Original article

Pedagogical conception of education for the climate change in secondary school

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ABSTRACT

Climate change is a challenge to education because it implies redefining moral values, changing modes of action, habits and social skills, so that they express environmentally friendly behaviors. The school plays an important role in achieving this. The research is based on the materialistic dialectic as a general method of science, it is characterized by a mixed approach, which involves processes of collection, analysis of quantitative and qualitative data. A pedagogical conception aimed at education for climate change in Basic Secondary School is proposed, materialized in a system of teaching and complementary activities.

Keywords: Climate Change; Pedagogical Conception; Mitigation; Adaptation

Introduction

Any change in the climate system will originate a change in the climate, these changes can be produced by external or internal factors. Among the external factors causing climate change are considered galactic, orbital and solar variations, the obliquity, eccentricity and precession of the Earth, these last three were proposed by Milankovitch in 1941, in his theoretical model of the Cycles.

Internal factors include orogeny, epirogeny, volcanic activity, ocean circulation and changes in atmospheric composition, including greenhouse gases.

As a consequence of the Industrial Revolution, since 1760, increasingly severe climate alterations have been occurring, caused primarily by the strengthening of the greenhouse effect (the atmosphere's ability to expel shortwave radiation (direct and scattered radiation) and retain the Earth's longwave radiation), which is leading to a progressive increase in air temperature.

The Earth has warmed and cooled naturally in the past, but the fact is that these cycles have always been much slower, over millions of years, whereas now, as a result of human activity, significant levels of temperature increase have been reached in just two hundred years.

Climate change is related to anthropogenic causes, according to Article 1, paragraph 2 of the United Nations Framework Convention, which establishes differences between climate change attributable to human activity that alters the atmospheric composition and climate variability due to natural causes, which is assumed by a large representation of the scientific community. This is the one embodied in the glossary of the State Plan for the confrontation of climate change Tarea Vida, of 2017 in Cuba.

> As a consequence of climate change, there will be a deterioration of the general environmental quality, as a consequence of the reduction of water potential on a regional scale, the loss of dry land in low-lying coastal areas, soil impoverishment, a decrease in agricultural yields in fundamental crops of the national diet, the loss of biodiversity mainly in coastal areas, the affectation of coastal human settlements, the increase of communicable diseases and the consequent impact on economic activity in general. (Planos, 2019, p. 24).

The scenario described in the previous text clearly expresses the need to act quickly, it is essential to draw strategies from all institutions and agencies of society, increasingly accurate, to minimize these effects as far as possible. Education is fundamental to achieve this.

Climate change is becoming an ever greater challenge for education, since it implies developing environmental awareness, modifying modes of action, habits and social skills; it is necessary to raise awareness in order to express rational behavior with the rest of the components of the environment.

Article 6, entitled “Education, Training and Public Awareness”, of the United Nations Framework Convention on Climate Change in 1992, states the need to provide access to information on the causes, consequences and confrontation of climate change in order to raise society's awareness and involve it in the development of appropriate responses to mitigate and adapt to the fact that the climate is changing.

During this process, the students' way of thinking and acting must be transformed, respecting the learning styles of each one, for which a climate of respect and trust in their possibilities must be established, considering their interests, their needs, their motives and the relationships they establish in their daily contexts of action, in their locality.

> Climate change (CC) is gaining increasing prominence in the educational system. The social representations of the population, however, reveal a limited and distorted knowledge of the aspects that characterize it and, therefore, are far from being translated into teaching-learning processes in accordance with the seriousness of the socio-environmental crisis. This is also the case among secondary school students (García-Vinuesa *et al.*, 2022, p. 25).

The programs of the subjects have conceived that the contents that the students should receive allow the acquisition of a scientific conception of the environment and its components, which prepares them to pose and solve problems in the context of daily action, in their locality.

However, students' knowledge on this subject is insufficient and their behavior expresses an inadequate education for climate change, since they lack habits and skills to contribute to solve daily problems related to climate change. Therefore, a pedagogical conception aimed at climate change education for students in Basic Secondary Education is proposed as a solution to this problem.

The research assumed the proposal of Hernández-Sampieri *et al.* (2018) that describes the mixed approach or mixed route of research, “(...) implies a set of processes of collection, analysis and linking of quantitative and qualitative data in the same study (...) to respond to a problem statement” (p. 610).

In general, the methodology followed was as follows:

- Collection of data on the problem and needs.
- Elaboration of the pedagogical conception.

- Elaboration of the system of teaching and complementary activities as an implementation of the pedagogical conception.
- Identification of new needs and potentials.
- Reporting the results of the activities to the school.

