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Education and Perception: a systemic look at environmental issues

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Abstract: This article had as main objective to provide a reflection on the environmental issues that is experienced in contemporary times. To this end, it was necessary to rescue conceptual milestones, conceptions in Environmental Education and the influence of the Cartesian Paradigm on the subjects' daily, as well as the contributions of studies on perception in psychology and the emerging paradigm called systemic. In this sense, the analysis and discussion of bibliographic references on the selected theme aimed to know the scientific contributions to enable us to foster new reflections and attitudes towards environmental problems. At a very great time, it was found that Cartesian Thought has brought several contributions to the advancement of humanity in various fields of knowledge, but nowadays it is necessary to envision the Environment as a whole; complex and interconnected, where issues of cultural, social and political spheres are in connection. Thus, socio-environmental education emerges as an imperative, which fostered by the emerging paradigm called "systemic", it rethinks and signifies our behavior towards the relationship between man and nature, in order to establish a sustainable relationship, through formal and formal educational processes.

Keywords: Cartesian thinking. Environmental education. Gestalt. Systemic Thinking

1. Introduction

In recent decades, several natural phenomena have plagued humanity. Among them tsunamis, volcanic eruptions, melting glaciers, advances of the sea in coastal areas, pollution, pandemic etc. These issues are that permeate the environmental sphere, this at the local and planetary level. In Brazil, more specifically, we had in 2019 the Brumadinho disaster (metropolitan region of Minas Gerais), which was the rupture of a dam with chemical tailings of a mining company

causing hundreds of human, flora and fauna deaths near the "accident". Similarly, another environmental disaster occurred in 2015 in the municipality of Mariana (also in the state of Minas Gerais) that resulted in the death of 233 people. In Petrópolis, a city in the Serrana region of Rio de Janeiro, due to heavy rains and landslides, more deaths were caused. Similarly, in 2022 heavy rains that hit Bahia and expanded to the south of the state of Minas Gerais caused deaths and hundreds of homeless people, which for Leff (2010) and

Bauman (1998, 2008) are anthropic manifestations manifested through attitudes, discourses and unsustainable lifestyles affected in a dissymmetrical way the planet Earth.

In addition, the devastation in different biomes and processes of desertification's in the Northeast region, as well as the fires in the Amazon region that attract worldwide attention. All this makes us reflect on the relationship between man-nature and a crisis of unsustainability caused by the "model of economic growth" that is experienced. (FURTADO, 2002). For Lovelock (2000,2006), in his theory called The Gaia Hypothesis, the planet Earth is a living organism that self-regulates itself. That is, he reacts to the manifestations that man himself provokes in him with both positive and negative implications. For him man envisions natural resources as infinite sources, inexhaustible, which is not according to the researcher. Therefore, it is necessary to update them in a rational, sustainable way, or even to save them for this and future generations (REIGOTA, 1995).

These issues drew the attention of some rulers and experts being deepened and discussed in various Meetings and World and National Landmarks (DIAS, 1998). Among them, at the national level there was the institutionalization of the National Environment Policy (PNEA), with Law No. 9,795 of April 27, 1999 referring to Environmental Education as a permanent educational process at various levels of education (Early Childhood Education, Elementary and High Education, Higher Education, Special, Professional and Youth and Adults). For example, in 1997 we had the launch of the National Curriculum Parameters (PCN). Thus, formal education becomes an essential tool for discussing the theme of the Environment (BRASIL,2016).

In this document the theme "Environment" should be addressed in a transversal way as also proposed by PNEA.Com this, several sectors of society, including school, assume responsibility with issues related to human formation and the emerging challenges in society from the perspective of training ecological subjects (CARVALHO, 2010) for the promotion of social justice, and planetary citizenship (GUTIERREZ, 2002). In other words, Trei (2007, p.130) tells us: "The current stage of development of the capitalist mode of production has reached levels of environmental destruction not experienced at any other stage in human history." Therefore, the present bibliographic study becomes relevant.

