in the Mathematics Curriculum in Upper Secondary Education

In this area when analyzing the theoretical references that support the formative evaluation in the curriculum of the mathematics programs of

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the EMS, the Undersecretary of Higher Secondary Education of Mexico (2018), argues that the processes of evaluation of learning are based on Agreement 8 of the Steering Committee of the National High School System in Mexico (2009), which describes the integration of the types of evaluation, according to their purpose and time: Diagnostic, formative and summative and according to the agent involved in this process: self-evaluation, co-evaluation and hetero-evaluation.

In this regard, it is considered that the *diagnostic evaluation* is the one that is developed at the beginning of training to estimate the previous knowledge of the students, which then helps to guide the educational process, has a predictive function of the learning potential, where the diagnosis and prognosis of each student and/or group comes into play; is an evaluation that not only needs to be done at the beginning, but is embedded in every step of the learning process.

It is interested in recognizing whether students, before starting a cycle or a long educational process, possess or not a series of previous knowledge, as prerequisites to be able to significantly assimilate and/or understand the new and according to Jorba and Sanmartí (1993); and Sanmartí (2007), diagnostic evaluation makes it possible to identify the cognitive abilities of students in relation to the curriculum, in terms of generating differentiated individual and group strategies; therefore constitutes an important moment for the design of teaching, learning and evaluation strategies.

For its part, *formative evaluation* is carried out in the course of the teaching and learning process. Enables teachers to design relevant and adapted teaching strategies that support students as an opportunity to explore new knowledge and continue learning; is a long journey through which the subject who learns, restructures his knowledge from the activities he carries out, which favor the appropriation of knowledge of greater level of complexity, thus it makes it possible to pinpoint the progress made by each student and, in particular, to identify the difficulties encountered during learning; to identify problems, show alternatives, detect the obstacles to overcome them, in short, to perfect the learning process, where everything learned is put into play, in a located know-how (Díaz Barriga, 2006).

In this area, Gimeno Sacristán (1991), points out that evaluation is a systematic and rigorous process of data collection, incorporated into the educational process from the beginning, so that it is possible to acquire continuous and meaningful information to know the situation, to form value judgements with respect to it and to take the appropriate decisions,

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in order to continue the educational activity, progressively improving it. He points out that the assessment refers to any process in which the characteristics of one or a group of students, educational objectives, teaching materials, teachers, programmes, educational environment, among others, are analyzed and assessed on the basis of criteria or benchmarks to make a judgment that is relevant to education, referents that support the formative understanding of evaluation in the curriculum.

It is also specified that the *summative evaluation* must be carried out at the end of a process or educational cycle, considering the set of evidence generated by each student, which validate the achieved learnings, aims to establish reliable balance of learning outcomes, supported by Jorba and Sanmartí (1993, 1994); and Moreno (2016), where they stress the importance that teachers consider, in the development of assessment instruments, their reliability and that they ensure the knowledge that students must integrate into their learning, as a basis for valuing what is learned and how it is learned.

According to Jorba and Sanmartí (1993), it is noteworthy that summative assessment has a formative function, by providing information on the learnings acquired by students and consequently whether they have the necessary prerequisites for further learning, or to identify those aspects that should be modified in the context of teaching and learning processes, where their qualitative understanding recovers.

It should be pointed out that the self-evaluation and co-evaluation activities give a participatory character to the evaluation process, which promotes the personal awareness of students of their academic strengths and weaknesses. In addition, the practice of heteroevaluation should be included in the concept of the assessment that the teacher or external agent makes of the performance of students, pointing out the strengths and aspects to improve, based on the achieved learnings, where feedback strategies are activated from evidence of learning.

Curriculum content in mathematics in Upper Secondary Education

As established in the Undersecretary of Higher Secondary Education of Mexico (2018), in the curricular organization of the curriculum of the EMS, is composed of four subjects from the first to the fourth semester; in Mathematics I, the purpose is to:

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> To develop logical-mathematical thinking in students, through the use of arithmetic, algebra, probability and statistics, allowing them to propose alternative solutions to problems taken from their daily lives, taking into account that knowledge is not the end of education, but a tool for the student to develop the competences that define the graduation profile (p. 6).

In the previous document it is specified that, within the contents to be developed, "the Basic Numbers and Operations, Reasons and Proportions, Probability and Statistical Models, Algebraic Operations, Linear Equations and Quadratic Equations" are delimited (Mexico, Subsecretaría de Educación Media Superior, 2018, p. 7).

In this sense, the teacher must design learning activities that promote the development of a mathematical thought in students, which must be based on reasoning, the formulation of conjectures, the resolution of problems, the connection of mathematical ideas and their applications in real situations linked to the lives of students; all this in function of the didactic treatment of mathematical contents, discarding the emphasis on the mechanical, simple and memoristic search for answers.

For its part, as established by the Undersecretary of Higher Secondary Education of Mexico (2018), the subject of Mathematics II, has the purpose of:

> Develop logical-mathematical thinking, by using Plane Geometry and Trigonometry that allow the student to propose alternative solutions to real situations or hypotheses from various approaches, bearing in mind that knowledge is not the end, but a tool for the student to develop the competences that define the graduate profile of Higher Secondary Education (p. 8).

