Chapter 98

Transdisciplinarity in Basic Education: a reflection from the concept of Edgar Morin

10.56238/tfisdwv1-098

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ABSTRACT
This article addresses the theme of transdisciplinarity in basic education. The theme is justified by the need for teaching that values the integral and global education of students, contributing to them having a "complex" view of the reality and the world in which they live. Thus, the reflection was based on the following problem: "how is transdisciplinarity, in the Morinian conception, present in basic education and what are its challenges?", having as a general objective to investigate transdisciplinarity in basic education, from the Morinian theory of complexity. To this end, the specific objectives were structured as follows: to conceptualize transdisciplinarity in the light of Edgar Morin; report transdisciplinarity with basic education; and discuss the need for an integrative teaching of knowledge in basic education. As for methodological procedures, this is a bibliographic study with a qualitative approach. Through this research, it is inferable that reflections on transdisciplinarity are fundamental to organize knowledge in basic education schools, so that those involved in the educational process can understand the contemporary world through a vision of the interconnections of phenomena to understand and face the challenges posed by contemporaneity.

Keywords: Transdisciplinarity, Basic Education, Complexity Theory, Knowledge organization.

1 INTRODUCTION

The discussion about transdisciplinarity in Basic Education, in the current conjuncture of the Brazilian educational system and in the face of the new demands that reality (social, economic, technological, etc.) imposes, requires a keen look at the need for teaching, at all stages, that values the integral and global education of students, contributing to them having a "complex" view of the reality and the world in which they live. However, faced with a fragmented and disjointed teaching with the disintegration and juxtaposition of the disciplines or contents offered in schools, the need to overcome, that is, transcend the simplifying paradigm, which Morin (2007) claims to be insufficient and mutilating.

On transdisciplinarity, Morin (2007) questions the usefulness of parcel knowledge if they cannot be confronted with each other, in order to form a configuration capable of responding to the expectations, needs and questions of the mental process of perception of human beings; also stating that "transdisciplinarity is usually characterized by cognitive schemes that cross the disciplines, sometimes with such virulence that puts them in a trance" (Morin, 2007, p. 51). From these premises, it is observed the need

to use what is essential within a discipline, to know its essence, its objectives and at the same time to overcome its limits, contextualizing and resignifying knowledge with a transdisciplinary view.

Basic Education, according to Art. 21 and 22 of Law 9,394 of December 20, 1996 (BRASIL, 1996), is formed by early childhood education, elementary school and high school and aims to develop the student, ensure the common training indispensable for the exercise of citizenship and provide it with the means to progress in work and further studies. Considered a primary stage for citizen education, Basic Education advocates compulsory education, quality and accessible to all. Therefore, in order to have this quality education and for all, it is necessary that the process of schooling of individuals be thought and planned in a comprehensive, contextualized and complex way.

In view of the above and taking into account that Edgar Morin focused on the theme in question, in order to awaken in readers complex thinking and to reflect on an immense universe and full of definitions and hypotheses, the present study has as main objective to investigate transdisciplinarity in Basic Education, from the Morinian theory of complexity.

Thus, the specific objectives were structured as follows: to conceptualize transdisciplinarity in the light of Edgar Morin's complex thinking, but nevertheless to mention general and important concepts of transdisciplinarity treated by other authors, who also embrace this theme as an object of study; to relate transdisciplinarity with andducation b seeking a reflection on the challenges it faces in relation to it; and, to discuss the need for an integrative teaching of knowledge, rather than a simplifier, in the b-asic ducation.

With regard to the methodological procedures adopted for the tessitura of this article, it can be affirmed that this reflection has a qualitative approach, which, according to Gonzalez Rey (2017), considers the subjectivity of relationships and singularities of the processes and, it has been that "por medium of qualitative research, seeks to understand the complexity of particular and specific phenomena, facts and processes" (BRITO, OLIVEIRA and SILVA, 2021, p. 03).