2. Methodology

Seeking possible answers to this fundamental question, the present study has the following general objective: to analyze theoretical contributions that present innovative elements to critically reflect on environmental issues nowadays. Therefore, the approach presented here will be qualitative in nature, because it seeks to describe the complexity of phenomena without necessarily measuring and quantifying behaviors, but analyzing the conceptions, opinions and or representations of the subjects (CAJUEIRO, 2012). Regarding the type of research, the bibliographic modality is adopted. It seeks to go directly to different

scientific sources and because it is historical studies such as this one that is available to be carried out.

From this, it is expected to bring new reflections to the educational/environmental scope through discussions that contribute to the advancement of knowledge and society justifying that this study is pertinent in the face of the demands and problems emerging from society initially presented. In turn, the present work consists of three general parts: theoretical contributions to the perspective of the research modality and our final considerations. The first part previously announced presents a discussion about the main paradigms that permeate our view of knowledge (MINAYO,1992, GIL, 2002).

In the second part two sub-topics about their Landmarks and conceptions in Environmental Education highlighting the perspective that approaches the emerging paradigm called systemic. Still a brief presentation on the construct of perception in psychology, as it corroborates the conception of Environmental Education that converges to systemic thinking in contemporary times. Finally, the conclusions that summarize the main ideas that demonstrate that it is relevant to reflect on environmental problems from a socio-environmental perspective from the emerging paradigm allied to the perception in gestalt psychology.

3. Results and Discussion

3.1. Paradigms: between the fragmentation of knowledge or its integrality?

According to Behrens (1996) the visions provided by the paradigms are underlying the conceptions and models that the subjects have on various issues such as: society, forms of learning and knowledge (BECKER, 1993). The scholar adds that in each historical socio-historical moment different perspectives are being constituted in paradigms of the sciences and many of them will also influence the field of people's worldviews and beliefs. In this sense, we will present and discuss a little about the influence of the Cartesian paradigm on education in general and the emerging perspective that we approach called systemic.

Santos (2001) discusses in his book "A Discourse on the Sciences", that there are two great paradigms that permeate society: one entitled Dominant (also called Cartesian, Linear, Traditional or Conservative), which tries to explain social reality through rational reductionism; and the other from Emergent (Systemic or Holistic), diverging from the former, seeks to understand the social reality through an integrated and complex order of reality (in the sense of being associated with each other). In short, it consists of two opposing views of man, world and society. Similarly. Morin (2001) signals that we are experiencing a crisis of paradigm models (thought structures, worldviews) present in different fields of society and refers mainly to the educational sphere.

Araújo (2011) explains that since the eighteenth century we have lived with the contributions of the Cartesian Paradigm coming mainly from the philosopher René Descartes (1973),

who elected mathematics to be the perfect science model by using the metaphor of the clock to explain the nature where the use of reason and objectivity when decomposing in parts the object to be studied would lead to scientific understanding and validation. Thus, we can find in the postulates of Cartesian thought the main aspects related to the segmented view of the world (DESCARTES, 1973).

Based on the fragmented view, during the 19th century, universities reorganized strongly influenced by positivism in order to accredit as legitimate the scientific knowledge said to be probable, rational and objective (BEHERNS, 2010). According to Araújo (2011), in the educational making the implications of Cartesians is present in a disciplinary and fragmented model of knowledge, whose objects are isolated from each other and disarticulated from the real contexts of the subjects, predominantly the model of teaching by transmission of knowledge and learning by reproduction of predictable or mechanical responses.

According to this same researcher, the Cartesian Paradigm in its trajectory brought necessary contributions to the evolutionary development of humanity, in contrast it fed the model of capitalist society causing profound social inequalities as well as ecological problems by objectify nature through interpretive and watertight models. As a result, the man himself lost the notion of the whole, since the segmented and compartmentalized parts did not always allow articulation of these parts between themselves and the consequences of the act of separating them from the whole (BEHERNS, 2010).

Other explanations about the influence of Cartesian thought can be found in the work "The Point of Mutation" by the Austrian physicist Frijot Capra (2006). In it, the physicist provides us with several explanations of how the principles of Cartesian thought influenced several fields of knowledge in the West, such as medicine and hyper specialization where Japiassú (1976, 1996) considers it to be a pathology of knowledge; the compartmentalization of sciences, as well as their limitations to understand phenomena today.