At the same time, the document states that "the contents to be developed are the Angles and Triangles, the Properties of Polygons, Elements of the Circumference, Reasons and Trigonometric Functions and Oblique Triangles" (Mexico, Subsecretaría de Educación Media Superior, 2018, p. 8). Contents that must be addressed through teaching strategies that stimulate the resolution of problems that are significant for students, that promote the search for patterns or principles that underlie everyday phenomena; All this depends on the fact that the student is immersed in the active construction of new knowledge based on experience, previous knowledge and the level of reasoning that they may have on this topic. This process stimulates students' interest in learning this science and pro-

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motes the development of imaginative and creative skills through work with different geometric shapes.

Likewise, the Undersecretary of Higher Secondary Education of Mexico (2018), points out that in the subject of Mathematics III, through the use of Analytical Geometry, has the purpose of:

> Develop logical-mathematical thinking, as well as the capacities to propose alternative solutions to various problems present in their environment from different approaches. It is from the application of Analytical Geometry and the proposed contents for the development of this program; geometric places in the plane, straight line, Circumference, Parabola and Ellipse, where students are introduced to concepts such as those related to the coordinate system, straight line or conical, through the solution of problems that allow them to perceive and interpret the spatial environment from the geometric analytical approach (p. 8).

Therefore, the contents of Analytic Geometry, require that the teacher of mathematics, provide an opportunity for students to explore, observe and know the environment around them, in which they will find diversity of geometric elements; all this through didactic situations that stimulate the development of skills that allow them to use representation systems to achieve spatial localization; apply transformations to analyze mathematical situations; make use of spatial visualization and reasoning for the construction of geometric models with which to explain real phenomena. All this in order to favor, in an ascending and gradual way, the advance of the students in the level of geometric reasoning in which they are.

For its part, the Undersecretary of Higher Secondary Education of Mexico (2018), establishes that in the subject of Mathematics IV, through the use of the Theory of Functions, has the purpose of:

> To promote both the development of logical-mathematical and variational thinking, in order to generate critical and reflective elements in the student that allow him to propose alternative solutions to human actions that impact on his environment from different approaches. It is from the application of the Theory of Functions and the proposed contents for this program; Relations and Functions, Polynomial Functions, Rational Functions and Transcendent Functions, where the student is introduced to concepts such as the use of applications of special, algebraic and transcendent functions, through the solution of problems that allow him to perceive and interpret his environment through functions (p. 9).

As stated in the previous references, the purpose of learning mathematics in EMS in the Mexican educational context is aimed at students

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developing a way of thinking that allows them to mathematically express situations of everyday life, which occur in different socio-cultural environments, as well as using appropriate techniques to recognize, pose and solve problems; at the same time, it is intended that through the study of this discipline, they assume a critical, collaborative, civic, and ethical conscience in life, developing a respectful attitude towards interculturality, that they learn autonomously and that they assume responsibility for their learning, among others.

Mathematical learning is based on the integration and application of knowledge and the progressive construction of new knowledge, as a basis for a relevant and deep learning founded on the generation of flexible problematizing learning environments, where students formulate and validate conjectures, ask questions, use their own procedures and acquire socially established mathematical tools and knowledge, while communicating, analyzing and interpreting resolution ideas and procedures[1].

Indeed, according to Morales Maure, Durán González, Pérez Maya, and Bustamante (2019), this mathematical learning is based on the skills developed from solving mathematical tasks where the mathematical activity, that is carried out, is evaluated. The teacher proposes a task to the student, then the teacher analyzes it and finds evidence of a certain degree of development of one or more mathematical competences through an evaluation.

Method

This study is based on a qualitative approach to information, where a diversity of criteria issued by mathematics teachers about their personal experiences regarding the learning outcomes of students intersect. All this supported by the contributions of Denzin and Lincoln (2012), as a framework that supports inferences in interpretations on the problems that affect learning outcomes in mathematics subjects in EMS.

The techniques used were the in-depth interview and focus groups, through which the diversity of criteria issued by mathematics teachers about their personal experiences around the learning outcomes of students intersect, All this supported by the contributions of Denzin and Lincoln (2012), as a framework that supports inferences in interpretations on the problems that affect learning outcomes in mathematics subjects in the EMS, in the six studied schools.

This work is structured in two moments; in the first moment, it was based on documentary and bibliographic research on the concept of eva-

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luation, its formative dimension, generalities of the EMS curriculum and the evaluation of student learning in mathematics, For this purpose, the contributions by Bordas and Cabrera (2001); Perrenoud (2008); Moreno Olivos (2009, 2016); and Cáceres Mesa (2018) were used as reference theorists who support the high school teacher's understanding of how to evaluate student learning, all with the intention of analyzingWhat theoretical framework on the educational dimension of evaluation, are present in the curriculum of the EMS? How to revitalize the practices of evaluation of learning in the subjects of the EMS mathematics curriculum? Whose aim is oriented towards analyzing the evaluation practices of learning in the EMS, considering the inferences in interpretations on issues that affect learning outcomes in the subjects of mathematics at this level.

In the second moment, the criteria issued by the mathematics teachers, on the results of the students' learning, were analyzed. We held meetings with an interview and focus group modality with teachers of mathematics, where they attempted to analyze and discuss from their personal experience on the learning evaluation practices in each class group.