Based on the technical procedures used, the research has a bibliographic nature, which provides theoretical foundation to the present work, since " bibliographic research is developed based on material already elaborated" (GIL, 2002, p. 44). In addition, Brito, Oliveira e Silva explain that:

> the importance of bibliographic research is related to the fact of seeking new discoveries based on knowledge already elaborated and produced. This is the case whereas bibliographic research is a driver of learning, maturing, taking into account in its dimensions the advances and new discoveries in the different areas of knowledge (BRITO, OLIVEIRA, SILVA, 2021, p. 08).

And in search of these new discoveries and reflections, notes were gathered regarding the theory of complexity of the philosopher Edgar Morin and other authors, such as: Sommerman, Nicolescu, Moraes, among others, aiming at the problematization of Basic Education, with regard to transdisciplinarity and its importance in search of an integrator teaching of knowledge in this stage that is so important for the formation of the human being.

2 TRANSDISCIPLINARITY FROM THE MORINIAN CONCEPTION OF COMPLEXITY

The term transdisciplinarity arose in the mid-twentieth century with the need to overcome the transmission of content through overspecialization of disciplines as a form of teaching. According to Sommerman (2006), the term was presented in 1970, by Jean Piaget, at the 1st International Seminar on Multidisciplinary and Interdisciplinarity, held at the University of Nice (France), organized by UNESCO (United Nations Educational, Scientific and Cultural Organization), which at the time, together with the OECD (Organization for Economic Cooperation and Development)), were the main responsible for promoting debates on multidisciplinarity, interdisciplinarity and transdisciplinarity in the 1970s.

Since then, transdisciplinarity has become the object of study of several researchers such as Edgar Morin, Basarab Nicolescu, Maria Cândida Moraes, among others, who through science, focus on the subject in order to overcome the traditional method of dividing disciplines, in search of a transversal, challenging and complex education.

According to Nicolescu, Pineau, Maturana, Random and Taylor (2000, p. 05), "we are talking about transdisciplinarity we are highlighting an emerging vision, which is a new attitude towards knowledge, a new way of being." Therefore, it can be said that transdisciplinarity is a still new term and that requires a lot of studies, understandings and reflections because it is considered a paradigm still under construction. However, it is a paradigm that opens up a range of new possibilities in the educational context, both with regard to overcoming the traditional division of disciplines and to stimulate those involved in the educational process to conquer a complex view of knowledge.

For Moraes (2015, p. 08), one of the approaches worked by the scientific community points out that transdisciplinarity "[...] it relates the different disciplinary contents, but goes beyond all of them, beyond the linguistic domains that gave rise to it, from the construction of a single linguistic domain, revealing a transdisciplinary knowledge that transcends disciplinary boundaries." Theu is, transdisciplinarity, in addition to crossing the boundaries of knowledge between disciplines and crossing all of them in some way, must understand the importance and particularities of each one, while seeking to obtain knowledge in a holistic and contextualized way.

From this perspective, it is worth mentioning that there are two other concepts that deserve to be highlighted because they have a certain degree of similarity and are confused semantically with transdisciplinarity, these are the terms: multidisciplinarity and interdisciplinarity.

The first concept, which is also known as multidisciplinarity/polydisciplinarity is defined by Rodrigues (2000), as the way disciplines are organized, in which each one, separately, uses its scientific knowledge to study a given subject, with no integration between them. According to Morin (2007, p. 50), "polydisciplinarity constitutes an association of disciplines around an object that is common to them. Disciplines are called to collaborate on it, just as expert technicians are called to solve this or that problem." That is, multidisciplinarity/multidisciplinarity/polydisciplinarity involves more than one discipline that

apparently has no connection with each other, and each is involved with its own methodology, without or seeking an integration of the results around the object investigated.

The second concept of interdisciplinarity is conceived, according to Japiassu (1976, p. 74), "[...] by the intensity of exchanges between specialists and the degree of real integration of disciplines, within a specific research project" and, there is also the following comparison made by Edgar Morin:

> Interdisciplinarity may mean that different disciplines are gathered as different nations do at the UN, without being able to do anything else unless they affirm their own rights and sovereignties in relation to the demands of their neighbors (MORIN, 2007, p. 50).

