SciencePG
Science Publishing Group

Complexity and Transformation of Education: The Transition from the Local to the Global

Olga Cecilia Basora Gomez

General Direction of Quality Management, Autonomous University of Santo Domingo (UASD), Santo Domingo, Dominican Republic

Email address:
olgabasora@gmail.com

Abstract: The relationship between the social, economic, and political systems with the educational system has always existed, but the observation of this correspondence through the gaze of complexity has only been carried out since recent times. Upon delving into it, an ever-growing dynamism is observed in that interdependence. To the extent that the development of the educational system is observed throughout history, the presence of the social, political, and economic system in it is more evident and vice versa. The complexity allows us to observe how the characteristic features of a long, centuries-long first stage, spurred on by the environment, are transformed into others and how they support the system that supports them. It is also observed how the traits belonging to the second stage are useless in these historical moments of social transformation, which is why a new transformation in education is taking place. What are the actions of the environment that can force an educational transformation to take place? What are those traits that characterize today's education? Where is education headed? Surprisingly, the center-periphery relationship emerges as the protagonist in the investigation of the relationship between these systems. This research tries not only to show the existence of this relationship but also the need to delve into it to glimpse the new trends in educational transformation.

Keywords: Education, Complexity, Periphery, Global, Local, System

1. Introduction

The System... always the System. The System, with a capital letter, is the set of social, political, economic and cultural sub-systems, among others, that has been created by us or, by some of us and accepted by the rest. We speak of the human planetary System, which we colloquially call the social system. When a person or group has not agreed with the System and does not accept its rules, he becomes a dissident and is outlawed by others, by those who support the System. But something very interesting happens when that disagreement, in addition to being only qualitative becomes quantitative, the System is forced to mutate, because it cannot escape itself.

Therefore, the main guardians of the System, even knowing that the only permanent thing is change, use strategies to perpetuate it or at least to keep it in the same state as long as possible. Those representatives of the System, its sponsors, and defenders, those who oversee the conservation task represent its nucleus. It can be a high

official, a minister, a director, but also a simple employee and even an unemployed person. The nucleus of the System has no physical place, it is a dimension that permeates any stratum, be it social, political, or economic.

The same happens with its *periphery*, it is not necessarily geographic, although in some cases, its representatives coexist in physically delimited spaces. However, the most important thing about the representatives of the *periphery* is their state. These are the ones affected by the behavior of the System or at best, they are the ones who do not agree with the behavior of the System, either in its entirety or in some characteristics. And of course, the majority is the one who decides where each of these characteristics go, which when interrelated are holistically manifested as the System.

One of its main strategies of permanence is formal education. Backed by a local, regional, and national "Educational (sub) System", the school processes obey implicit (and sometimes explicit) guidelines of how education should be in that country, region, or educational center. It is not that this is bad... nor good, it is how education

is integrated into the System. And it serves many things. It builds and reaffirms paradigms, it allows us to use memorization, the mind, and sometimes even imagination and its sister creativity.

Since the teaching-educational process is social, education is formalized through institutions created for this purpose. Such are: initial, basic and middle schools, technical institutes, and institutions of higher education, such as higher institutes, universities, and specialized centers. All of them, by exclusively developing traditional processes, do not represent society with its hopes, its knowledge, its traditions, its culture, its conflicts, and its benefits.

In addition to those mentioned, the social system provides non-formal but massive strategies for education, through the media such as radio, television, the press (written, radio and television), cultural centers (museums, salons art, libraries) sports, and entertainment centers, religious and with more and more power in this last century, the web media. In all of them, formal or not, a dialectical relationship develops from which new knowledge emerges.

The school, as an operational expression of the educational system, has context and components, both procedural and structural. These have a high level of importance if you want to preserve, develop, and spread knowledge through it. The relationships that develop between the components and between them with the context should give it meaning and meaning for what it should be: a *community of knowledge*.

Formal education has been nested in human culture and not as a simple whim of outdated intellectuals, but as a response to the need to channel the course of society through its impact on culture. It could be said that it is one of the strategies, if not the most, essential of the System. But education has a problem: it does not always faithfully obey the System, creating conflicts, and promoting dissent. And as this and its educational strategy has not always existed in the way it is currently observed, it is necessary to search for its trajectory, to observe possible trends, and dare to try to influence them.

2. The Problem of Education

The phenomena of globalization, wars, epidemics and pandemics, economic reforms, and paradigmatic changes have been happening in postmodern society and its institutions, in ever-faster cycles. This situation increases the obsolescence of the educational processes that still endure to try to influence the new and ever-changing conditions of the context, to fulfill its maintenance task.

At present, it is notorious that the global context is changing rapidly, largely due to emerging causes. The situation that brings uncertainty not only in the System but also in educational institutions.