This process is based on a qualitative analysis of the information based on this interpretative framework. Some conclusions and implications are offered related to the need to promote a methodological change in the evaluation practices of learning in the EMS and the need for strengthening collegial interaction spaces from where an exchange of experiences on evaluation is generated, as a viable alternative that conditions academic decision-making.

For the analysis of results, ATLAS Ti was used as tools that supported qualitative analysis and helped organize, regroup, and manage the study results, and the following categories were considered:

- First Category of Analysis: The conception that mathematics teachers have of the concept of learning evaluation.
- Second Category of Analysis: Mathematical content in the curriculum.

Results

With the intention of assessing the understanding of mathematics teachers on the concept of evaluation of learning, a space of dialogue was promoted in the field of interviews and focus groups, where some criteria were rescued, those that refer to aspects of their conception of evaluation, the time and purpose of evaluation:

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The evaluation of learning is a process through which the student is graded, is planned in each subject program and is structured in three moments, first and midterm and final evaluation (Teacher 1, 3/12/2018).

I consider the evaluation of learning as the component that allows me to assess the achievements of my students, so each student has a portfolio of evidence, I am sure that through personal monitoring the results are improving (Teacher 2, 3/12/2018).

Through the evaluation of learning is how I can know the mastery of the students of certain knowledge and adjust teaching and learning strategies, is aimed at progressively improving (Teacher 3, 3/12/2018).

"Learning evaluation has a diagnostic and formative function, in my class students develop the exercises and problems that appear in the textbook" (Teacher 4, 3/12/2018).

Through the evaluation of learning I can know the achievements and weaknesses of the students and thus be able to support them to pass the class (Teacher 5, 3/12/2018).

The evaluation of the learning allows me to reflect on the teaching I imparted and therefore work in a personalized way with some students that I perceive do not understand the content treated in class, but my priority is the midterm and final exams (Teacher 6, 3/12/2018).

It is through the evaluation of the learning that I can improve the results of the students, as they develop complementary exercises and problems as part of the independent work (Teacher 7, 3/12/2018).

I consider that the evaluation is a process for improvement, but the truth is that they require time and dedication to attend students, but I have four groups that demand a lot of attention and time exceeds me, I apply the midterms and final exams (Teacher 8, 3/12/2018).

For me the evaluation of learning is very complicated because it requires a continuous process, which allows us to clarify the doubts of all students, personally I pay more attention to those who are failing, because I do not have time to attend to all (Teacher 9, 3/12/2018).

These educational reforms consider the diagnostic and formative dimension, in practice we continue to evaluate the learning of students and we stick to the problems and exercises of the textbooks and apply the three tests established in the program (Teacher 3/12/2018).

Considering the testimonies of the teachers, we can affirm that some privilege evaluation as a final product and in some cases as a pro-

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cess to improve results. It is identified that they do not visualize their understanding from the formative dimension of it with an emphasis on learning, therefore a traditional vision of said concept prevails since they state that they are attached to the criteria established in the subject program and the textbook, which limits the teacher from thinking and reflecting on the evaluation of learning from mathematical processes.

Likewise, it is important to highlight that if teachers do not have a concept of learning evaluation in correspondence with contemporary curricular demands, their teaching strategies do not stimulate the development of logical-mathematical thinking in students.

According to the interviewed teachers, the problems with the highest incidence of failure for students are:

Formulate and explain arithmetic problems, factorization of polynomials by grouping of terms, factorization of trinomials of the form $x^2 + bx + c$, factorization of a perfect square trinomial, factorization of a sum and difference of cubes, solution of simultaneous equations, for the methods of reduction, substitution and graph, solution of second degree equations, complete and incomplete; by factoring methods, decompose a polynomial using the different cases of factoring, calculate the value of the trigonometric ratios, solve exercises and problems involving calculating the slope, angle of inclination and angle between two lines, solve exercises and problems involving parabola and ellipse equations, in their different vertex positions at the origin and outside it, solve exercises and problems involving equations of the hyperbola and its asymptotes in their different vertex positions at the origin and outside it, solve exercises and problems involving the graphical construction of a function, solve exponential and logarithmic equations.

In this regard, in the context of interviews, teachers state that:

> The main difficulties are due to the fact that students have poor prior knowledge (Teacher 2, 3/12/2018).

> There is no systematic academic accompaniment with students who have learning problems (Teacher 3, 3/12/2018).

> There is coherence between what the program establishes and what is evaluated, but there is not enough time in the program to exercise exercises and algebra problems, they are oriented for independent work, but we can only develop in the classroom a model example, as time is short (Teacher 5, 3/12/2018).

> The excessive hourly load that students have in each school cycle, limits their time of dedication to independent study to the mathematical contents (Teacher 7, 3/12/2018).

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> Most students with learning problems in mathematics have a lack of study habits and spend very little time solving exercises that are oriented to them as tasks (Teacher 10, 3/12/2018).

> I almost always rely on the use of linear equations as algebraic models of problem-situations of an elementary complexity level (Teacher 2, 3/12/2018).

When analyzing the criteria issued by the teachers, it is inferred that the majority assumes a traditional concept of evaluation of learning, they assume it as concrete actions in the semester, they think that learning is evaluated through three moments, two partial exams and a final exam, and they do not rescue the diagnostic, formative and summative dimension; as a process that would allow them to understand the progress of the students and establish differentiated feedback actions.

