Environmental and Heritage Education as a tool for the sustainable development: "an analysis on experimental science and social science textbooks in Secondary School"

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ABSTRACT: The treatment of environmental heritage in textbooks secondary education Spanish educational system has been analyzed using a set of analyzed criteria and a checklist. The study shows how the environmental heritage is treated somewhat academic, unusual, undisciplinary and no little educational significance in textbooks. This treatment of heritage from a comprehensive perspective (symbolic-identity, holistic and systemic of heritage) which is what promotes a better understanding of knowledge, is predominant in the books. So knowing how textbooks treat environmental heritage allows us to design educational proposals that improve not only knowledge about the environment but to promote the awareness of students from a comprehensive heritage. In short, the education of future citizens in taking responsibility towards their environment.

1 INTRODUCTION

Nowadays, we live in a world dominated by a crisis in values, characterized by breaking relations between human beings and their natural environment, which is causing social and environmental problems. For this reason, it is necessary to prevent and minimize the destructive processes in order to defend and preserve our environmental Heritage. In this context, we consider education as a tool at the service of Sustainability and environmental current problems, since it allows to develop not only knowledge and skills but also critical attitudes towards the environment. Therefore, from formal education, textbooks take an important role because they are the main means for which students reach a wide variety of knowledges, although these are descontextualized, very slightly significant and scanty functionality. In this sense, many studies have been undertaken on the analysis of textbooks and research approaches, ideological aspects concerning training analysis, assessment, development and use, from which have been made. In this paper we as a new content analysis of textbooks from a comprehensive heritage (hereafter CHP), which combines the experimental sciences and social sciences by promoting scientific literacy, cultural and civic life. From this perspective we analyze how to work interdisciplinary environmental heritage and environmental education both in textbooks, in order to make proposals that allow teaching environmental awareness of students and future citizens. Therefore, the heritage is an interdisciplinary space in which interrelate the diverse concepts from art history to biology, geology or physics and chemistry that form a framework privileged education to raise the uniqueness of reality (Bennet, Sandore y Pianfetti, 2002; Tani, 2004)

This topic is related to the Heritage Education, one of the lines of work DESYM research group, which has extensive experience in this field (Wamba and Pérez Jiménez, 1996 and 2005, Steppe et al., 1998; Estepa, Wamba and Jimenez, 2005, Cuenca, 2004; Wamba et al., 2006a and 2006b; Estepa, Avila and Ferreras, 2008, Jimenez, Cuenca and Ferreras, 2009) and which is currently developing a project I+D+i[1] on heritage Education entitled *"Heritage and teaching. Analysis of resources and materials for an integrated approach to heritage education"* (2008 edition of the National Research EDU2008 code-01968), within which this work is included. Specifi-

cally, one of the objectives of this project, in relation to teaching and learning of heritage in a formal education, is to analyze the materials and resources used commonly by teachers in compulsory education classrooms where textbooks are the more widespread use in the Spanish educational system.

In this article we focus on the analysis of textbooks SSNN Natural Science (includes all science subjects: Physics and Chemistry, Biology and Geology and Natural Sciences) and Social Sciences SSCC (covers subjects Geography and History) in education secondary obligatory (ESO), where it is analyzed through a validated and reformulated checklist environmental heritage and its didactic treatment from a symbolic-identity perspective to know, if from this heritage perspective, promote sustainable attitudes are allowed to environment. All this takes shape in our study in the following research question: to what extent the environmental heritage which appears in textbooks of ESO let develop sustainable attitudes towards the environment and its heritage? The hypothesis is to depend on the perspective heritage books dealing SSCC and SSNN, provides environmental awareness of environmental problems and their heritage. That is why we focus on the environmental heritage type, which is what is directly related to the conservation of the environment and therefore their heritage, in addition, this typology is that it works both from the SSCC as of SSNN.

2. CONCEPTUAL AND METHODOLOGICAL FRAMEWORK

2.1 What do we mean by environment and landscape?

The initial meaning of *environment* was coined in the *United Nations Conference on Human Environment* held in Stockholm in 1972: *"the environment is the set of physical components, chemical, biological and social effects likely to cause direct or indirect, in a short or long on living beings "*This definition has varied over time and moving towards a more holistic and interdisciplinary concept, encompassing issues that must be approached from different disciplines. In this sense, the environment must always be linked to the concept of system, understood as a whole that act on other portions of interest and mainly consider the global behavior, not the sum of its parts because of the interactions between them arise the emergent properties, which are absent in the study of the parts separately.