Complementing, below, that interdisciplinarity "[...] it may also mean exchange and cooperation and thus turn into something organic" (MORIN, 2007, p. 50). In view of the above, it is inferable that an interdisciplinary methodology can be understood as a dialogue between the various disciplines or areas of knowledge so that there is a confabulation and an exchange between them, so that they can relate to each other in favor of a common goal.

Although they start from different points of view, it is observed that, consonantly, for several authors, interdisciplinarity contributes to the development of science; and, consequently, in order to reach transdisciplinarity, which can be considered, epistemologically, a more expanded concept, in which teaching requires contextualization and organization of knowledge in a more complex way, going beyond the division or even the addition of disciplines. This understanding goes against what Moraes proposes:

> Thus, transdisciplinarity, as an epistemological and methodological principle, encourages us not to remain only at the disciplinary level of knowledge and, which often privileges technical aspects, linear procedures and the apparent externality of things. It causes the breaking of barriers, the overcoming of borders in order to be able to go beyond appearances, in addition to knowledge resulting from a binary logic, with its respective excluding values, towards a deeper, comprehensive, integrative and global knowledge (MORAES, 2015, p. 15).

From there, it can be seen the need to cross the limits that the division of disciplines imposes and also to go beyond the addition of disciplines, so that transdisciplinarity can be achieved. Thus, Moraes (2015, p. 15) invites us to face this transposition of barriers when he states that "transdisciplinary knowledge invites us to transcend this logic, to weave the differentiated and apparently contrary threads of the kind or this or that, to rescue and unify the polarities of the contradictory".

According to Nicolescu, Morin and Freitas (1994), transdisciplinarity has three fundamental characteristics: rigor, openness and tolerance. The first, rigor, seeks the valorization of all the elements and aspects found in a discipline; the second, the openness, aims at the acceptance of the new, what is not expected, not known, of the unpredictable; and the third, tolerance, the author puts it is to recognize the right to ideas and truths different from our own. Therefore, it can be understood that these characteristics value the specificities that each discipline brings with it in its particularities and in its totalities; suggests innovation and openness to know new possibilities; and at the same time it puts in mind the need to

recognize the importance of respect for the ideas that go against it, which is often conceived as absolute truth, something undeniable or unchanging.

Entering more into the concept of transdisciplinarity, with the objective of conceptualizing this term in the light of Edgar Morin's complex thought, it is necessary to reflect on the theory of complexity, seen as one of the main bases of support for transdisciplinarity. According to Folloni (2016, p.113), " The Theory of Complexity is one of the most fertile fields by which contemporary science advances." In this regard, Morin explains the following:

> At first glance, complexity is a tissue (complexus: what is woven together) of heterogeneous constituents inseparably associated: it puts the paradox of one and multiple. Secondly, complexity is effectively the fabric of events, actions, interactions, retroactions, determinations, cases, which constitute our phenomenal world (MORIN, 2005, p. 13).

In view of this definition, it can be concluded that the Complexity Theory, with its nuances of order-disorder, junction-disjunction, uno-multiple, ambiguities, uncertainties, among others, can be known and recognized as one of the main bases of support for transdisciplinarity, since it helps in the perception of the world and phenomena in a complex way.

According to Morin (2007, p.51), " transdisciplinarity is generally characterized by cognitive schemes that cross disciplines, sometimes with such virulence that puts them in a trance"; explaining that transdisciplinarity can be understood as a complex network, which uses both multidisciplinarity, interdisciplinarity and transdisciplinarity, which together can operate and play a fundamental and profound role in the history of sciences.

For Morin (2007), to reach the level of transdisciplinarity, one cannot leave aside interdisciplinarity, but rather consider it as a way to reach that. In this sense, this author elucidates a very important vision to understand the importance of these terms and to understand and learn to apply the concept of transdisciplinarity in practice, in order to achieve knowledge within a view of the theory of complexity; a vision not only of the parts, but of the whole and of the parts at the same time, according to the hologramatic principle, belonging to the Theory of Complexity, which goes beyond reductionism that only sees the parts and the holism that only sees the whole (MORIN, 2005).