At the same time, three of the teachers participating in the sample, consider that through the evaluation they can assess the learning achievements of the students, understand how they learn and adjust the teaching strategies, depending on the personalization and application of the On-site mathematical knowledge, however, six teachers emphasize that in order to select the problem situations to be solved by the students in the exams, they focus on the textbook (Moreno Tapia, Parada & Hernández, 2016).

They also say that they do not have enough time to design didactic situations related to the context and limit themselves to developing the exercises and problems that appear in the textbook, which limits the development of logical-mathematical thinking, in addition, the limitations in the application of the formative function of the evaluation are revealed, since they do not implement systematic feedback and differentiated follow-up actions.

Likewise, in the scope of the focus groups, they report that the essential purpose of the entire evaluation process is aimed at students building a portfolio of evidence, as a strategy that allows them to account for their learning, but when reviewing them, it is identified: that there are no notes and suggestions from the teachers as part of the feedback process, with the purpose of making the pertinent observations and corrections so that the student recognizes the successes and errors in the development of an exercise or mathematical problem.

Similarly, it was found that teachers lack documented evidence of student learning results, as they do not have a qualitative report that reflects learning problems in a personalized way because, when they inquired about it, they referred to the control of qualifications.

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Only two teachers recognize the influence of evaluation in improving learning, and the majority emphasize that they do not have time to attend to students in a differentiated way or to exchange experiences and criteria about student learning problems with other teachers. Because they have multiple groups. These references allow us to infer that the evaluation of learning is a control mechanism at the service of the demands of the curriculum and not of the demands and needs of the students, which influences on their low academic performance.

Likewise, in the interviews carried out with these teachers, they report that they apply strategies aimed at self-evaluation and co-evaluation, in accordance with the provisions of their program, since they adhere to what is established in the regulations, but they do not they give credibility to these strategies because the students lack a critical conscience and, in most cases, they issue the highest grade.

Discussion

The results coincide with what was proposed by Trillo Alonso and Porto Currás (2002), who consider that when teaching and evaluating mathematics learning in EMS students, a relevant line is generated in the study of educational quality, therefore, in the field of mathematics, this view is analyzed in terms of encouraging the development of logical, creative thinking, the realization of operations, problem solving, data processing; all of them with an increasing complexity of cognitive processes, in order to promote meaningful, deep and transferable learning. This implies that through the evaluation process the integration of knowledge and the application of knowledge to life situations in students is generated.

In the context of these reflections, it is important to note that the teacher of mathematics at this educational level according to Jorba and Sanmartí (2000), must have didactic references that allow him to conceive of evaluation as the axis, from which all school work turns, that not only conditions what, when and how is taught, but also the adjustments that must be made to meet the diversity of needs that arise in the classroom and, at the same time, promote differentiated care that meets the needs of all students.

In this context it is important to take up the contributions of Moreno Olivos (2011); and Cáceres Mesa, Gómez Meléndez and Zúñiga Rodríguez (2018), when they argue that the evaluation of learning has a direct impact on the training of students, therefore it is necessary for tea-

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chers to undertake their practice professionally and rigorously in order to evaluate learning, because throughout the experiences built up in the field of their work in teaching, preconceptions are generated that influence decision-making on the strategies to be applied in this process.

Likewise, William (2009), argues that all practices of evaluation of learning, should be immersed in an adequate articulation between how it is taught, how it is learned and how it is evaluated, where students are recognized as protagonists of that process, where motivational elements that encourage the incorporation of learning arise, rather than considering what the results are; where it considers the role of the regulatory function of evaluation, which, in the words of Jorba and Sanmarti (2000), enables each student to build an autonomous, gradual and progressive personal learning system, which shapes and develops mental structures that favor logical-mathematical thinking.

In light of these ideas, says Moreno Olivos (2011, 2016), that teachers should assume formative evaluation, as part of the culture that revitalizes a differentiated and group interaction with all members of the class, Self-regulation processes are activated in each subject that learns and feedback is strengthened and systematized, whose impact is reflected in academic performance and improvement of learning. In this sense, the formative evaluation transforms the teaching and learning processes, being immense in a constant change according to the demands and needs of the students.

For his part Godino (2013), emphasizes that formative evaluation should be considered as a process that activates the ways of teaching and learning, since it invites to the evaluative reflection for the taking of academic decisions in each class group, where the educational work of the academies is resized as spaces for collegial interaction that allow the analysis of curricular requirements; the learning activities to be designed and the methodological strategies underpinning the evaluation, the role of feedback is highlighted as an effective process that impacts on the levels of support for learners. All this in order to contribute to the pedagogical regulation, the management of errors and the improvement of the learnings during the formative journey of the students.

In this regard, Alsina (2016), emphasizes the transition from training evaluation to formative evaluation, which considers the reflection on own mistakes as a starting point of learning, from where internal forces are generated in students to continue learning consciously, autonomously and independently, as it promotes a positive personal assessment towards learning.

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According to the Undersecretary of Higher Secondary Education of Mexico (2018), the theoretical references that support the formative evaluation in the curriculum of the programs of the subject of mathematics of the EMS, are supported in the integration of the types of evaluation, according to its purpose and time: According to the Undersecretary of Higher Secondary Education of Mexico (2018), the theoretical references that support the formative evaluation in the curriculum of the programs of subject of mathematics of the EMS, are supported in the integration of the types of evaluation, according to their purpose and time: diagnostic, formative and summative and according to the agent involved in this process: self-evaluation, co-evaluation and heteroevaluation, which is established Agreement 8 of the Steering Committee of the National Baccalaureate System in Mexico.