Faced with this uncertainty, more and more people favor transformations at all school levels. Changes that involve innovation, flexibility, relevance, teaching-educational processes focused on learning, integration, research, creativity, innovation, and connection with the community, among others.

Currently, it is essential to meet the need for education to innovate its processes to try to influence the new and changing conditions of the context and thus fulfill its mission. But also, you are facing the opportunity to turn schools, at all levels, into organizations that learn from their daily practices and their links with communities.

A concept of great importance to characterize the school and the fulfillment of its mission is its *impact*. This evaluation criterion can be conceived as the ability of educational processes to satisfy social expectations about situations that arise in the environment of the social system. However, it would be reductionist to understand the school as a simple trainer, from the initial level to the professional level, since this, although it constitutes an important part of their work, is not everything.

Due to the nature of the school, the educational processes that take place in it should have as a center the search for knowledge through the relationships that arise between teacher, student, and environment, consciously and intentionally. Integration between the holistic and the dialectical, between the external and the internal, emerged from their essential triadic relationship of preserving, developing, and spreading culture.

It is urgent to build 'knowledge' to start building a fairer, more humane, and conscious society. For this, it is necessary to base the processes, the relationships, and the educational structure so that its nature, its reason for being, can emerge in it, retake the school as a community. One, where knowledge is managed in the most comprehensive, universal, and inclusive way possible, a community of knowledge.

The reductionism in which a large part of the schools has fallen has led them to diminish on numerous occasions the fulfillment of their social function, mission, or reason for being, to the functions of forming elements useful to the system. People capable of working adequately in the field of activities that they or the shift system choose without critical thinking or recognition of their human integrity.

In educational centers, regardless of their level, the function of generating knowledge, developing attitudes, and promoting values through research and extension activities is scarce, and the school's contribution to the development of nations and the creation of science is also scarce. and human culture. Consequently, the advisory and social interaction function that would contribute to the improvement of society and the institutions themselves is almost non-existent.

These aspects, as well as the recognition of the need to fulfill the mission of the school, are awakening the interest of many of the social actors, to the point of considering them worrying, both from the internal perspective in educational institutions, as well as the users and beneficiaries of their environment.

However, the actions that are carried out will lack a true social sense if they are not observers of nature and raison d'être of the school, of the trends of possible future scenarios and if they do not express their intention to modify the current reality. Well of ostentatious educational centers capable of providing unbeatable services and amenities will

do nothing if they do not contribute to social and human, personal, and collective development.

3. The Morphogenesis of Formal Education

The complex look opens windows to understand education from the systemic and the holistic. When observing the complexity of education, it is verified that the processes that manifest in the educational system influence its structure, and this, in turn, fosters the continuity of those processes. The school, like the educational system, shows similar behavior and the same thing happens in the classroom. Everything happens in a space-time context in a continuous movement who's internal and/or external pressures cause the occurrence of small changes frequently and large mutations in an exceptional way.

Considering the multidimensionality of educational reality, it is convenient to approach the components of the educational system through the holistic conception provided by the paradigms inherent in complex systems. Thus, the educational system, with its components, relationships, and linkages, is seen as consisting of a set of structures and processes that are interrelated through the efforts made by its actors.

Any support where processes inherent to the educational system are developed is recognized as a structural component. In this way, among the structural components of the system, the organizational structure - such as politics, vision, mission, values, and objectives - stands out, as well as infrastructure and physical structure - such as equipment and technology, among others. It is interesting to observe that this structure is repeated most appropriately throughout the educational system at its different levels: In the Ministry of Education, in the university, in the faculty, in the career, in the initial, basic and secondary, but also the classroom.

Aguerrondo groups them into three levels and calls them "supporting forms"[1]. The first level, which he calls political-ideological, is the one that gives meaning and meaning to the educational system. The second or technical pedagogical level involves what the educational strategy should have and the third or organizational level assumes the content, values, and attitudes and norms that guide the teaching-learning process.

The processes, on the other hand, as protagonists of the action, are the movement, what happens in the here and now, the actions of the actors in the system. Among the most relevant are the academic-administrative processes, the teaching-learning processes, the classroom processes, the investigative processes, and the bonding processes, among others.

All this occurs within the System, with its center and periphery wrapped in the dynamics of the global and the local. From this perspective, it will be possible to see how education has contributed, first from the periphery to building new ways of thinking, which have become Actions contributed to the development of new attitudes and behavior. As C. Maldonado expresses, there has been no social, cultural, religious, or political project that has not gone through education and has made education a fundamental tool for the preservation of power and the status quo, or for the change of the society and of the time [14].

A common belief in the current system is that things are valued by price, by their exchange value in the market and not by their use-value. Thus, things are worth more when they cost more money and are worthless when less money costs. Inclusively, people have been valued for their assets and capital. It could be said that, for a few centuries, in the System, there has been a confusion between value and price.