In addition, another idea of the Theory of Complexity that deserves to be highlighted when it comes to transdisciplinarity is when Morin talks about the fragmentation or division of disciplines, a model of rationality that the author calls the paradigm of simplification, which would be "[...] the set of intelligibility principles specific to classical scientificity, which, linked to each other, produce a simplifying conception of the universe (physical, biological, anthroposocial)" (MORIN, 2000, p. 330). This model is present in the organization of knowledge in most Brazilian schools, since this type of organization simplifies and organizes the disciplines in order to "facilitate" the work of the organization as a whole; however, because of this simplification, knowledge is no longer seen in a complex way to be understood in a simplifying way. About the subject, Edgar Morin adds that:

> We must 'green' the disciplines, that is, take into account everything that is contextual, there understood the cultural and social conditions. It is necessary that we see in what context they are born, how they pose their problems, how they scan or metamorphose. The metadisciplinary - goal meaning to overcome and conserve - must take into account all this. You can't throw away what was created by the disciplines, you can't break all the cloisters. This is the problem of discipline, science and life: it is necessary that a discipline be open and closed at the same time (MORIN, 2007, p. 51).

That is, one must observe and use the disciplines in the most complex way possible, using the cultural and social issues present in them, observing every detail, as well as its totality, one must preserve the important facts and at the same time, overcome the barriers and limits that each discipline imposes, in order, finally, to arrive at the complex knowledge of everything that really is important and can be applied in a contextual and organic way.

Edgar Morin (2007) defends the importance of the complexity paradigm to overcome the old transdisciplinarity and promote a new transdisciplinarity:

> To promote a new transdisciplinarity we need a paradigm that certainly allows us to distinguish, separate, object and, therefore, disjoin these scientific domains, but that can also make them communicate with each other, without operating the reduction. The paradigm of simplification (reduction-disjunction) is insufficient and mutilating. It is necessary a paradigm of complexity that, at the same time, disjoins and associates, that conceives the emergency levels of reality without reducing them to elementary units and general laws (MORIN, 2007, p.55)

It can be seen from this statement, among several other factors, that there is a need to overcome the old transdisciplinarity, that is, the paradigm of simplification, which, according to Morin (2007), presents as one of the essential aspects, the subject-object disjunction "[...] by which scientific thought seizes inseparable realities without being able to face their relationship, or identify them by reducing the more complex reality to less complex reality" (MORIN, 2007, p. 55).

In this perspective, a transdisciplinary methodology seeks a knowledge organization in a more complex way, which allows separation or disjunction, but without making the reduction. And at the same time it makes knowledge communicate with each other, taking into account all possible aspects of being found in each area, overcoming the barriers of each discipline so that one can reach global knowledge, thus moving towards an intellectual evolution.

3 NEED FOR AN INTEGRATIVE TEACHING OF KNOWLEDGE IN BASIC EDUCATION

The current Law of Guidelines and Bases of National Education - LDBEN (Law 9,394, of December 20, 1996), in its organization and purposes, explained in the introduction of this work - emphasizes the developmentof thestudent, his common training indispensable for the exercise of citizenship and the provision of subsidies to progress in work and further studies. Thus, giventhis mission and the current development scenario in which the world is currently, especially with regard to globalization and new technologies, the discussion on the organization of teaching in Basic Education points to the need for a proposal that can accompany the advances that the present day imposes in people's lives and a look capable of promoting changes in this organization of knowledge.

In other words, we understand that Basic Education has the challenge of seeking a new paradigm, which is able to understand the teaching and learning process in a contextualized, attractive way; seeking a transdisciplinary perspective and overcoming the traditional division and superspecialization of disciplines, which can be defined "as a category that organizes scientific knowledge and institutes in this knowledge the division and specialization of work responding to the diversity of domains that the sciences cover" (MORIN, 2007, p. 39). According to Nicolescu (2000), there is a need for a change in the disciplinary model of teaching and a transdisciplinary proposal in the educational process. This innovation, however, means a rethinking of pedagogical practices under a complex vision to redirect actions in order to understand the educational needs of today.