In this area, it is important to point out that the mathematics curriculum in Mexican Upper Secondary Education aims to enable students to express mathematically situations in their daily lives, which requires teachers to design teaching strategies based on problem formulation and resolution. All this in order to promote the formation of a critical, collaborative, reflective and ethical conscience in life, that they learn autonomously and that they take responsibility for their learning, among others.

Mathematical learning should be promoted through independent activities that require a significant effort, where students exercise and systematize knowledge individually and in collaborative interaction with others. All this in order to consolidate lasting knowledge throughout life.

Conclusions

Based on the contributions made by the teachers who participated in the study, it is considered that a culture of evaluation should be installed that ensures the educational quality in Upper Secondary Education, where its formative dimension is designed with a focus on understanding and improving students' learning, which requires promoting the renewal of teaching practice, in function of consolidating mathematical logical thinking and generating strategies that condition differentiated attention, in correspondence with the demands and learning needs of students in each class-group.

In this area it is important to specify that teachers, through their contributions to the interview, consider self-evaluation and co-evaluation as processes that stimulate the self-evaluation and management and

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regulation of learnings in students, where students develop skills and initiatives for progressive self-evaluation in the field of peer interaction, as a procedure promoted by Jorba and Sanmarti (2000), "the issuance of a judgment on the work done by him or his colleagues, according to criteria negotiated with the teacher and having as reference the learning objectives" (p. 6). However, they specify that students always give themselves and peers the highest grade, so it is not for them an indicator of progress; they emphasize the importance of these processes in their training to help them raise awareness of the construction of their knowledge.

Consequently, the teaching, learning and evaluation strategies that the teacher designs in order to carry out his educational intervention, to cover subjects that make up the disciplinary field of mathematics in Upper Secondary Education, should revolve around significant problems for the lives of students, that is, they must not be repetitive or resolved by applying a procedure or mathematical model that has no meaning for students, such situations should be aimed at stimulating the mobilization of various resources for the design of an evaluation-based methodology for learning, all of which are essential means of achieving mathematical knowledge, which constitutes a training potential for students throughout their school career in the baccalaureate.

One of the ideas that is beginning to expand relates to the transformation of the sense of evaluation to stop conceiving it only as an instrument of approval or reprobation and start seeing it as a complex practice that needs to be reviewed and renewed in the light of contemporary curricular requirements, for their contribution to student learning.

The evaluation of learning should constitute a process of reflection based on how to teach and how to learn mathematics, where reasoning and demonstration are essential components in the exercise of analysis and reflection by teachers, which, at the level of the academies, should promote the reflection and exchange of criteria on the methodologies they apply in their teaching practice and, at the same time, should assume a culture of evaluation based on understanding and improvement, as a strategy that promotes and activates effective feedback processes based on the demands and needs of students in each class-group and, at the same, time stimulates lifelong mathematical learning.

For all of the above, in Upper Secondary Education, mathematics teachers should consider the constructive alignment of learning and consider various didactic strategies that integrate the formative dimension of evaluation, to support the qualitative transformation of their educational practices, in order to promote the knowledge defined in the curriculum.

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It is therefore a reflective, rigorous and systematic process of inquiry that globally considers the situations in context, which addresses the explicit and implicit in favor of a sustained improvement of students' learning.

In this sense, one of the ideas that is beginning to expand relates to the transformation of the sense of the evaluation of learning, to stop conceiving it only as an instrument of approval or reprobation and begin to see it as a complex practice that promotes learning through it, which requires the mathematics teacher to reflect and analyze his practice from a didactic-discipline perspective, with emphasis on rigor, strategies that promote how to teach how to learn and evaluate.

The main findings in the study, point out the need for the mathematics teachers of the baccalaureate, to assume the challenges of formative evaluation, to transform their educational practices and generate strategies that help in the learning process of their students, which gives them the possibility to internalize mathematical knowledge and apply it in life situations.

It is therefore of vital importance to revitalize the collegial work of mathematics teachers in terms of exchanging reflections, experiences, strategies that promote the reasoning of mathematical problems based on experience and previous knowledge, analyze the assessment of learning and its results, in terms of their understanding for the improvement of students and teachers, all in terms of their classes becoming learning communities; as a strategy that conditions the professionalization of their teaching practice.

Note

1 These foundations are some of the contributions given by the mathematics teachers of the schools under study (Academy Meeting 03/12/2018).

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Editorial guidelines / *Normas editoriales*

Publication guidelines in «Sophia»

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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 the 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 giveLiterature 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

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of the 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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Normas de Publicación en «Sophia»

ISSN: 1390-3861 / e-ISSN: 1390-8626

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 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

2.4 Periodicidad

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«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.