This confusion, accompanied by some characteristics exhibited by the System, such as the tendency to accumulate and appropriate social wealth, as well as the lack of appreciation for the care of natural resources, favors the transmission of competing ideas to human beings., control and domain, among others. And formal education contributes, in most cases, to the consolidation of these ideas through their plans and actions. It is evident from the selection of places for the best and worst students of the course to the essence of many of the subjects.

Since its inception, the school has been the social institution that has been closely related to education and with it, to the evolution of society, so studying its morphogenesis and development is decisive for understanding both its link with the System and its influence on culture. The essence and future projection of the System often depends on it.

The school, at any of its levels, has the essence of preserving, developing, and spreading culture, so observing school processes and their relationships, from initial education to university, as well as their meaning as conscious processes, therefore, holistic and dialectical, it can throw a clue as to why it does not always obey the System.

Education has been present in all cultures since its inception. Unlike the planned systematicity with which it is currently characterized, education in primitive towns was a social activity that was carried out continuously, despite the absence of teachers.

Covered by common characteristics such as the teaching of religion and the preservation of traditions, C. Tünnermann among others, indicates that it is possible to observe, the emphasis on philosophy and poetry from China, writing, mathematics, science, and architecture in ancient Egypt, as well as physical training methods in Persia, where schools, boarding schools and teachers already existed. Greece not only rescues methods of body training from Persia by turning them into gymnastic training but also develops other concepts that permeated the teaching of philosophy such as the arts and aesthetics [23].

Later, the Romans, in addition to using Greek citizens to teach young people, study and practice law, engineering, administration, and government organization, in addition to Latin language and literature. And, before the end of the 1st century, Charlemagne fostered the development of a school in his palace with clerics and educators brought from England.

In this long period, the first phase of the System can be recognized, where educational institutions contribute to strengthening it.

Under the influence of the Muslims, Córdoba stars, in the Iberian Peninsula, it is flourishing as an important center for the study of science, mathematics, philosophy, and culture. And on the same peninsula, protected by the socio-cultural context of 12th century Europe, a new type of institution emerges in the West. Dedicated to education and made up of "Universitas" or members dedicated to the profession of learning or teaching, this institution provides a university degree or universal validity as proof of the degree acquired in the learning of knowledge.

In Bologna in 1119 a different form of teaching emerged, irreverent, and with certain coincidences with the eastern educational systems, it is the University. This affront is followed by Paris and Oxford in the same century and Palencia, Cambridge, and Salamanca continue in the 13th century. The reproductions continue and in the 15th century, the one of Alcalá de Henares was founded, of an ecclesiastical nature and on which the first university foundation of the new world in Santo Domingo was inspired. From 1538 onwards a reproduction of universities in different countries and cities of America continues, manifesting a bifurcation that had already begun in Europe: universities of a theological nature, reproducers of ecclesiastical culture, and universities of a secular nature, with students as the center of the system and decision-makers.

It is interesting to highlight the conceptual difference in the management system of these, the professors administered the universities located geographically to the north (Paris, Oxford, and Cambridge) and the students did so with those located in the south. Although, in both regions, education at the university was a prerogative of classes, since the poor could not access it.

The university, absorbed by the educational system of the time, shows a marked fractal behavior in the structure and behavior of each of its two modalities. The university becomes part of the structure of the system.

At the end of the 18th century, the first mutation of the system took place and the society experienced an accelerated development due to technological advances. As a result of this mutation, a second phase emerges, known as the Industrial Revolution. This phase occurs in two waves: the first in the late eighteenth century and the second in the late nineteenth century.

However, just before the first mutation, in the early eighteenth century, processes emerge on the periphery of the educational system. The integration of teaching and research based on the ideas that Guillermo Humboldt proposes at the University of Berlin. This form of education, which highlights the presence and cooperation of students and professors in the research work for the creation of knowledge, began to permeate in most universities.

In the first wave of the second phase and with the advent of the steam engine, a major change is made to the system.

The mutation reaches the merchant and his activity, degrading it. The position of mercantilism is no longer the main source of profit, but productivism. It is about manufacturing as much in the shortest possible time and selling it at the highest possible price, both goods, and services. The industry appears and replaces commerce as a fundamental activity and Industrial replaces the figure of the merchant. Industry intelligence is willing to lose money to earn more later when it gets a place on the market accompanied by more profit.

In the second half of the 19th century, when the second wave of the Industrial Revolution occurred, the relationship teaching - university research and its contributions to the incipient industry, reached such a leading role that the Humboldtian model and strategy reached the name of Academic Revolution.

