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Autonomy and ICT in environmental education

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Abstract

This paper aims at tackling the need for appropriate knowledge when addressing Environmental Education (EE) from an autonomous and critical viewpoint. It also aims at showing the need for the appropriation of ICT with a view to foster the perception of the environmental complexity, as well as the construction of a new kind of environmental knowledge and awareness. These two factors should be capable of modifying the way human beings behave and relate to their environment. Before looking at effective ways to achieve this goal, a suitable praxis should be developed in such a way that a new environmental awareness emerges. This new praxis should in turn help foster the autonomy of both educators and learners by enabling them to discuss and reflect on the possibilities and changes brought about by ICT, given the increasingly important role ICT play in the learning process. The use of ICT is likely to promote changes in attitudes, behaviour and values, as well as in the cognitive and perceptive processes. Therefore, new teaching methods and approaches are required in order to meet the needs and expectations of the new generations so as to achieve mutual understanding; this being an essential aspect of education, given that every learning process is a communicative process, and mutual understanding is key to successful communication. In this context, the different aspects regarding the relationship between EE and different means of communication will be examined so as to point out the need for suitable teaching materials which bear in mind the role of ICT in education.

1. Introduction

To begin this discussion, the authors of this paper will draw on Carvalho's (2002) argument that all education is environmental education (EE), given that all teaching and learning processes should include an environmental dimension. Without this dimension, teaching and learning processes would lose their essence and the contribution they would make towards the perpetuation of human life would be too limited. This train of thoughts can help avoid the common mistake of dissociating the different elements which make up the complex concept of education.

The goals of this paper are, first of all, to highlight the necessity for the development of a new environmental knowledge and awareness capable of fostering the emergence of praxis based on the autonomy of both teachers and learners. On the other hand, this paper aims at discussing the possibilities and changes brought about by the introduction of the Information and Communications Technologies (ICT) into this process. It should be borne in mind that knowledge has been built throughout the many centuries of human history in which the different technological devices used for communication evolved successively from oral to the printing-press and then towards

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computerisation. According to Lévy (1993), this process does not take place because of the substitution of one means of communication by another one, but rather by means of the complexity and displacement of the traditional "centres of gravity".

In this context, it has been borne in mind that geographical space is a very good example of the reproduction of the relations of production in society and, therefore, it is very dependent on the techniques used. Consequently, the geographical information systems and the means of communication play an important role in research projects in EE. In addition to fostering the preservation and protection of the environment, geographical knowledge also provides individuals with the techniques needed for the development of mechanisms of interpretation. In this way, the concept of "territory", within nowadays' historical context, must include science, technology and information so as to foster the self-recognition of individuals as (potentially) active social subjects. The ability of these social subjects to act and interact with and within the different social spaces in such a way that the environmental quality increases should also borne in mind, since this might, in turn, lead to an improvement of the individuals' quality of life.

2. Environmental Education (EE)

The overview of the history and practices surrounding EE shows how, in spite of the fact that in the last few years several relevant works on this topic have been published, there are still methodological flaws in the way practitioners approach research and in the projects carried out. According to Pedrini (1997), it is commonly believed that many environmental educators tend to address issues concerning EE but only a few of them are practitioners and most of those do not use a theoretical framework as a departing point and they do not refer to this framework in their practices, nor do they always reflect on their own work. In his reflection on the criticism that the university has received regarding the role it played in the re-conceptualisation of EE, Ab'Sáber (1993) points out the fact that the praxis of EE demands a method, a notion of scale, a good perception of time, space and juncture relations; as well as knowledge about the regional realities and, above all, of the linguistic codes, which should be adapted to the learners' age range.