2) Datos de Identificación: Nombres y apellidos completos de cada uno de los autores, organizados por orden de prelación. Se aceptarán como máxi-

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mo 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 competitivos nacionales e internacionales. En todo caso, para la valoración científica del manuscrito, este debe ir anonimizado con XXXX solo para su evaluación ini-

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cial, 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) Justificación del tema; 2) Objetivos; 3) Metodología; 4) Principales resultados; 5) Principales conclusiones. Ha de estar escrito de manera impersonal "El presente trabajo ana-

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liza...". 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 juventudes: violencias, conflictos, memorias y procesos de construcción de paz" [Introduction of the thematic dossier "Infancy and Youth: Violence, Con-

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flicts, 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 ser como máximo de tres niveles: 1. / 1.1. / 1.1.1. Al final de cada epígrafe numerado se establecerá un retorno de carro.

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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 (,).

Keywords. Los 6 términos antes referidos traducidos al inglés y separados por coma (,). No utilizar sistemas de traducción automáticos.

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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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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

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WoS, 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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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 (www. 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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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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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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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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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	
Se incluye título del manuscrito en español, inglés, resumen, abstract, descriptores y keywords	

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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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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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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

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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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PRESENTATION
Cover Letter

Mr. Editor of «Sophia»

Having read the regulations of the journal «Sophia» and analyzed its coverage, thematic area and approach, I consider that this journal is the ideal one for the dissemination of the work that I hereby attach, for which I beg you to be submitted for consideration for publication. The original has the following title "_____", whose authorship corresponds to _____.

The authors (s) certify that this work has not been published, nor is it under consideration for publication in any other journal or editorial work.

The author (s) are responsible for their content and have contributed to the conception, design and completion of the work, analysis and interpretation of data, and to have participated in the writing of the text and its revisions, as well as in the approval of the version which is finally referred to as an attachment.

Changes to the content are accepted if they occur after the review process, and also changes in the style of the manuscript by the editorial process of «Sophia».

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Author first and last name
Identification document

Signature

Author first and last name
Identification document

Signature

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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.

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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».

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Announcements 2020-2025 / *Convocatorias 2020-2025*

Announcements 2020 - 2025

Sophia 30
Philosophy of the cognitive sciences and education

Descriptors: Philosophy and cognitive science; Philosophical debate on the cognitive sciences; Philosophical foundation of cybernetics; Epistemological foundations of cognitive theory; Philosophical foundations of connectionist theory; Current trends in cognitive science; Theory of mind and cognitive sciences; Evolutionary psychology and education; Relations between cognitive sciences and education sciences; Contributions of the cognitive sciences for education.

Generation of articles from representatives of philosophy prominent in the central theme and its implications in psychology, pedagogy or other disciplines.

Deadline for receipt of manuscripts: July 15, 2020

Publication date of this issue: January 15, 2021

Sophia 31
The problem of truth in the sciences and in the pedagogical practice

Descriptors: Conceptions of truth in the history of philosophy and its implications in educational processes; Philosophical, psychological and pedagogical foundations of truth; Truth, fact and science; Truth in the social sciences; Truth in the natural sciences; Truth in the exact sciences; Truth in the human sciences; Truth in the sciences of information and communication; New trends, approaches and perspectives on truth; The truth in education.

Generation of articles from representatives of philosophy prominent in the central theme and its implications in psychology, pedagogy or other disciplines.

Deadline for receipt of manuscripts: December 15, 2020

Publication date of this issue: July 15. 2021

Print ISSN: 1390-3861 / Electronic ISSN: 1390-8626, pp. 352-355.

Sophia 32
Philosophical reflection on the quality on education

Descriptors: Analysis of the concept of "quality" in education; Philosophical, psychological and pedagogical fundamentals of quality in education; Quality and comprehensive and inclusive educational models; Philosophical basis of complex competences in education; Quality and skills in education; Approach of the capacities and educational quality.

Generation of articles from representatives of philosophy prominent in the central theme and its implications in psychology, pedagogy or other disciplines.

Deadline for receipt of manuscripts: July 15, 2021

Publication date of this issue: January 15, 2022

Sophia 33
Philosophy of the mind and education

Descriptors: Effects and causes of mental states; The nature of mental states and their importance in education; Monistic responses to the mind-body problem; Theories about the philosophy of mind; The philosophy of mind at the present; Philosophy of mind and its relationship with other sciences; Foundation of mental activity and behavior; Relationship of the philosophy of mind with psychology; Philosophy of mind and education; The power of the mind in education; Pedagogical strategies for the development of the mind; Concept of disability or mental dysfunction: implications and proposals in education.

Generation of articles from representatives of philosophy prominent in the central theme and its implications in psychology, pedagogy or other disciplines.

Deadline for receipt of manuscripts: December 15, 2021

Publication date of this issue: July 15, 2022

Sophia 34
Philosophy, anthropology and education

Descriptors: Philosophical foundations of ethnography; Philosophical basis of cultural theories; Contributions of cultural and social anthropology to education; Philosophical foundation of dialogue between cultures; Interculturality, multiculturalism and education; The task of philosophy in intercultural dialogue; The thought of diversity and its educational importance; Global citizenship, cosmopolitanism and education; Ecosophy, culture and transdisciplinarity.

Generation of articles from representatives of philosophy prominent in the central theme and its implications in psychology, pedagogy or other disciplines.

Deadline for receipt of manuscripts: July 15, 2022

Publication date of this issue: January 15, 2023

Print ISSN: 1390-3861 / Electronic ISSN: 1390-8626, pp. 352-355.