But since chaos is nested in all stability, the insufficiency of specialists to respond to the needs, not only of knowledge and skills but also of submission required by the incipient mechanical industry of the early nineteenth century, encourages the emergence in Paris of a new bifurcation: the Napoleonic conception of the university.

Legacy of enlightened despotism and supported by Russian and Austrian contributions, encyclopedism is a product of Prussia based on Spartan discipline and obedience, accompanied by a strong class divide. This produces a dynamic relationship between mechanism and encyclopedism, which by continuously complementing each other constitutes a retroactive loop.

In this dynamic, enlightened despotism manifests itself as parental form, embodying morphogenesis that includes the environment, represented by the incipient industrial society. This legacy fostered, in the nascent structure led by the educational system, the ability to preserve its viability within the new constraints of the environment [2].

The extrapolation of this model to American universities undermined the creation of scientific institutions throughout the continent and as an antithesis to the extreme submission that the model fosters, arises at the beginning of the 20th century, on the periphery of the system, the Cordoba Reform in Argentina. Emphasizing the university social service and privileging freedom against all oppression, this emerging process influences the academic field with the integration of general courses into the curriculum that lessens the narrow professional training.

The second wave of the second phase produced by the first mutation begins in the 19th century and consolidated during the 20th century, strengthening the system with the reaffirmation of the productivism, industry, and business. The expansive strategy continues to be colonialism, which allows the great powers to continue obtaining natural resources at low cost and manifests itself, not only in Europe but also in the United States and other countries. Absolute monarchies are being replaced by systems that we call democratic, characterized by suffrage, parliament, and political parties, among others.

In the final stretch of the 20th century and the beginning of

the 21st, a new mutation is being experienced. The latter is driven by the current Technological Revolution and all that it entails. This system is characterized because, although the money is still earned by trading and producing, the great profit is mainly in speculation. This is done immediately and globally. The new manifestations of the system are speculation and short-termism, trying to earn as much as possible in the shortest time, only the present moment being valid, downplaying the future. It is to win as much as possible in the now. Due to this, neither commerce nor company or industry are the fundamental economic agents; now it is the financial sector and within these, banking. Well, they are the appropriate setting to carry out this activity [5].

There has been a geographical movement in the phase change, going from the United States and Europe to the Pacific coast. The economic powers are currently the United States, China, Japan, and other Asian countries. As a curious coincidence, the Pacific also bathes emerging powers such as India and Brazil. The political movement increasingly relies on international organizations. Many of the decisions in "sovereign" countries are not made by governments, but by groups above them, such as the G7, G20 and others.

In this new state of the System, debt is also used, credit being one of its most important elements. Z. Bauman states that we are facing a new breed of slaves that they call the debtor race, because people accept credit, debts, and mortgages as normal, without realizing that this way of life often prevents them from making free decisions [3]. But people are not the only prisoners of debt, only the first, after them, companies have joined the same and finally, the countries have joined. Many of the states no longer could pay, not only for capital but also for interest. The situation that leads to refinancing the debt, where a bank imposes the economic and political conditions that it deems appropriate, regardless of whether it is convenient for the state. Since money was no longer backed by gold since the second half of the 20th century, it has become bank money, which has allowed many companies to take advantage of the opportunity to become large corporations.

Thus, and in the meantime, the educational system continues to reproduce the same processes that made it successful in preserving the System in the second phase.

4. Proposal: Processes That Emerge from the Periphery

The systemic approach to school, in addition to not being new, has been widely accepted since the conceptualization of complex systems permeated the social sciences. Among important contributions, the proposal made by M. Gell-Mann in 1994 stands out, where she affirms that organized social groups conform to complex adaptive systems and that even humans is functioning to a high degree as a complex adaptive system [9].

The macrostructure that transcends geographical space and where educational processes take place in the 21st century,

cannot always be manifested in each of the schools in the system. Frequently, schools, as individual systemic units, try to impregnate their seal [10], so that they are subject, rather than to the general processes that are developed regularly, to the differences that could exist at a geographical, social, economic, and political level, among others.

Thus, to inquire into the field of the systemic-complex dynamics that is the school, it is necessary to venture into the field of the environment capable of influencing it globally and in the field of components capable of becoming entangled in that dynamic, to cross both with the temporal dimension. In this way, it will be possible to infer the degree of distance from the balance that the school presents and to glimpse if its complex behavior is rigid, adaptive or if possibilities are perceived for the development of spaces that allow it to evolve through the emergence of new expressions that promote its effectiveness and social relevance in the 21st century.

The world, societies, and how they develop have been transforming rapidly in recent years. This change has not always been in favor of the survival of humanity. Such is the case of excessive economic growth, which according to E. Leff has damaged ancient cultures such as the production and care of nature [12].

