

GRACIELA GIRÓN, CLAUDIO RAFAEL VÁSQUEZ MARTÍNEZ, JUAN SÁNCHEZ LÓPEZ, ANTONIO AYÓN BAÑUELOS**ENVIRONMENTAL EDUCATION: FROM THE PERSPECTIVE OF SCIENTIFIC KNOWLEDGE FOR CONSTRUCTIVIST LEARNING****Introduction**

The vision of environmental education is that it should raise the level of critical thinking and reflection as the appropriate basis of the activity of human beings, develop thinking on a higher plane, so that they can think about the future that they desire and how they wish to live, not merely focusing on the present. This will involve changes in the way people think, how they analyse, interpret and act. It involves a transition from the individual to the group, to team work, and producing changes in personal habits to motivate and sustain changed relationships with the people that we live with, neighbours, colleagues and friends, inside and outside the immediate locality. There needs to be strategic engagement, orienting and applying the basic habits of thought to the world they inhabit.

At the same time, environmental education is not merely a modern form for the didactics of natural science, but is, on the contrary, an educational process that integrates ecological knowledge, philosophy, politics, economics and sociology, among others. This is because its purpose is to change the relationships of production, social structures of economics and cultural patterns, which include both the individual and the collective, with the intention that the present generation, and future ones, should change how they live, so as to develop the members of contemporary industrial society in a new historical context of a worldwide environment.

The Epistemology of Environmental Education

On the 5 June 2010 there were two seminars. The first was given by a professor of higher education, who presented a study of the variety of flora and fauna that exists in the locality of Lázaro Cárdenas, Michoacán. He pointed out that it is not necessary to go to Brazil to see the great beauty of vegetation, but he did not mention the environmental problems there are in the city, as much for industry as for the community. The second seminar was about a project to protect a “green belt” to contain the industrial pollution inside and outside the factories. While the first seminar dealt with general issues without discussing the problematic of the environment, which could have helped students and employees in the factories understand their situation, the second seminar referred to establishing a response which did not address the root causes of the problematic of the industrial environment, namely, Why is pollution produced? What causes it? And how can the owners, managers and employees in general prevent pollution rather than merely containing it? For this reason Leff (2003) suggests that there is a crisis of knowledge, a selective blindness, which everybody knows exists, but nobody knows how to correct, much less avoid in the first place.

For this reason it is necessary to bring introduce an environmental education which will transform and reform in educational planning, where management will be

in the vanguard of change, guiding and participating in the struggle to transform the school to promote critical thinking, first among teachers and later in the studies of their students, so that they can promote activities and remedial action and raise questions about the environmental problems that result from the globalisation of the world through a consumerist economy. It is essential and urgent in the twenty first century that we construct a new vision based on critical thinking that will promote changes in attitude that are not merely cosmetic. This is confirmed by the work of Morin (2002) who states that human beings are victims of the separation of nature, culture, and humanity, which follows the split in the way we live and our physical and social natures.

It follows that there is a need for an environmental education which promotes constructivist learning and helps in the rebuilding of the ways we think to bring about sustainable development to control, reduce and improve the present environmental crisis. As Rodríguez (2010) says, we face an emergency in the clash between our knowledge and our dreams of other possibilities where egoism and individualism are not privileged together with greed, the power of money, hedonism and unbridled consumerism, but on the contrary where we can advance an inclusive, democratic, sustainable and compassionate society. As Leff (2000) observes, the environmental crisis is not ideologically neutral.

The environmental crisis is a matter of knowledge, because it is possible to examine the rationality of the current system of economics which, without any doubt, is bringing about the global destruction of the environment. As Leff (2001) notes, theory, to the extent that it creates a cognitive picture of what is, produces a transformation in practice. Leff (2001) suggests that epistemology is a strategy for environmental management, bearing in mind that knowledge is not constructed independently or in an ideological vacuum.

According to Leff (2000), environmental epistemology is a policy of seeking a sustainable way of life, taking into account flora and fauna, so that there is a link between all modes of life in the world, and people can live in harmony with nature. Environmental knowledge supports elements that help to transform attitudes and abilities in relation to the locality.

Philosophy in Environmental Education

Environmental philosophy holds up a utopian vision of an ecological civilisation, which encourages a new political Project, including economics, and sociology in the humanities (Zamudio, 2005). Industrial civilisation is hegemonic in nature, and promotes the modern concept of quantitative progress, growth in production, improved well-being in spite of damage to the natural environment, without considering the future.