Sophia 35
Philosophical currents and their impact on pedagogical orientations

Descriptors: Philosophy as the fundamental basis of pedagogical orientations. Idealism as the basis for the generation of pedagogical orientations; Rationalism as the foundation of pedagogical orientations; Empiricism as the basis of educational realism; Illustration as support of educational enlightenment; Other philosophical currents as the basis of theories or pedagogical orientations throughout history; Philosophical foundations of the new pedagogies; Philosophy of technology in the educational field; Philosophical basis of constructivism and other pedagogical theories; Ethical thinking and pedagogy; Philosophical critique of current educational models; Philosophy of dialogue and education; Hermeneutics and their contributions to the current pedagogy.

Generation of articles from representatives of philosophy prominent in the central theme and its implications in psychology, pedagogy or other disciplines.

Deadline for receipt of manuscripts: December 15, 2022
Publication date of this issue: July 15, 2023

Sophia 36
Philosophical approach to learning as a cognitive process

Descriptors: Philosophical basis of learning; Learning as a cognitive process; Learning as a product and as a process of knowledge; Philosophical foundation of learning theories; Psychological and pedagogical foundations of learning; Philosophical foundations of multiple intelligences and education; Emotional intelligence and its impact on educational processes; Science and philosophy of human emotions: educational repercussions; Sense and meaning of cognitive processes; Memory, thought and language as the main cognitive processes of the human being; Cognitive processes and meaningful learning.

Generation of articles from representatives of philosophy prominent in the central theme and its implications in psychology, pedagogy or other disciplines.

Deadline for receipt of manuscripts: July 15, 2023
Publication date of this issue: January 15, 2024

Print ISSN: 1390-3861 / Electronic ISSN: 1390-8626, pp. 352-355.

Sophia 37
Physics, metaphysics and education

Descriptors: Philosophical reflections on the interpretation of physics; Metaphysics in the twenty-first century; History of physics and its educational approach; Relations between conceptions of physics in the history of philosophy; Problem of sense and truth in the philosophy of physics; Nature and implications of thermodynamics; Epistemology and guiding principles of current physical theories; Philosophical foundations of quantum mechanics; Philosophical implications of quantum theory; Philosophical implications of Newtonian physics; Philosophical implications of the theory of relativity; Pedagogical strategies in the teaching-learning of physics; Educational proposals to boost the understanding of physics; Philosophical implications of current theoretical physics.

Generation of articles from representatives of philosophy prominent in the central theme and its implications in psychology, pedagogy or other disciplines.

Deadline for receipt of manuscripts: December 15, 2023

Publication date of this issue: July 15, 2024

Sophia 38
The inductive method in the humanities and pedagogy

Descriptors: Scientific activity and reflection on the method of knowledge; The inductive method in the social sciences; Induction, experience and action as the foundation of pedagogy; The methods of knowledge and learning in the humanities; Value and limits of the experimental method in the human sciences; Value and limits of pedagogical positivism; Reflections on the scientific method and implications in the learning processes; Applications of the inductive method in education; Usefulness of the inductive method for psychology; Pedagogical proposals of an inductive character in the human sciences.

Generation of articles from representatives of philosophy prominent in the central theme and its implications in psychology, pedagogy or other disciplines.

Deadline for receipt of manuscripts: July 15, 2024

Publication date of this issue: January 15, 2025

Print ISSN: 1390-3861 / Electronic ISSN: 1390-8626, pp. 352-355.

Convocatorias 2020 - 2025

Sophia 30
Filosofía de las ciencias cognitivas y educación

Descriptores: Filosofía y ciencia cognitiva; debate filosófico sobre las ciencias cognitivas; fundamentación filosófica de la cibernética; fundamentos epistemológicos de la teoría cognitivista; fundamentos filosóficos de la teoría conexionista; tendencias actuales de la ciencia cognitiva; teoría de la mente y ciencias cognitivas; psicología evolutiva y educación; relaciones entre ciencias cognitivas y ciencias de la educación; aportes de las ciencias cognitivas para la educación.

Generación de artículos desde representantes de la filosofía destacados en el tema central y sus implicaciones en la psicología, en la pedagogía o en otras disciplinas.

Fecha límite para la recepción de manuscritos: 15 de julio de 2020
Fecha de publicación de esta edición: 15 de enero de 2021

Sophia 31
El problema de la verdad en las ciencias y en la práctica pedagógica

Descriptores: Concepciones de verdad en la historia de la filosofía y sus implicaciones en los procesos educativos; fundamentos filosóficos, psicológicos y pedagógicos de la verdad; verdad, hecho y ciencia; la verdad en las ciencias sociales; la verdad en las ciencias naturales; la verdad en las ciencias exactas; la verdad en las ciencias humanas; la verdad en las ciencias de la información y de la comunicación; nuevas tendencias, enfoques y perspectivas sobre la verdad; la verdad en la educación.

Generación de artículos desde representantes de la filosofía destacados en el tema central y sus implicaciones en la psicología, en la pedagogía o en otras disciplinas.

Fecha límite para la recepción de manuscritos: 15 de diciembre de 2020
Fecha de publicación de esta edición: 15 de julio de 2021

Sophia 29: 2020.

Print ISSN: 1390-3861 / Electronic ISSN: 1390-8626, pp. 356-359.