In order to achieve the objectives of this work, a review of the documents of official international and national organizations developed from the 1990s to the present to address climate change has been carried out, analyzing the issues related to education.

The main working method has been inductive: based on a detailed analysis of the official documents mentioned, a diagnosis of their strengths and weaknesses has been made. All this with the aim of highlighting those ideas that can be presented as examples of good practices in the different scales of work and making proposals for improvement for the correct valuation of education as a tool in the fight against global warming.

Development

It is necessary to teach contents on climate change in schools to help children, adolescents and young people to acquire knowledge, skills, habits, values and modes of action aimed at educating them to adapt to and mitigate its effects.

Climate change education is assumed as: "a systematic educational process, aimed at enriching the contents related to climate change to raise awareness and promote ways of action in people, related to adaptation and mitigation to its impacts, from a transformative and sustainable position" (Ricardo *et al.*, 2019, p. 6).

For the study of climate change, its causes and consequences should be treated as a whole, establishing cause-effect relationships and not in isolation the phenomena and processes that explain it. It is essential to achieve the "(...) perception and interpretation of the problem, especially the vulnerability of living beings in the face of this phenomenon, in order to understand how to face it in order to adapt" (García *et al.*, 2019, p. 4). It is urgent to bring about changes in behavioral patterns, considering that the climate is already changing.

Education for climate change should be conceived in such a way that, from the foundation of the Model of Basic Secondary Education, with systemic organization of scientific knowledge, in its general objectives and in the specific objectives of the programs of each discipline, as well as in the contents, everything related to this topic is explicitly dealt with in a coherent and contextualized manner, which is currently not the case.

Therefore, it is considered necessary to propose a pedagogical conception aimed at climate change education for students in Basic Secondary Education, to be implemented through teaching and complementary activities in which teachers, the group and the community are involved in their elaboration and execution, with the everyday and the local as the center of adaptation and mitigation.

For this research, several scientific works were consulted, which propose different types of conceptions as solutions to the problems investigated: theoretical-methodological, educational, didactic and pedagogical. The authors recognize that a conception is the result of a process of abstraction of the qualities of an object, presupposes the modeling of a concrete process and constitutes a system of ideas, principles, value judgments, concepts and representations, attitudes and feelings, which expresses the relationships between these components and constitutes a potential theoretical solution to a problem and its implementation in practice.

The conceptions studied are a form of systemic organization of scientific knowledge, they are based on the postulates of the Marxist-Leninist theory of knowledge, they are the result of the current criteria of the educational sciences, their contextualization to the investigated object is distinguished in them and they contribute strategies, alternatives, models, methodological orientations, systems of activities, methodological actions all of them oriented to their practical implementation.

In the proposed pedagogical conception, education for climate change is conceived as a process of transformation of the student's way of thinking and acting, in which teachers, the group and the community play an important role, as transforming agents of the educational reality, respecting the learning styles of each one. A climate of respect and trust must be established within their possibilities, considering their interests, their needs, their motives and the relationships they establish in their daily contexts, in their locality.

The pedagogical conception is characterized by being flexible and contextualized, since it takes into account the particularities of the students and the need to articulate the contents with life, with the knowledge and experiences acquired by them in their daily lives and in their locality.

Guiding idea

Education for climate change requires acquiring knowledge, skills, habits, values and ways of acting in order to commit to actively participate in daily and local activities in favor of the climate, in the adaptation and mitigation of its effects, and to involve others.

Principles

Unity of the scientific and ideological character of the direction of the pedagogical process.

Linking education with life, social environment and work.

Unity of instructional, educational and developmental aspects.

Unity of the affective and the cognitive.

Collective and individual character of education.

Unity between activity, communication and personality development.

The integrating character of the contents of education for climate change towards the appropriation of a culture that allows active participation in daily actions in favor of the climate in their locality.

The flexibility of the pedagogical process to the characteristics of the locality and students, to contribute to adaptation, mitigation and empowerment in the face of climate change.

Characteristics

The contextualization from the pedagogical process of the contents on climate change in relation to everyday life.

The development of skills for the search, updating and management of climate change information in the work with maps, other scientific texts and digital media.

The relationship between environmental education and education for climate change from the pedagogical process, to contribute to develop students' motivations, interests, convictions and attitudes that lead to active participation in adaptation and mitigation.

The relationship between climate change education and the characteristics of the locality applied to the actions that students can take to solve or mitigate environmental problems in their spatial diversity.

The relationships between the participants in the pedagogical process and other agents and socializing agencies of education, provided reflection and appreciation in the collective, aided in group learning, as stimulators of development.

Categories

The following categories are proposed: climate change, mitigation, adaptation, everyday life, locality and community.