Helping us to understand the systemic perspective, we find in the studies of Moraes (1997) some important reflections. According to the author, studies in science as an evolving system in a permanent state of change can already be found from the 19th century in Lamarck's studies; Charles Darwin; Einstein (Quantum Theory) and Prigogine. Such propositions point to the understanding of the world in terms of movement, energy flow and change processes (MORAES, 1997).

Using Capra (2006), we can find in his book "The web of life" and "Hidden connections "a new scientific understanding of living systems in networks converging to the approach of systemic thinking. Thus, we can say that systemic thinking sees from the whole and reaches smaller parts in terms of movement and transformation, in process and not as something linear and isolated as is characterized in the Cartesian Paradigm.

On systemic thinking, Moraes (2002, p. 33) comments that systemic thinking emerged from the 1930s, when biologists and ecologists began to develop the first reflections

on the concept of organization that began to replace the old mechanistic notion of "function" present in physiology. The organization came to be seen as a system consisting of parts that have essential properties that arise from common relationships. In geris lines, it is the authors who have been dealing with the construction of systemic thinking.

Thus, we realize that systemic thinking is contextual and only allows the analysis of the parties placing them in a broader whole, since the focus on systemic theory, as referred to Vasconcellos (2013), is the change of the parts to the whole. What implies say that the relationship between the parties and the whole is reversed, because the whole is in each of the parts. In summary, there is an interaction between the parts and the whole, that the whole together with the parts constitutes the social reality that is dynamic and relational, and not something watertight, isolated and disjointed as Cartesians implies.

Still according to this author, these characteristics come from the postulates of the Cartesian Paradigm, which in the present day of the 21st century no longer account for a society in constant transformation and the problems that emerge from it, whose mark of the transience of knowledge, complexity and uncertainty evidence new ways of conceiving natural and social phenomena as, for example, environmental issues.

3.2. Environmental Education: Conceptual milestones

To reflect on the environmental problems that were experienced in the 21st century, it is necessary to reflect on the historical socio-historical periods of humanity in order to outline an overview, even if in a synthetic way, of how man-nature relations were constituted, evolving to the current stage of "crisis of civilization", as Henrique Leff (2012) calls it. On this Loureiro (2000) adds that the causes of environmental degradation go beyond the relationship between society and nature, because it involves other elements related to each other such as capitalism-modernity-industrialism-urbanization. In this sense, Guimarães (2006, p. 83) points out that:

"The fragmentation and simplification that reduce the understanding of reality, characteristics of the scientific paradigm that was consolidated from the Modern Age, have been analyzed by several authors as one of the pillars of the environmental crisis today, for not taking care of society and the environment, and in its relationship, as a complex reality."

Thus, we know that in the ancient communities (Primitive, Slave, Asian...) the way man himself related to the land, natural resources were based on less predatory exploitation, that is, the use and appropriation of resources were intended for the consumption and maintenance of non-market subjects, but in the passage of Feudalism (peasant society), land tenure, private appropriation for the emergence of Capitalism, parallel to the Industrial Revolution and scientific and technological advances (urban-industrial society) made the mode of occupation and use of geographical space

allied to manufacturing production intensify the use of natural resources drastically producing a series of environmental problems, such as, soil degradation and its contamination by toxic products (SANTOS 2006). This phenomenon for Guimarães (1998) caused changes constituted in the different urban and rural spaces that directed them to the formation of so-called postmodern societies, markedly characterized in the creation of lives for consumerism and by a model of economic growth with inherent characteristics for the promotion of environmental degradation.

Thus, we can affirm that from the Industrial Revolution the way man began to extract natural resources and to consume unbridled these resources configured the perverse face of the capitalist system and remains until the present day about different configuration, nodded neoliberalism. Characteristics such as consumerism, individualism, competitiveness and the value of having to the detriment of being are some indicatives of the lifestyle of this unsustainable society that we experience. These characteristics of the formation of social subjects depart from an ecological subject formation, because the promotion of environmental justice permeates the ethical and environmental formation in which the relationship between man and the environment constitutes a relationship of sustainability (GRU, 1996; ACSELRAD, 2009).