The excesses that have occurred during globalization have contributed to disrespect for human rights, to the corruption of political processes, to the decomposition of the productive structure of countries, with the consequent decrease in jobs and environmental and social degradation.

Looking more deeply, it could be said that the current situation in the environment is promoting the approach of the school towards a new reality. A space that fosters care not only towards nature, but also towards the communities in which it is immersed and, above all, towards its actors.

It is urgent to develop knowledge 'through fundamental competencies to begin to build a fairer, more humane, and conscious society. To base the processes, the relationships, and the educational structure so that their nature, their reason for being, retake the school as a community. One, where knowledge is managed in the most comprehensive, universal, and inclusive way possible, a community of knowledge.

Social bonding in the teaching-learning process

In the school, a bifurcation is essential: the design and development of the curriculum based on the structure: teaching - research - extension, with an emphasis on social bonding. This approach should be the basic premise, a guarantee of fostering creativity and innovation in accordance with science and aimed at improving the living conditions of the environment and consequently towards sustainable development.

At the same time, in the periphery of the educational system, the teaching-learning process continues, through a set of actions carried out by educators and learners, or in other words, teachers and students, in each social context. And it is this peripheral process, where there is a brilliant opportunity to allow the genuineness and specificity of people to develop because it depends on the actors involved.

To make this philosophical burden operational, it is necessary to permeate both institutional and individual tasks, so the design and development of teaching-learning processes, in addition to knowledge management, must reflect their integration with skills, abilities, values, and attitudes to be achieved.

In this way, the didactic requirements must reflect the relationship between research methods, extension processes, professional and work behaviors, as well as social and eco-environmental attitudes, among others. Without going into the important orientation to quality, where standards and indicators would demonstrate the level of achievement of each of these components and their relationships, it would be a great advance for the school to achieve relevance by becoming a community of knowledge.

If you want to promote the desired educational change, the actors in the educational process must relate teaching to research and extension. An ideal space for this is the development of community projects, where students link what they have learned with the communities. In this strategy, community members recognize their realities, desires, and possibilities, assume responsibilities, and make decisions, which favors the strengthening of their community development process. Students, for their part and under the guidance of the teacher, build knowledge, and develop skills through their participation in these communities.

The comprehensiveness of this educational process, which benefits all actors and allows the school to fulfill its social responsibility, can be seen in the change in behavior of the participants, the strengthening of values, and the construction of knowledge. Besides, it lays the foundation for the development of socially responsible attitudes and behaviors in students and members of the community.

Coinciding with F. Vallaeys, it is further recognized that the community provides the conditions for the school to find novel modalities for the professional and comprehensive ethical education of students, as well as new topics, resources, and sources of research and extension [24].

This high entropy environment is ideal for the emergence of new possibilities. It is there where the results of the school-society relationship are manifested, or in other words, the results of the relationship between the components and the environment.

By conceiving society as a multidimensional and systemic set; where knowledge is related to the whole to make sense, the school as a nodal institution needs to be managed so that it develops social and professional commitment, its flexibility and transcendence and that it can respond appropriately to the expectations and needs of society and its subjects. that compose it [20]. This action is identified with formal education as a necessary condition for rethinking the relationships between educational centers and society.

Education is undoubtedly a great challenge to develop relevance in a society characterized by the abundance of information and the search for knowledge in an environment of great inequalities.

And, although the most generalized conception of relevance refers to the coincidence between what the school does and what society expects of it, successful proposals such as that of H. Vessuri expose that, to recognize the relevance of the institution educational, it must be deepened beyond the transmission of knowledge [25]. Its construction, from the teaching-learning process integrated into the investigative function and social responsibility with other sectors of society. Including in the latter the world of work and community services, without forgetting their participation in the search for solutions to current problems, such as the vulnerability of the population, the current situation of the environment, climate change, the search for peace and international understanding, as well as the exaltation of democracy and human rights.

5. The Harmonizing Role of the Curriculum Enriched by Transdisciplinarity

The gift that UNESCO made to the world when the 21st century was to be born, as a result of the report by the International Commission on Education for the 21st century chaired by J. Delors called "Education contains a treasure", the set of the four pillars of education emerged. These four fundamental learnings have been positioned as the fundamental axis of education in this century. Learning to know, learning to do, learning to live together, and learning to be is a call to stop accumulating knowledge to incorporate it into life and turn it into wisdom.

Another, not less important, signal of the commitment of the educational process that the current school must develop can be evidenced in the contribution that E. Morín makes to UNESCO and the world, where he identifies seven knowledge and proposes them as necessary for the education of the future [16].

To make the construction of knowledge effectively, it is necessary to contextualize learning to know, learning to do, learning to live together, and learning to be [8], together with the recognition of illusion, relevant knowledge, the human condition, the terrestrial identity, learning to face uncertainties, teaching the understanding and ethics of the human race [19]; and immerse them in the curriculum. Curricula, knowledge, educators, and students must remain "in-network-given" so that the school can manifest itself as a community of knowledge.