Climate change: “(...) a change in climate attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods” (UN, 1992, p. 3).

Mitigation: “Human intervention aimed at reducing sources or enhancing sinks of greenhouse gases” (Intergovernmental Panel on Climate Change IPCC, 2014, p. 135).

Adaptation:

> Process of adjustment to actual or projected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or take advantage of beneficial opportunities. In some natural systems, human intervention can facilitate adjustment to the projected climate and its effects. (IPCC, 2014, p. 5)

Cotidianity:

> (...) the possibility of unveiling and explaining the issues of daily life in a direct way and overcoming the mere study of the what of the facts by a critical reflection on the why and what for, where the pedagogical intervention generates a difficulty that shakes subjectivity and transforms previous knowledge towards a more argued, coherent and relevant explanation of daily events. (Svarzman, 2000, p. 57)

Locality:

> (...) that territory that allows the realization of observations during the students' learning activities, either in the surroundings of the school, or in an area possessing a radius of one kilometer and having the school as a center of reference. (Cuétara, 2018, p. 17)

Community: “something that goes beyond a geographical location, it is a human conglomerate with a certain sense of belonging. It is, therefore, common history, shared interests, spiritual and physical reality, customs, habits, norms, symbols, codes” (Socarrás, 2004, p. 176).

The proposed pedagogical conception constitutes a theoretical solution to the research problem of how to contribute to the education for climate change of elementary school students. For its practical implementation, teaching and complementary activities and

methodological guidelines are proposed to the teacher for contextualization and for the elaboration of others.

The methodological guidelines constitute recommendations for teachers to be taken into account in the implementation of the pedagogical conception.

Their use will allow the teacher to contextualize the teaching and complementary activities and to elaborate others, taking into account his/her pedagogical experience, the diagnosis of the students in the group, the particularities of the school, the locality and the community.

The purpose of these guidelines is to prepare teachers to contribute to the education for climate change of students through personal initiative and pedagogical creativity.

These methodological guidelines recommend taking into account the requirements of the institutional curriculum and the Basic Secondary School study plan, so that the implementation of teaching and complementary activities is enriched in practice.

The implementation of teaching and complementary activities will require teachers to use a varied bibliography and the most updated information from scientific publications related to climate change, mitigation of its effects and adaptation to its consequences, as well as the systematic use of documents that regulate the work of the school.

It is necessary to study in depth the explanatory documents related to: climate change, its causes and consequences; mitigation and adaptation to this fact; the legal framework of the State to confront climate change; the normative documents of Basic Secondary School (General and Institutional Curricula, resolutions that regulate the methodological and educational teaching work, study plan, subject programs, among others).

Study of the guiding idea, principles, characteristics, categories and the teaching and complementary activities proposed in the thesis for its contextualization.

Physical-geographical and economic-geographical characterization of the locality where the school is located, as well as the characteristics of the community.

Review and contextualization of the teaching and complementary activities elaborated for this thesis in order to check if they can be implemented in their school.

Analysis of the structure of the proposed activities in order to assume it or make modifications in those that are elaborated.

Elaboration of new teaching and complementary activities based on the proposed pedagogical conception, on the diagnosis of the students, the locality and the community where they will be implemented.

It is essential to establish the necessary coordination with the community to guarantee the implementation of complementary activities in the locality.

The role of the methodological work in the grade group in the contextualization and elaboration of the teaching and complementary activities is considered very important.

The pedagogical conception, the methodological orientations and the teaching and complementary activities were validated by 25 specialists, who highlighted their relevance.

The implementation of the teaching and complementary activities allowed the application of a satisfaction test to the participants, at the conclusion¸ assumed from (Elende, 2016). The tendency according to the median was to value them as very good, the active and systematic participation of teachers, students, family and community in the complementary activities, allowed to consider that they were very satisfied and that the proposal is viable.

Conclusions

The pedagogical conception aimed at contributing to climate change education in elementary school students is the result of the systematization of scientific research on current climate change, education for adaptation to it and the characteristics of elementary school, which is expressed in guiding ideas, principles, categories and characteristics that reveal the need to address, mitigation and adaptation in relation to the locality, the community and everyday life.

The materialization in practice of the pedagogical conception through teaching and complementary activities that involve the school, the family, the community and the economic and political institutions of the locality, based on pedagogical mediation as the central axis of educational work, learning as a process of transformation of the personality in which the teacher plays an important role, the group and other educational agents

transforming the educational reality, respecting the learning style of each individual and promoting it in a creative and developmental way, in a climate of respect and trust, contributes to education for climate change as an urgent need for sustainability.