Internationally, according to Dias (2004), when American journalist Rachel Carson released in 1962 her book entitled "Silent Spring" became a classic in the history of the environmental movement. This work reported and denounced how the abusive use of pesticides in agricultural plantations was affecting not only the pests in the plantations, but the birds that inhabited there were intoxicated and no longer sang in the spring (CARSON, 1969).

In 1972 the report "The Limits of Growth" was published. This was prepared by a group of Italian scientists exposing the fragility of so-called economic development, or rather economic growth. Because what prevails in this model of society is economic growth, since economic development would promote the equal distribution of material goods of existence, which never occurs in the capitalist system (HARVEY, 2013). In 1972, the First United Nations Conference on the Environment took place in Stockholm, Sweden, organized by the United Nations (UN). In this meeting there were small advances in promoting actions that minimize environmental disasters, because the divergent interests among countries in the face of the decrease in their industrial production generated many controversies. However, there was the creation of a letter that guided the collective well-being of the world population through Environmental Education that gained prominence in the discussions (DIAS, 2004).

Then, in 1975 there was in Belgrade (former Yugoslavia and present-day Serbia and Montenegro) the event Entitled International Meeting in environmental education resulted in the Belgrade Charter. This document set out possible issues on which Environmental Education (EA) should address. Fostering the idea of Environmental Education- EA, we have at the Intergovernmental Conference on Environmental

Education, organized by UNESCO, in Tbilisi, Georgia, in 1977 a real conceptual framework in EA by referring to the environmental dimension in the educational process. This conference established great advances to promote the rescuing points that occurred in Stockholm, and it should be treated in a systemic and interdisciplinary way (DIAS, 1994).

In Brazil, in 1988 the Constitution of the Republic in its Art. 225° through the ideas already brought in 1981 by the National Environment Policy (PNEA) proposes to spread the EA at all levels of education in this period of opening of re-democratization (BRASIL, 2022). About this, Loureiro (2004) clarifies that the way environmental education was introduced in the country was done in an ecological and behavioral way, that is, focused on solving physical problems. The EA, of this time, saw the environment as a natural heritage to be preserved by configuring itself in a simplistic and reductionist way.

Notified, this period was that of the Military Dictatorship (60s and 70s) that in the field of Education experienced the peak of the technical/behaviorist tendency leaving rancid of a conservative and uncritical AE in many of these environmental practices in contemporary times (CUNHA, 2000).

In 1992, also in Brazil, we had the second United Nations International Conference on Environment and Development (ECO-92). Involving more than 170 countries the conference discussed several socio-environmental issues such as climate and biodiversity on the planet. Rescuing and ratifying Tbilisi's main ideas, this meeting promoted the creation of Agenda 21, which would be methodological indicators to consolidate actions for sustainable development. After this conference (ECO-92) was noticed a growth of proposals on the environmental issue in the country,

3.3 Between conceptions: For a socio-environmental education

Because it is a field still under construction and does not have a defined epistemological character (LEFF, 2010), Environmental Education (EA) has been constituting and spreading through various approaches in society. Many of these approaches or conceptions are of a reductionist and conservative nature. On the other hand, some approaches stimulate the critical thinking of the subjects. In short, EA can present different visions and conceptions of man, world and models of society.

There are several aspects in AE and can contribute to the perpetuation of social inequalities or aimed at social transformation. Thus, it is necessary to have theoretical clarity about which approach is developing and adopting in various contexts, since there are different perspectives in environmental education disseminated in society. In this sense, we share with the ideas of Loureiro (2009, p. 69) by stating that:

"[...] the way environmental education is carried out and the different understandings of the society-nature relationship inherent in it, does not allow us

to point it out in a unique and monolithic way."

Becoming a polysemic field with divergent visions of the environment, for example, as well as permeated by power relations (FOUCAULT, 1979, 2005, 2005). Therefore, the field of EA becomes a space of interests and contradictions (CARVALHO, 2006). Having theoretical-epistemological clarity of the bases that support certain conceptions and social practices concerns a critical take and political view of Education as a whole. Thus, there are different views of nature and society materialized in discourses and practices, configuring themselves in a network of interests and interpretations (field of tensions and disputes) in permanent conflict and or dialogue (CARVALHO, 2001).