Faced with this need placed on schools, it is essential and at the same time challenging to analyze the context of Basic Education in Brazil, in a general and more specific way with regard to transdisciplinarity; since there is a social, economic, cultural diversity, among others, that infuses a heterogeneity that ultimately hinders the process of further analysis; but, on the other hand, it can offer an immense wealth of realities, challenges and several other factors that deserve a multidimensional look on the part of education professionals.

In addition, there are several factors in Basic Education that hinder this search for a knowledge organization in a transdisciplinary way, such as: closed curricular organization and in some imposed situations; the overvaluation of some disciplines to the detriment of others; devaluation and precariousness in the training of education professionals; the demotivation of teachers and students; and the lack of investment by the government, among others.

However, even in the face of this reality of Basic Education, it is necessary to reflect on the need to seek this paradigmatic change in the school space; for, according to Morin (2007, p. 55), "the paradigm of simplification (reduction-disjunction) is insufficient and mutilating." Especially in Basic Education, which is a fundamental phase for the integral formation of people. And to begin this process of change in the organization of knowledge, Morin (2007, p.37) states that "reform must originate from teachers themselves and not from abroad"; clarifying that teachers must be the motivators for change to happen effectively and that they must understand that "the world does not revolve on a path previously traced, it is not a locomotive that walks on rails" (MORIN, 2007, p. 37), and it is up to teachers to think and act with and in uncertainty.

Therefore, the search for transdisciplinarity and complex thinking in pedagogical practice is presented to both teachers and students, as experiences that, according to Morin (2005, p. 96), "[...] leads them to cross disciplines, to make journeys in knowledge." In other words, that lead them to use what is most important in each of the disciplines, causing them to be entrecled and at the same time break down the barriers and limits imposed by themselves so that knowledge is contextualized, globalized and presented in a complex way to see reality more broadly; thus forming "[...] spirits capable of organizing their knowledge instead of storing them by an accumulation of knowledge" (MORIN, 2002, p. 18).

However, it is aware that Basic Education is still far below expectations, with regard to this process of change. In this regard, Morin makes the following statement:

> The reform of teaching and thought constitute a historical undertaking: it will not, of course, be from this first event that it will take place. It is a work that must be undertaken by the teaching universe, which obviously involves the formation of trainers and the self-education of educators (MORIN, 2007, p. 37).

This is one of the great challenges of Basic Education: taking care of teacher education with the hope of a paradigmatic reform with regard to the organization of knowledge aimed at transdisciplinarity. For, according to Morin (2001), the reform of thought is a non-programmatic but paradigmatic reform, concerning our ability to organize knowledge, also stating that the reform of education should lead to the reform of thought, and the reform of thought should lead to the reform of education.

Based on this point of view, one is aware that this reform of thought and the reform of education can change the direction of conduct and organization of basic education schools. on how disciplines are organised; however, for this paradigmatic reform to be implemented, education professionals have a fundamental role, because change requires openness on their part, especially of teachers who deal daily with students in the classroom. However, it is aware that this paradigmatic change is not an easy task, since it requires a willingness on the part of these educators for a new conception and pedagogical action. In other words, there must be an openness on the part of teachers for a re-education, in order to reflect and rethink pedagogical practice through a complex view of knowledge, and, moreover, a disposition on the part of the rulers and the entire educational system, starting from the university; that is, the initial and continuing education, which play a fundamental role in favor of significant changes in the school context.

Taking into account that each school is unique, that each classroom is composed of a heterogeneity of personalities and that each person is a complex being. who takes with him his needs and specificities; the teacher, being the closest professional to this reality, ends up carrying this responsibility to filter all this complexity and assume a role of agent of change, with the objective of transforming the classroom space into a place with interconnected knowledge contextualized with reality.

Thus, one of the challenges that teachers face in relation to the transdisciplinary proposal, according to Venturella (2005), is to build knowledge from reality, bringing to the classroom knowledge, experiences, experiences and dreams. This challenge requires training with a deep reflection on the way of thinking, acting, organizing teaching and deconstructing and rebuilding new bridges in the organization of knowledge in basic education professionals; whereas most teachers are the fruit of a traditional education, which has difficulty in opening up to the new, to recognize how much today's society requires an organization focused on a complex vision of things and the world.