For these reasons we need a new paradigm that moves us away from traditional development, which allows improvement in the quality of life through study and reflection about what is done, how it is done and why it is done, not only at the individual level but also at the organisational level. This will achieve a technical development that considers qualitative growth and not only quantitative, with which it will be possible to improve the conditions of human existence at a planetary level. According to Zamudio (2005), humanity faces the global problem of planning for

the proper growth in relation to the natural conditions of life, which have been damaged by industrial civilisation.

But, to date, environmental education as it has been “taught” has been focused only on the transmission of scientific knowledge about the environment, about material cycles, physical, chemical and biological principles and reactions, so that classes of environmental education are taught by chemists and biologists and deal with the causal relationships between events, and the technical means that are designed and empirically tested to produce changes in attitudes and habits at the level of the individual. As Morin (2002) wrote, human sciences make our analysis of the human condition weaker, because they are fragmented, divided and compartmentalised.

It follows that environmental education has not been directed to the real roots of the problem. That is to say, it has ignored the examination of the present paradigm, with its consumerist patterns and its spendthrift taxation underpinned by the neoliberal ideology of the global market. As Martínez (2007) puts it:

A modern environmental education should describe a collective process of living in relation to the environment as an alternative way of life, a new cultural order that gives space to communitarian participation, to an equal society, to exploring new economic relations that respond to the need to recast the concept of environmental exploration as an opportunity to improve the quality of life, to re-evaluate the intangible, stop the exploitation of resources and dignify human life, repaying our debt to our ecosystems and to their natural cycle of regeneration in general.

Philosophy should lead individuals to develop a culture that promotes the construction and reconstruction of environmental thinking. Thinking environmentally would then be a task of thinking in a new way. We do not think so that we can live on the land, but it is the living, the form of living, that finds expression in our thinking (Eschenhagen, 2007).

Environmental Ethics

In our conduct as citizens, activities are carried out that can affect people in the near future, and also the future of many generations to come. Although many people have no knowledge of ethics, that cannot excuse them if they act without respect for nature. As Gadotti (2002) says, we cannot search, decide, break, or prefer, as though we were historical, transforming subjects, unless we first conceive ourselves as ethical beings.

Rodriguez (2007) argues that in the 1980s the idea originated that knowledge is not only an isolated trigger that produces adaptive environmental behavior, but that it has an ethical component, that is to say, it connects with attitudes, values and emotions. For this reason, environmental ethics is a process of becoming aware that has evolved through time and that consists, basically, in becoming more and more aware of the value of things in the world that surrounds us. From this perspective, individual consciousness begins to extend to include ever more individuals, as Gadotti (2002) indicates in the concept of tripolar formation first described by Rousseau; the other, things and our personal nature. We realise that there are many reasons why we must include animals and other forms of life on the planet if we

wish to be congruent in what we say, write and do. Leff (2002) considers that ethics is the way to recreate existential awareness, so that awareness once again becomes awareness, and reason reconnects with emotion and thought with sentiment.

Environmental ethics must extend the responsibilities of the present generation to construct a sustainable perspective, where the moral obligation must be to search for alternative paradigms for organising society and nature in the future. Leff (2002) indicates that environmental ethics give to account of the degree of relation between education, culture and society, to reinforce personal and institutional commitment to education, the protection and conservation of our natural heritage for present and future generations. Consolidation of environmental ethics is the foundation for the formation of values, attitudes and commitments of joint participation between educational authorities, teachers and student. According to Iglesias (2003), value is a social creation from which society emerges in all environments, resting on the protection of nature, respect, love and similar sentiments.

In addition, the environment is not merely what is natural. It includes, as Gutiérrez (2007) says, the social, economic, political, cultural, local and planetary, and aesthetic aspects, as well as research from a globalising, integrating point of view of the different aspects and the relationships between them.

Constructivist Learning in Environmental Education

Since the 1960s, there have been different initiatives to control and to reduce the environmental problems which each year have damaged the planet earth and therefore humanity, the flora and fauna. This was evident in the contamination of water, air and earth. In educational matters, educational models have been fundamental to sustainability and to applying learning processes where students obtain significant learning. As Ertmer and Newbt (1993) note, to the extent that we have moved from behaviourism through cognitivism to constructivism, the focus of instruction has moved from teaching to learning, from the passive transfer of facts and routines towards the active application of ideas to problems. As Espinoza (2003) indicates, the student will move from being a passive receiver to an active controller of his or her own process of learning.