One of the great challenges in education is to find the ideal way to develop the educational process to achieve its final objective: The improvement of the quality of life for most human beings. Understanding that the cultural burden that the concept "quality of life" has is permeated by the concept of "human being" and all the burden that it entails.

E. Morín clarifies the conception of the human being assuming it as a complex unit or entity that integrates the physical, the social, the biological, the historical, the cultural, and even the psychic, which must be restored, since disciplinary education it has disintegrated and prevented him

from recognizing himself as a human being with a complex and common identity with other humans [17].

Under this concept and with the accompaniment of complex thinking, the science of pedagogy is conceived as a way of constructing knowledge, which approaches the learning of world knowledge from new rationality.

One, where the interaction between the parts and their elements is considered to observe the whole, where the differences are accepted as part of the model, where recursion is considered, where it is reflected that the opposite could be complementary and where the order and uncertainty as part of the same system. Thus, this conception of pedagogy considers the actors of the learning process as protagonists, which places research in a transcendental place of educational activity [4].

M. Sousa says in this regard that the pedagogical process is considered as a permanent action, where human and material resources are continuously linked to produce results subject to modification according to new ideas [13].

The nature of positivist science fosters a type of knowledge that has yielded immeasurable techno-scientific achievements, moreover, it has not been able to generate knowledge so that it can interrelate with each other. This segmentation is deepening as research increases in each of the types of knowledge. As a result, advances in each branch of science increase dramatically, both in the number of discoveries and inventions and in the refinement of what has already been discovered and innovations.

But this successful positivist bet based on multidisciplinarity has a setback: the knowledge that is generated is reductionist and fragmented [11].

The relationship between the paradigm of complexity and transdisciplinarity is masterfully exposed by B. Nicolescu through three postulates: the first is ontological, recognized as the principle of non-reduction, which recognizes different levels of reality of both the object and the subject. The second is logical, where the passage from one level of reality to another is recognized, ensured by the logic of the included third or inclusion principle. The last is epistemological and recognizes that the structure that comprises all levels of reality is complex, with all levels existing at the same time [18].

Applied to Human and Social Sciences, transdisciplinarity allows us to verify the continuities and discontinuities of socio-human phenomena integrating the explanations and visions offered by the sciences of complexity.

6. Privileging the Development of Soft Skills and Competences

Didactics, as an expression of concretion of pedagogy, has its focus of action in the teaching-learning process. The approach to the situations that arise in this process should be based on the reality of the actors in the process and investigated from different areas to carry out the theoretical construction from there [21].

To develop didactics based on complexity, it is necessary to bear in mind that building knowledge is an emergent, non-linear, and uncertain process, otherwise, the results will tend to be reductionist and linear. When the teacher shares with the student the known and unknown of a specific topic, he is promoting the beginning of the investigative process and the creation of knowledge.

Uncertainty fosters emergence and self-organization. The dialectical relationship between order and disorder that can be fostered in students can favor the construction of new knowledge. Thus, activity tends to change, while certainty tends to excessive stability. M. Colodro asserts this by pointing out that as time passes, the disorder tends to be ordered and order is naturally disorganized, also ensuring that rationality needs emotions and feelings [6].

No less important in teaching from complexity is the management of emotions. The psychologist and researcher in Neuroscience A. Damasio demonstrate in his book "The error of Descartes. The reason for the emotion" that the machine of reason has as an integral component of the feeling, meaning the integral relationship between the emotions and the reason [7].

Also, the Chilean H. Maturana, who together with Varela made Autopoiesis known to the world, reaffirms these concepts when he expresses that the foundations of rational systems are relations that we accept as the first intention because they please us, that is, they are not rational, but emotional [15].

Even though these aspects are only just beginning to be investigated from classical science, the results show more and more force that the interchange between bodily activities, the intellect, and the emotions propitiate the emergence of ideas and knowledge.

Knowledge, as a set of knowledge built from the learning, needs to be applied to impact social development. The potential for its execution is known as capacity, and whoever possesses it has power. Furthermore, their relationship is so intimate that it is the latter that allows the articulation of knowledge.

When the capacity is applied in a specific reality such as the execution of tasks, in the production of innovations, or the solution of problems, they acquire the category of competence.

Increasingly valued in today's fields, far from being a fad, competencies are becoming, along with concepts such as transdisciplinarity, essential components in the training process of the 21st century.

Upon further investigation, they only exist when knowledge is applied in practical application scenarios. Hence its great acceptance. But they have a characteristic that makes it difficult to insert them into the traditional educational system: they cannot be transmitted. When they try to learn mechanically, they do not work, because they mix knowledge, abilities, skills, values, and in many cases even experience.