It was not until 1972, when United Nations' (UN) International Conference on the Human Environment took place in Stockholm, that human beings started to be considered as a key component of the process of environmental preservation and, according to Sato (1997), EE was for the first time understood in an increasingly comprehensive manner, as reflected by The Stockholm Declaration signed in that conference. Later that decade, in 1977, in the conference organised by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in collaboration with the United Nations Environment Programme (UNEP), The Tbilisi Declaration was signed. This Declaration updated and clarified The Stockholm Declaration and established new goals, objectives, characteristics, and guiding principles of environmental education. The Tbilisi Declaration was therefore key to the consolidation of the EE International Programme and Agenda. Among the main characteristics of this Declaration are the interdisciplinary, the interrelated regional and global perspectives and the continuity. In 1992, the United Nations Conference on Environment and Development (UNCED), also known as "the Rio Summit", "Rio Conference" or "Earth Summit" was hold in Rio de Janeiro, Brazil. The different discussions and reflections there led to new perceptions concerning the way environmental issues should be addressed. In that context, the acknowledgement of the need to take into account the social dimension of these issues led to the coinage of the term socio-environmental. This term underlines the role of society as a constituent of the environment while manifesting the scientists' quest for new concepts which help them comprehend this complex reality. While this official Earth Summit was taking place in Rio, another event was also taking place in a parallel space: the NGO "Global Forum" or "Forum Global 92". In this alternative forum, the participants, mainly different non-governmental organizations (NGOs) together with other sectors of the civil society, signed the Earth Charter. The Earth Charter is an international declaration of fundamental values and principles aimed at building a just, sustainable, and peaceful global society in the 21st century. Among these principles the respect for the environment, the ecological integrity, the socio-economic equity and the peace were underlined as being essential for the improvement of everyone's quality of life worldwide.

After the simultaneous Rio Summit and Global Forum, EE started to be integrated into educational settings in an increasingly wide and diversified manner, strictly dependent on the educational perspective and the way the concept of environment is understood in every setting. However, overall EE has been connected to sustainability in all contexts. This connection was emphasised in 2002 by the NU and the period of 2005-2014 was declared The NU Decade of Education for Sustainable Development (ZAKRZEVSKI, 2004). Leff (2002) considers that the first two perspectives ascribes the responsibility of sustainability to the most powerful nations in terms of economy, commerce and technology, while making poorer and less powerful countries become subordinated to and dependent on the powerful ones, devaluing the educational process understood as the basis of the development of internal capabilities for the transition towards sustainability. In Ferreira's (2005) opinion, sustainability is nowadays a cross-sectional concept encompassing all dimensions of human life, and not only the direct relations with nature. Furthermore, this idea on multidimensionality can be considered as one of the few common points of most of the definitions of sustainability, which tend to be polarised into two opposed viewpoints. These viewpoints tend to be, according to Lima (2002), either conservative or emancipating.

The conservative viewpoints concern the economical and technological approaches, and tend to capitalise and direct the proposal for sustainability commonly known as "sustainable development". As for the emancipating viewpoints, relating to the ethical approach, these tend to foster the reconstruction of the socio-economical order, as well as of the foundations of production and consumption in force nowadays so as to develop a new productivity rationality, based on the ecological potential and on a new conception of civilisation viewed from the perspective of the diversity of humankind (Leff, 2002). At the same time, EE must be oriented towards the development of a transformative knowledge of the relation society-nature, contextualising and addressing the following issues: the articulation of the natural and social spaces and temporalities; and the harmonisation and conflict-resolution of the opposed forces of economy and ecologic cycles, the economic valorisation and the cultural values, the maximisation of profits and the times of natural resource regeneration together with the processes of innovation and technological assimilation, and the different ecological, geographical, cultural, political and economic spaces where the actions concerning environmental management are set (Leff, 2002). Morin (2002), in turn, conceives complexity as a way of perceiving the world as a complex system in which chaos and insecurity lead to a new type of understanding and order, as well as to a new kind of complex thinking (Morin, 2002). Environmental issues, therefore, should take into consideration the complexity of the systems involved, the multiplicity of their components (physical, chemical, biological, ecological, human and social), the non-linearity of the subjacent phenomena and, above all, the spatial structure and the different spatial and temporal scales, together with their causes and effects.

In this way, the investigation of the environmental issues should necessarily follow an interdisciplinary approach, mobilising and involving all disciplines in different degrees. This might and should lead to the integration of the natural and social processes within different orders of materiality and spheres of rationality, while fostering the emergence of new conceptual strategies for the development, from an emancipating viewpoint, of a new theoretical order which questions the economical rationality and the production processes in force.

