

THE EDUCATION UNDER THE SIGN OF COMPLEXITY

La educación bajo el signo de la complejidad

DARWIN JOAQUI ROBLES*

Uniminuto/Pitalito-Colombia University
darwin.joaqui@uniminuto.edu.co

Orcid code: <http://orcid.org/0000-0002-4833-7652>

DORYS NOEMY ORTIZ GRANJA**

Pontifical Catholic University of Ecuador / Quito-Ecuador
dortiz107@puce.edu.ec

Orcid code: <http://orcid.org/0000-0003-0617-0361>

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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* Master in Contemporary Philosophy with Research Modality, Specialist in Contemporary Philosophy and Bachelor of Philosophy. Research leader and coordinator of the Laboyano SILA Research Center at the Uniminuto University Corporation, Pitalito Tutorial Center, Huila-Colombia.

** Clinical psychologist with a master's degree in systemic family therapy. Professor and coordinator of the Master's Degree in Psychology in Systemic Family Therapy at the Faculty of Psychology of the Pontifical Catholic University of Ecuador. Researcher in mental health, psychological well-being, family and education.

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.

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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-

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-

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.

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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

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-

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).

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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-

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.



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



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.



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.

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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.

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



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



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

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



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



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.



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-



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:

- 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.

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



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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