Among the components of competencies, the modern world has strongly emphasized skills. Some of these, the best

known and internationally recognized as desirable in a competent professional in postmodern society are ease of communication, leadership, the ability to work in a team, proper time management, and self-confidence. In addition to innovation, the ability to accept and learn from criticism, and flexibility and adaptability.

Promoting these skills involves a long-term development that involves considering art as an enhancer of creativity, promoting flexibility and adaptability, helping the student to recognize their strengths and weaknesses, helping to develop reflective thinking, fostering environments where debates are held. It also involves stimulating the ability to listen, communicate, and interact with the community through extracurricular activities as well as helping to raise awareness of solidarity and peace.

But, if the educational system only focuses on those skills, it would be forgetting those that each human being must develop to live on this planet and interact with others.

According to S. Tobón, the dimensions that are mainly considered in human development are cognitive, bodily, social, communicative, ethical, recreational, work, and spiritual [22]. The cognitive dimension refers to how human beings process information, while the bodily dimension works on how culture gives meaning to the physical structure of human beings.

The social dimension refers to the interaction between people and the processes of coexistence and collaborative work, as well as the construction and adoption of collective norms and laws. And the communicative dimension starts from language and its significance to configure the symbolic and cultural universe of each individual and interact through codes between the sender and receiver.

The ethical dimension seeks individual, collective and environmental respect through responsibility in decision making. For its part, playfulness refers to the attempt to reduce tensions and improve health through cultural expressions and social integration. The labor dimension involves carrying out activities aimed at an external purpose. And the spiritual dimension refers to the location and role to be played by the individual in society, in the species, on the planet, in the cosmos, that is, the relationship with the whole.

The application of these dimensions proposed by Tobón, in the design and development of the teaching-learning process, should help to develop the human being, if not in its entirety, at least concerning its planetary identity. An educational system is necessary that takes into account each one of them and fosters in the individual the interest of knowing who he is, discovering his role, and deciding how he wants and can play it.

To promote comprehensive training, the actors in the teaching-educational process must develop both knowledge and skills, but above all, to promote the development of less obvious characteristics, such as personality traits, attitudes, values, among others.

Although the transformation of the primary and secondary school curriculum has been prioritized in most countries, university education has not been so successful. University systems in almost all the world have emphasized professional

competencies, leaving the fundamental and the specific to their fate. This abandonment, adequate to train docile and obedient citizens, limits the development of criticality, creativity, and inventiveness, but above all the sense of identity, essential to develop a citizen with a planetary identity.

To be able to travel through the 21st century, the school requires, in addition to cultivating the 'knowledge 'or knowledge, to act based on the development of the fundamental competencies, if you want citizens who will lead their learning and commit themselves to its results. It is urgent to develop soft skills at school to start building a fairer, more humane, more conscious society.

7. Conclusions

Mainly characterized by academic-administrative processes and teaching-learning processes, the complex dynamics that develop in educational structures are very rich. In today's environment, it is necessary to design and develop processes that influence the structures of the educational system to achieve transcend it. The processes emanating from the center of the educational structure, in general, contribute to reaffirming the existing model, contrary to the processes that take place on the periphery of the system, in the operation of the classroom, where the educational system and the environment.

It would be important to recognize that it is possible to reflect on an education that embraces humanism together with the development of competences and that, at the same time, works with the integration of teaching, extension, research, and innovation in the teaching-learning process, as well as with environmental sustainability and sustainability including the resilience of communities. All this would harmonize in a curriculum that favors innovation in favor of improving life.

This harmonizing curriculum based on transdisciplinarity, could be a space for the construction of knowledge in the different dimensions, be it of the students, teachers, and the community in a simultaneous and integrated way.

In this way, the procedural components could prefer the possibilities of emergence that arise from the relationships that manifest between learning processes and transdisciplinarity, taking into account community bonding and the development of competences and soft skills. This approach, in addition to contributing to the education of individuals and the improvement of society, could begin to play a leading role in the sustainable and relevant development of the educational system. In other words, influence the nuclear structure from peripheral processes.

It could be a curriculum that fosters the transformation of classroom practice taking it to new and broader dimensions and generating innovative changes, not only in knowledge, abilities, skills, values, science, and technology but also in communities and individuals.

There would be an opportunity to retake the vision and practice of the school to place it in a new, more human dimension, necessary for the foundations of the new society that has begun to express itself from the periphery of the System for

several decades. From us, the actors that intervene in it depend on the form that the structure and educational processes take and the form that the structure and social processes that we build for ourselves and future generations take.