Although there is an awareness of the demands that current development and globalization impose on society and the need to seek complex thinking, with transdisciplinarity as one of the main means of transformation for the improvement of the teaching and learning process, it is noted that knowledge is still

being transmitted in a fragmented way, without the necessary contextualization with reality and without taking into account interdisciplinarity and transdisciplinarity in their processes of organization for the reconnection of knowledge, in which students cannot go from the parties to the whole and from the whole to the parties (MORIN, 2007), considering the multiple and diverse knowledge offered during Basic Education.

According to Suanno e Silva (2016), transdisciplinarity in the school space can provide means for the student to reflect and become aware of their capacity for transformation, reinvention and construction of their autonomy. Therefore, educational institutions of Basic Education, whether in Early Childhood Education, Elementary School or High School, must bring to themselves the mission of promoting an Education that encompasses the essential issues (anthropological, civic, ecological, spiritual, etc.) to reach a broad understanding of human beings, the planet, the world; to understand the humanity to which it belongs in a way that transcends personality, culture and science, as a form of knowledge of the parts and the whole of the world in which one lives; bringing with it a fundamental challenge for a current and quality education that requires, according to Morin (2007, p. 88) "teaching the human condition" so that people can see the world in its multiple dimensions and its role in that same world as a human being and belonging to a society.

4 FINAL CONSIDERATIONS

Resuming the objective that guided this study, which inspired to investigate transdisciplinarity in Basic Education in the Brazilian context, based on the Morinian theory of complexity, it is concluded that in view of the above and reflecting on the current organization of Brazilian education, one can consider all aspects of reflections that revolve around transdisciplinarity as fundamental to organize knowledge in basic education schools in the Brazilian context; so that those involved in the educational process can understand the contemporary world through a vision of the interconnections of phenomena to understand and face the challenges posed by the present day.

Challenges that refer to globalization and technological development, which are taking over people's lives at an alarming rate and in a way much more attractive to students compared to a fragmented and decontextualized teaching offered in most Brazilian schools.

Therefore, it is perceived the urgency to make significant changes in the way brazilian educational systems are organizationd. Although we recognize that it will not be an easy task, one is aware that the way to achieve complex thinking is transdisciplinarity; that is, to seek an organization of knowledge in order to overcome the barriers of disciplines and build a challenging teaching, which will mean a considerable advance with regard to the actions of teaching and learning.

With regard to transdisciplinarity, it can be seen that it is a term still on the rise, but that from the moment there is an understanding and action in relation to this concept by teachers and all education professionals; and, consequently, a given openness to these professionals, there will be a revolution in

Brazilian teaching, with the constant search for a complex, multidimensional and contextualized view of the world and phenomena.

For this paradigm shift, there is still much to be done regarding the organization of knowledge and disciplines in basic education schools with a view to transdisciplinarity; such as: the initial and continuing training of education professionals focused on a complex thinking that takes into account the real needs of today; the motivation, openness and predisposition of teachers in favor of the reconstruction of knowledge and change; and, the investment in education by the governments, especially with regard to the valorization of teaching work, qualification, infrastructure and innovation.

Transdisciplinarity in basic education is an indispensable approach for this object of study to be increasingly known, studied and applied among professionals working at this level of education; since, because it has a focus that seeks the articulation between the various disciplines that make up the curricula of all stages of Basic Education, it aims to reconnect knowledge in order to achieve a level of cooperation between the parties and the whole, understanding the importance and interdependence between this cooperation to achieve a complex human cognition.

Moreover, in the midst of scientific and technological advances and the current social reality, it is extremely necessary to seek the understanding of the world and the role of oneanother as belonging to this world, understanding the importance of this interaction between subject and world, more specifically, referring to the Morinian triad: individual/species/society, it is extremely necessary to reorganize the educational system, to redirect Brazilian Basic Education in order to start a revolution with transdisciplinarity as one of the main foundations; so that this new paradigm can be triggered as soon as possible, which may constitute significant, contextualized knowledge and provide an awareness of the real and complex in all areas of knowledge.

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