Sophia 32
Reflexión filosófica sobre la calidad en la educación

Descriptores: Análisis del concepto de "calidad" en la educación; fundamentos filosóficos, psicológicos y pedagógicos de la calidad en educación; calidad y modelos educativos integrales e inclusivos; bases filosóficas de las competencias complejas en la educación; la calidad y las competencias en la educación; enfoque de las capacidades y calidad educativa.

Generación de artículos desde representantes de la filosofía destacados en el tema central y sus implicaciones en la psicología, en la pedagogía o en otras disciplinas.

Fecha límite para la recepción de manuscritos: 15 de julio de 2021

Fecha de publicación de esta edición: 15 de enero de 2022

Sophia 33
Filosofía de la mente y educación

Descriptores: Efectos y causas de los estados mentales; la naturaleza de los estados mentales y su importancia en educación; respuestas monistas al problema mente-cuerpo; teorías sobre la filosofía de la mente; la filosofía de la mente en la actualidad; filosofía de la mente y la relación con otras ciencias; fundamento de la actividad mental y de la conducta; relación filosofía de la mente con la psicología; filosofía de la mente y educación; el poder de la mente en la educación; estrategias pedagógicas para el desarrollo de la mente; concepto de discapacidad o disfunción mental: implicaciones y propuestas en educación.

Generación de artículos desde representantes de la filosofía destacados en el tema central y sus implicaciones en la psicología, en la pedagogía o en otras disciplinas.

Fecha límite para la recepción de manuscritos: 15 de diciembre de 2021

Fecha de publicación de esta edición: 15 de julio de 2022

Sophia 34
Filosofía, antropología y educación

Descriptores: Fundamentos filosóficos de la etnografía; bases filosóficas de las teorías culturales; aportaciones de la antropología cultural y social a la educación; fundamentación filosófica del diálogo entre culturas; interculturalidad, multiculturalidad y educación; el quehacer de la filosofía en el diálogo intercultural; el pensamiento de la diversidad y su importancia educativa; ciudadanía global, cosmopolitismo y educación; ecosofía, cultura y transdisciplinariedad.

Generación de artículos desde representantes de la filosofía destacados en el tema central y sus implicaciones en la psicología, en la pedagogía o en otras disciplinas.

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Fecha de publicación de esta edición: 15 de enero de 2023

Sophia 29: 2020.

Print ISSN: 1390-3861 / Electronic ISSN: 1390-8626, pp. 356-359.

Sophia 35
Corrientes filosóficas y su incidencia en las orientaciones pedagógicas

Descriptores: La filosofía como base fundamental de las orientaciones pedagógicas. El idealismo como base para la generación de orientaciones pedagógicas; el racionalismo como fundamento de orientaciones pedagógicas; el empirismo como sustento del realismo educativo; la ilustración como apoyo del iluminismo educativo; otras corrientes filosóficas como base de teorías u orientaciones pedagógicas a través de la historia; fundamentos filosóficos de las nuevas pedagogías; filosofía de la tecnología en el ámbito educativo; bases filosóficas del constructivismo y de otras teorías pedagógicas; pensamiento ético y pedagogía; crítica filosófica a los modelos educativos actuales; filosofía del diálogo y educación; la hermenéutica y sus aportaciones a la pedagogía actual.

Generación de artículos desde representantes de la filosofía destacados en el tema central y sus implicaciones en la psicología, en la pedagogía o en otras disciplinas.

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Sophia 36
Enfoque filosófico del aprendizaje como proceso cognitivo

Descriptores: Bases filosóficas del aprendizaje; el aprendizaje como proceso cognitivo; el aprendizaje como producto y como proceso del conocimiento; fundamento filosófico de las teorías del aprendizaje; fundamentos psicológicos y pedagógicos del aprendizaje; fundamentos filosóficos de las inteligencias múltiples y educación; la inteligencia emocional y su incidencia en los procesos educativos; ciencia y filosofía de las emociones humanas: repercusiones educativas; sentido y significado de los procesos cognitivos; memoria, pensamiento y lenguaje como principales procesos cognitivos del ser humano; procesos cognitivos y aprendizajes significativos.

Generación de artículos desde representantes de la filosofía destacados en el tema central y sus implicaciones en la psicología, en la pedagogía o en otras disciplinas.

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Sophia 37
Física, metafísica y educación

Descriptores: Reflexiones filosóficas acerca de la interpretación de la física; la metafísica en el siglo XXI; historia de la física y su planteamiento educativo; relaciones entre concepciones de la física en la historia de la filosofía; problema del sentido y de la verdad en la filosofía de la física; naturaleza e implicaciones de la termodinámica; epistemología y principios rectores de las teorías físicas actuales; fundamentos filosóficos de la mecánica cuántica; implicaciones filosóficas de la teoría cuántica; implicaciones filosóficas de la física newtoniana; implicaciones filosóficas de la teoría de la relatividad; estrategias pedagógicas en la enseñanza-aprendizaje de la física; propuestas educativas para dinamizar la comprensión de la física; implicaciones filosóficas de la física teórica actual.

Generación de artículos desde representantes de la filosofía destacados en el tema central y sus implicaciones en la psicología, en la pedagogía o en otras disciplinas.

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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.

Generación de artículos desde representantes de la filosofía destacados en el tema central y sus implicaciones en la psicología, en la pedagogía o en otras disciplinas.

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