As Characterized by Sauv  (2005), there are several cartography/currents in AEs disseminated in society with various nuances and theoretical and methodological propositions. In the author's saying, we have in the naturalistic conception a strong support in society in the most varied social spaces, including in the school environment. Thus, the naturalistic conception promotes a perceptual isolation by pointing out environmental problems only in the parameters of biological and ecological chains. Thus, generating a reductionist and fragmented view on environmental issues.

Other studies aimed at identifying conceptions in EA-Environmental education are those of Le o e Silva (1999). For the researchers, another strongly adhered understanding in the educational field concerns the design of AS from an ecological and conservative/naturalistic dimension. Consequently, practices aimed at promoting specific moments (vegetable gardens, lectures and selective collections) generally have a strong conservative and reproductive content in the commemorative and conservative approaches. This implies, in these perspectives, the support of decontextualized and disciplinary ways the actions in AE, because they isolate and distance social, cultural and biological elements as not being part of the same sociocultural context. Other denominations are given to conceptions in EA that have a simplistic or reductionist content. Among many, we can mention: anthropocentric and behaviorist conception. It is noteworthy that the latter has as theoretical basis the assumptions of behaviorist, behavioral psychology.

All these conceptions present simplistic and uncritical reflections by directing AS to the parameter of the ecological chain and fragmented view of reality assuming, in general, a naturalistic view. Which, at all, follows a reproductive and hegemonic model of education and a society divided into classes. In an attempt to overcome these conceptions and promote a reflexive critical thinking, other denominations emerge in AE by proposing a systemic and interdisciplinary view of environmental problems (LEFF, 2003).

Of all, they envision being the human being an active subject and builder of his knowledge and belonging to a community of social, political, cultural and economic relations. Therefore, the individual and collective participation of social subjects situated in a socio-historical context becomes fundamental to problematize (causes and consequences),

analyze and propose alternatives from a systemic or interdisciplinary view, because a single discipline or field of knowledge would be insufficient to tell of environmental complexity (LOUREIRO, 2006).

Trends that, according to Layrargues (2004), assume different identities in Brazil, such as environmental management. In the studies and research stemming from Carvalho (2006) and Loureiro (2004) we found important reflections to discuss other approaches on AS, i.e.: transformative, socio-environmental or critical education. These conceptions in environmental education approach, or converge to other denominations, for example, emancipatory EA and libertarian EA. Theoretical contributions from the reflections of Edgar Morin, Henrique Leff, Paulo Freire, Guti rrez, among other names defend the emancipation of subjects and social transformation through collectivity and social justice (GRUN, 2006).

In view of the above, we join the so-called transforming, critical or socio-environmental Environmental Education as a conception of AE that approaches, converge to the systemic paradigm and consequently dialogue with the principles of the construct of perception in psychology that we will see later suggests that for the realization of critical environmental subjects some axes should be discussed. Among them: To work the constructivist perspective of education in the education of the environmental educator. Since the perspective of education as a transmitter of systematized knowledge (banking and behavioral education) is still extremely consolidated in the practices of educators (GUIMAR ES, 2011).

Based on these approaches, our perspective on Environmental Education aims to build a more just, sustainable and critical-humanizing society (ARA JO, 2015). In a nutshell, when we are relating to EA in socio-environmental bias, we are certainly referring to issues such as pollution, deforestation of forests, contamination of rivers and soils, for example, and sociopolitical issues, that is, hunger, wars, unemployment, etc. Issues, thus complex, which are associated with each other and that should be discussed through an emerging paradigmatic approach, that is, systemic.

3.4. Perception: contributions of Gestalt psychology to promote Social and Environmental Education

According to Cunha et. al. (2006) the expression perception is derived from the Latin "*sensus*", which according to the Portuguese Language Dictionary Aurelio Buarque de Holanda. Therefore, it means the act of perceiving, a form of combination of the senses for the understanding of the object, that is, the fact of perceiving from the sense organs to understand the phenomenon and its variations. Thus, our representations, conceptions or concepts influence the way we feel and interpret the environment, and in this case our views of world, man and society. In Reigota's saying (2010, p.14) different social representations about Environment are disseminated and consequently referring to distortions that distance man from nature. Sometimes for an anthropocentric

sense.