References

[1] Aguerrondo, I. (1999). The New Paradigm of Education for the century. Retrieved on April 20, 2020, from OEI for Science and Culture. Reading Room: http://www.campus-oei.org/administracion/aguerrondo.htm

[2] Basora, O. (2017). Transdisciplinary Group of Complex Thought and Complexity Sciences (RD Complexity). Retrieved on June 20, 2020, from Morphogenesis and morphostasis of the educational system: https://complejidad.net/2017/05/12/la-morfogenesis-y-morfostasis-del-sistema-educativo/

[3] Bauman, Z. (2010). Time is short. Conversations with Citlali Rovirosa-Madrazo. Arcadia Editions. Barcelona.

[4] Brower, J. (2010). Epistemological foundations for the outline of a complex pedagogy. Retrieved on April 2, 2020, from Polis. Latin American Magazine: http://www.scielo.cl/pdf/polis/v9n25/art04.pdf

[5] Carrillo, M., Delgado, J., López, M., González, M., Grinszpun, R., Quiroga, S., Marcos, V. (2020). Dystopian Consciousness and Society. Seville: Adaliz Ediciones.

[6] Colodro, M. (2002). Reflections on the chaos. Santiago de Chile: University Editorial.

[7] Damasio, A. (1996). Descartes's mistake. The reason for the emotion. Santiago de Chile: Andrés Bello.

[8] Delors, J., et al. (1994). The education holds a treasure. Report to UNESCO of the International Commission on Education for the 21st Century. Paris: UNESCO.

[9] Gell-Mann, M. (1994). Complex adaptive systems. Complexity: Metaphors, Models and Reality, 17-45.

[10] Gell-mann, M. (2003). The quark and the jaguar. Barcelona: Tusket editores.

[11] Henao-Villa, C. F., García-Arango, D. A., Aguirre-Mesa, E. D., Henao, C; González, A.; Bracho, R.; Solorzano, J.; Arboleda, A.. (2017). Multidisciplinarity, interdisciplinarity, and transdisciplinarity in training for engineering research. Lasallian Research Magazine, 179-197.

[12] Leff, E. (2004). Environmental knowledge, sustainability, rationality, complexity and power (fourth ed.). Mexico: XXI century.

[13] Sousa, M. (1993). Towards a group didactic. Buenos Aires: Miño and Dávila.

[14] Maldonado, C. and Gómez, N. (2011). The World of Complexity Sciences. Rosario University. Recovered from: http://www.ugr.es/~raipad/investigacion/excelencia/seminario XV/2011_el_mundo_de_las_ciencias_de_la_complejidad.pdf

[15] Maturana, H. (1992). Emotions and language in education and politics. Development Education Center (CEO) (fifth ed.). Santiago de Chile: Ediciones Pedagógicas Chilenas S. A.

[16] Morín, E. (1995). Introduction to complex thinking. Barcelona: Gedisa, S. A.

[17] Morín, E. (2001): The seven knowledges necessary for the education of the future. Barcelona, Gedisa, Barcelona.

[18] Nicolescu, B. (1990). Transdisciplinarity Manifesto. Du Rocher editions. Retrieved on October 20, 2017, from http://www.ceuarkos.com/manifiesto.pd

[19] Nicolescu, B.; Morin, E. (1994). De fritas Lima, Letter of transdisciplinarity. Portugal: Convent of Arrábida.

[20] Núñez, J. (2003). Science and technology as social processes: what science education should not forget. Havana: Félix Varela.

[21] Souto, M. (1997). Souto, M. (1998). The school class, "A Look from the didactics of the group." In the book by various authors. In A. e. Camiloni, Contemporary teaching currents (pp. 119-139). Buenos Aires: Paidos.

[22] Tobón, S. (2006). Competences in higher education. Quality policies. Bogotá: ECOE Ediciones.

[23] Tunnerman, C. (2003). The Latin American university facing the challenges of the XXI century. Mexico: Union of Universities of Latin America.

[24] Vallaeys, F. (2010). Development learning community. Interculturality. Creation of a concept and development of an attitude. Peru. Retrieved on March 8, 2020, from http: // related: www.ucu.edu.uy/linkclick.aspx? Fileticket = ckiklueaqym

[25] Vessuri, H. (2006). University and scientific research. Buenos Aires: CLACSO.

Biography

Olga Cecilia Basora Gomez, PhD in Pedagogical Sciences. Master in Complex Thought and Complexity Sciences. Master of Science in Education for Engineering. Mechanical-Electrical Engineer. More than 35 years of experience teaching, directing quality systems, dean of engineering, vice-chancellor, and consultant in evaluations for accreditations and quality certifications. Autor of various chapters and articles in academic journals on education, quality, and complexity. At present is a professor and General Director of Quality Management for the Autonomous University of Santo Domingo (UASD), a full member of the Academy of Sciences of the Dominican Republic, and an active member of the Complexity Chapter of the Dominican Republic.