ITESM (2005) states that with passive education, based on memory, many students today find difficulty reasoning in an effective way when they graduate from the school. This can be seen when the graduates enter employment, and in many cases, have difficulty with assuming responsibility appropriate to their position, even when it is associated with work corresponding to the area where there studies have been focused. It can also be seen that they have difficulty carrying out tasks in a collaborative way. As Iglesias (2003) observes, teachers work hard to transmit knowledge, culture and skills, but emphasise memorisation, partly because the curriculum is selected to promote it.

It is important to note that the application of constructivist learning in environmental education, and the constructivist approach of showing students how to construct knowledge, promotes collaboration with companions in the process of reviewing multiple perspectives that can be brought to bear on the solution of a problem. Gutiérrez, (2007) indicates that constructivism starts from the idea that the individual constructs his or her knowledge by means of sensory motor experiences,

and by means of mental operations, stimulated by interaction with the environment, society, and the culture.

It is crucial to bear in mind that, when education is implemented through a process of construction of knowledge, it must take into account social issues to achieve communitarian learning. Garcia and Cano (2006) note, people learn through social interaction, and what is learned is determined socially. People construct knowledge together, negotiating meaning and cooperating in the task of construction.

Currently, many educators claim that the process of education is constructivist, but the proper outcome requires more than just saying, and requires that they should also act on it. This is where the function of the directive management is important, so that teachers are directed to make the effort required by this difficult form of significant learning. Torres (2000) argues that teachers, in spite of the new theories, have themselves experienced only behavioural processes of education, and perhaps without realizing, they still reproduce the traditional scheme in their work.

The Nature of Environmental Problems in Environmental Education

Concerning environmental education in educational institutions from kindergarten to university, for teachers it is a challenge that society makes consistent efforts to reduce, to control and to improve environmental problems, on the assumption that it will achieve a better level of quality of life for people. Actually, this is the same approach that has produced the ecological problems and the environmental contamination. Leff (2000) stated that ecological catastrophes are not products of contemporary civilization.

But, it is also known that when people occupy a space, environmental problems grow exponentially. As Pujol (2000) puts it, consumption becomes an environmental problem that has social importance from the moment at which the individual and society have to consume in order to live. The relationship between society and nature are always a reflection of the economic organization and established policies of society and, consequently, environmental problems can only be explained with reference to those organizations. In this context Leff (2000) argues that the maximization of short term economic benefits has generated the globalisation of a set of effects: pollution of air, land, water, rivers, lakes and seas, environmental degradation by means of deforestation, soil erosion, loss of fertility, and waste of finite resources.

In this way, the solution rests with people, who make up this consumerist society. As Rivarosa and Perales (2006) observe, to solve the problems they must rely on everyday knowledge, together with scientific knowledge. They must rely on the former, because the problems arise from daily experience, and on the latter, because the problems are complex, which makes it necessary to resort to more sophisticated forms of knowledge. However, the traditional scientific knowledge is not sufficient to reduce or to eliminate the environmental problems. Pujol (2000) considers that the increase in consumption, generated by the industrialization and exacerbated by the consumer society, explain why the human species has stopped respecting the natural chain of events and the natural cycles of matter to establish, primarily, the economic chain. This presupposes an increase in the complexity of relations of consumption, creating serious imbalances.

Conclusions

The adaptation of ecology and environmental education from their establishment on our planet earth, have been surrounded by very good intentions on the part of the managers, researchers and senior teachers in education. In the governance of companies producing goods and services there have been established norms and/or laws that in many of the cases are not sufficient to prevent environmental pollution. For this reason it is necessary to investigate new strategies that allow for critical and reflective thought about our activities as human beings. These new strategies must bring about a sea change in thinking in the long term, producing a holistic educational process that integrates ecological, philosophical, political, economic and sociological knowledge, at the very least. This will bring about a modification in relationships of production, socio-economic structures and cultural patterns, that embraces the individual and the collective with the intention that present and future generations change the way they live, to encourage members of contemporary industrial society in a new, historic and global environmental context.

What is needed now is the construction of an alternative paradigm to the paradigm of traditional development, which supports improvement in the quality of life, a technical development with a view to qualitative growth and not only quantitative, which takes into account more than utility in the short term, that invests in educational processes to promote the generation of productive and sustainable services with the purpose of improving the human condition.

Therefore, the philosophy must bring people and society face the challenge of managing a culture that supports the construction and reconstruction of environmental thought. To think environmentally will then be to assume the task of a new type of thinking that harmonises all of nature (fauna, flora), including productive people and processes for a planet earth that is full environmental problems.

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