According to Schultz and Schultz (2002), it was Wundt who in the History of Psychology is considered as the "Father of Modern Psychology", The construct on human perception began in his studies, when he created the first experimental laboratory in Germany in 1879 in Leipzig. For Davidoff (2004) the perception seeks to understand how the subjects perceive and feel the internal and external sensory stimuli through the organs of the senses. That is, in the social sense it concerns the ability to see and interpret human behavior by retaining, the information that our senses receive externally and process internally through the organs of the senses and consequently attribute meanings and meanings to our experiences.

Thus, for psychology, perception is the process or result of becoming conscious of objects, relating events through the senses, which includes activities such as recognizing, observing and discriminating (MERLEAU-PONTY, 2006, 2012). Thus, it was with the emergence of gestalt's approach, a psychological current born at the end of the 20th century in Germany that the studies of configurations, in the way in which it has as a principle that "the whole is greater than the sum of the parts". In summary, to understand the phenomena, an integrated and non-fragmented view of the whole is necessary, dissociated from its contexts in which it composes it (MARIN, 2005). Perceiving the totality of phenomena is the focus of this psychological approach and therefore helps to verify the social reality in interaction through the whole and not dissociated from its parts, that is, fragmented and compartmentalized as expressed by Cartesian thought.

Understanding that studying human behavior in isolation from the elements that are present in different contexts may hinder the relationships that are established in the environment, that is, only to what is directly observable to us (SKINNER, 2009). However, establishing relationships in the environment and realizing that the ways in which phenomena present us make up the whole and are not isolated favors envisioning the environment as an inseparable whole, so developing this perception becomes an important factor of self-knowledge and consequently to foster a systemic education, no longer socio-environmental (RODRIGUES, 2000).

Briefly, it becomes an obstacle to the knowledge compartmentalized in the understanding of nature and man is that nature and man cannot be fragmented or separated, because there is no unrelated nature of another nature, that is, man cannot be understood without nature that is beyond environmental, becomes existential (MERLEAU-PONTY, 2000).

4. Conclusions

The initial concerns that guided the reasons for the construction of this article led us to approaches of theoretical contributions that guided the main points of this investigation. They are: systemic thinking, environmental education and perception. The necessary cut-out was made in view of the theoretical amplitude and depth, therefore, to have a minimum clarity about the approximations and their findings

corroborating to foster critical thinking about environmental issues. Thus, moving away from a purely descriptive and reductionist analysis. In this universe presented we can see that the emerging paradigm called systemic comes to contribute to the overcoming of Cartesian thought, which still prevails in different spheres of society, but it becomes limited to the current dynamics of environmental phenomena that we have seen to be something discussed for decades and intensifying today without an effective proposition to mitigate such problems. Thus, we are referring to reflect on this model of mercantile and unsustainable society.

Assume a new epistemological perspective (CUNHA, 2000; BECKER, 2001) requires a movement of ruptures, so it becomes a continuous theoretical and practical exercise, thus being a great challenge for this and future generations. And in this regard the systemic paradigm with the element of interdisciplinarity seeks to establish relations of dialogue between knowledge in the face of overcoming the fragmented view of knowledge. Indeed, it is not necessarily a question of seeking the new from the old, because it requires that different social actors are engaged in launching a new look at our behavior before the environment, which in addition to being exclusively biological is also cultural, political and economic. It's socio-environmental, it's making it sustainable. To this end, the contributions of studies in psychology on perception, nobly, of gestalt's approach can contribute to see the totality of phenomena and not only their parts as favored by Cartesian/mechanistic philosophy. This, by far, contributes to using the elements of nature in a predatory way.

Having said that, having a new behavior, that is, with sustainable attitudes is necessary, as well as the formation of ecological subjects such as Referenda Carvalho (2000). By the way, this new vision of the world, man and society requires a common goal that is to provide the good of the subjects (including their mental health) and collectively participate in the conservation of our planet using their natural resources in a sustainable and rational way. Finally, it is considered relevant that Formal and Informal Education be allied in this construction, but from a socio-environmental conception perspective (CASCINO, 2000, PENTEADO, 2010). Likea, we agree with Morin (2014) that reforming a thought means new ways of understanding educational processes, their bases and meanings.

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