3. The role of ICT in EE

The threefold composition of ICT makes this concept hard to define, since ICT comprise three attributes, each of which has different meanings depending on their application in the wide variety of human knowledge areas and also on the historical context. One of the most common ways to solve this conflict is to comprehend the conceptualisation of the three elements that make up the technology, information and communications triad. First of all, the word "technology" comes from the Greek "téchne" and "logos", which correspond, respectively, to the ideas of art, trade, industry; and to the concepts of word, treaty, study and science. Therefore, the term "téchne" was not used by Greek philosophers to refer to any kind of trade of art, but just to those activities involving study and science. In the environment, the techniques are combined with the natural properties which are the basis of the existence of human groups. After the Upper Palaeolithic, complex techniques were adopted for defence, settling, dressing, agriculture, and such techniques, according to Santos (1997), were not aggressive thanks to the fact that they were closely linked to nature. They also helped reconstruct and regulate this very same nature. The next element of the triad to be

discussed is "information", which derivates from the Latin word "informare", meaning "the act of shaping the matter". According to Wurman, until the 1940s, the concept of information was closely linked to the act of informing and to the mind and character- forming processes, as well as to training, instruction, teaching and the transmission of constructive knowledge (Wurman, 1991). With the advent of computer science, the concept of ICT became gradually linked to those computing technologies used for the transmission of information.

After the 1960s, the use of ICT, namely computers, brought about great achievements in terms of storage, processing and transmission of information from distant places, leading to the development of Geographic Information System Management (GIS). The GIS can not only be used to store geographical data or to analyse processes, but also to provide environmental educators with a new means of communication and transfer of geographical data and thus of geographical information. This information can be used for educational purposes.

Yildirim (2005) suggests using computers as cognitive tools which do not just present information but also encourage users to access, analyse, interpret and organise personal knowledge from previously set-out problems. According to Silva (2002), a new learning paradigm should be developed. In this paradigm, the learning process should be based on the individual's capability of interacting with sources of knowledge arising from other knowledge processors/holders. This means that within this paradigm teachers play the very important role of assisting learners in their transition from the intuitive and summative knowledge to a reflective kind of knowledge which the student needs to build up by means of organising, making connections and relating old and newly-acquired knowledge and information. This author (Silva, 2002) also points out the fact that when students are surfing the Net and also before they do so, their teachers should provide them with assistance and guidance. Even though the final goal of teachers' support is that students take advantage of the opportunities for emancipation provided by the Web, this emancipating process does not require the suppression of mediators, but rather the acknowledgment of the essential role mediators play in the learners' process of emancipation. In such cases, the use of ICT in EE can help teachers take advantage of the computer integration and multimedia possibilities to raise their students' awareness. At the same time, teachers can help learners get to know their environment and the issues concerning this environment. Virtual environments and settings point out the need to work towards the development and integration of environmental knowledge by means of more appealing and effective communication strategies.

4. Concluding remarks

The environmental crisis worldwide is a consequence of the contemporary models of society and production/consumption, resulting in a crisis of the scientific knowledge and a questioning of the traditional core disciplines, as well as an urgent need to reconsider the current model and to acquire new knowledge. ICT bring about a change in attitudes, values and behaviours, for both mental and perceptive processes, demanding new methodologies and pedagogical approaches in accordance with the needs of the new generations. This new approaches can help teachers and learners achieve mutual understanding, a key aspect of successful communication.

In spite of the fact that several national and international official documents provide definitions of the different concepts regarding the characteristics and principles needed for the development of EE, the environmental field still lacks a more definite an clear-cut paradigm. Therefore, the development and usage of teaching materials aimed at helping teachers support their students' involvement into a participatory and emancipating approach to EE can help bridge the gap between content and both the interaction with and the reaction towards content. In this way, the use of ICT is not related to the mere introduction of recreational materials or the perception of hypermedia as an innovative tool. Rather, ICT in EE can be seen as cognitive tools which should be an integral part of a reflective process involving the way contents are presented and how they relate to the students' needs and interests.

Consequently, hypermedia can foster the sharing of audiovisual content and information between students and teachers while helping raise the learners' awareness and making them capable of identifying environmental issues. This is turn can lead to the reflection on the urgent need to change the current patterns of use and distribution of environmental goods. Finally, it should be borne in mind that although teachers have their own values ways of understanding environmental themes - to which they tend to adapt their teaching methods- hypermedia can be used

by them as an interesting teaching tool capable of bringing about positive changes and innovations concerning the teaching and learning processes.

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