Landscape and its diversity is the embodiment of running different environmental systems and cultural systems, in a territory. In this case, concept of landscape, has in itself an important anthropic component, in that there pristine landscapes outside the human intervention. Along these lines comes the concept of cultural landscape, with Carl Sauer (1925) pioneered the formulation of the same who understands the landscape like*: the cultural landscape is fashioned out of a natural landscape by a culture group. Culture is the agent, the natural area is the medium, the cultural landscape is the result".*
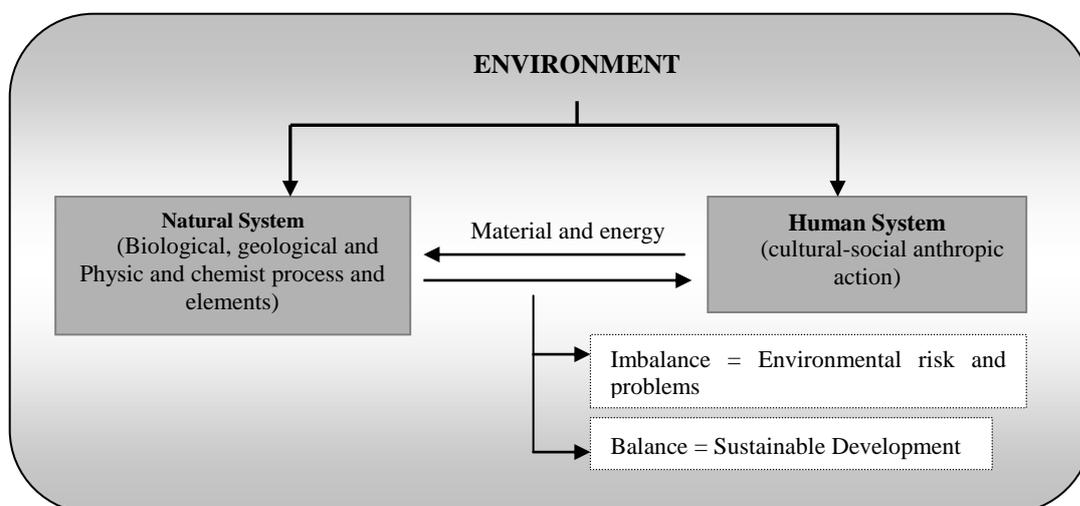

Figure 1: The environment as a system (Morón and Wamba, 2010)

In this sense, from some international organizations also understand the term landscape, under a viewpoint that combines action between nature and humans (UNESCO, 1972). More recently the European Landscape Convention (2000)[2] and Spanish Law 42/2007 on Natural Heritage and Biodiversity, also made the landscape in this view. The first speaks of the landscape as an area, as it is perceived by people whose character results from the action of human factors and natural interaction. The Natural Heritage Law, consider the landscape as anywhere in the territory whose character is the result of the action and the interpretation of natural and / or humans as perceived by people. As we see all these definitions agree that the landscape is not a sum of elements but a system that depends on the value of perception of the observer.

In short, we understand the environment (Fig. 1), the set of two basic systems, Natural System and Human System or Anthropic related through material and energy flows and balance or imbalance which derive sustainable development and the problems environmental respectively.

2.2 What do we mean by heritage?

Daily live with patrimonial elements and however its conceptualization is of great abstraction for education and outreach, especially for intangible heritage. This is due largely to its own complexity and diversity, which also depends on the perception held by each individual based on factors such as sex, age, knowledge, cultural aspects, etc. And is therefore subjective (Morón and Wamba, 2008). So the concept of equity can consider polysemous and changing, depending on the cultural moment and varies depending on the area of knowledge to which ascribes the heritage element (Hernández Cardona, 2004).

Some issues relating to the Heritage Education and its potential as an educational resource, have been approached from several studies (Steppe, 2001; Estepa, Wamba and Jimenez., 2005, Cuenca, 2004, Hernandez Cardona, 2003; Fontal, 2003, Aguirre and Vazquez , 2004; Avila, 2005; Calaf, 2008; Rico, 2009 and Steppe. et al. 2011). However, there is little interest in conceptualizing the heritage as a school and update your communication teaching and learning in the classroom.

Given that we conduct a heritage from a systems perspective, we provide a holistic view, we rely on the definition of Cuenca (2004, 141) who defines equity as the set of *"all those elements which by reason geohistorical , aesthetics, and sometimes, of exceptionalism, they become symbols that shape identity references of social structures, according to a defined and legitimized largely assumed by them, representing relevant cultural aspects of past and present, articulating, of thus, as basic sources for the knowledge society through the interpretation from a holistic perspective".*
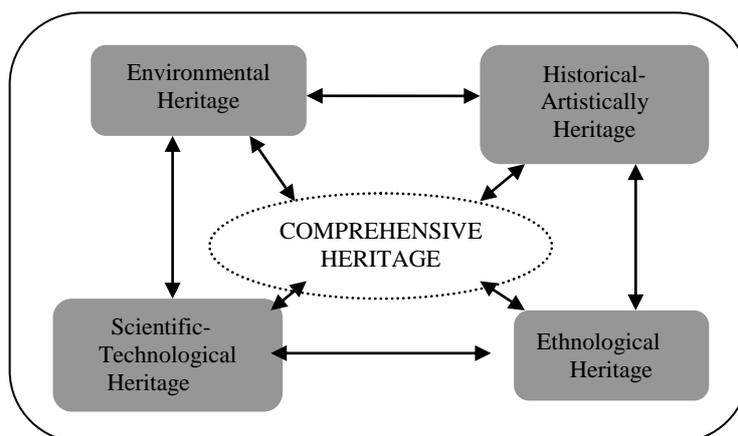

Figure 2: The system Comprehensive heritage as a result of the interaction of different economic types

This definition has been reformulated by Estepa and Cuenca (2006), reinforcing the holistic view in a systemic and complex points the importance of heritage and natural scientific-technological and echoed by Estepa et al (2011) talk about cultural heritage and that heritage

encompassing the different types including natural heritage. Finally from the concept of environment in the line above and pointing Mattozi,(2001), assuming the systemic dimension of heritage establish the concept of comprehensive heritage as one complex system shaped by the interaction of different equity types difficult to understand how isolated parts (historical-artistic, ethnological, scientific, technological and environmental) and its emergent properties arise symbolic interaction-identity (Fig. 2).

2.3 From natural heritage to environmental heritage

In the case of *natural heritage*, there are different definitions in terms of legislation and research in which distinctions are made between natural and geological heritage (this last sometimes composed into the natural heritage and other type considered independent), and between biotic heritage and abiotic and even definitions that provide for human interaction on the natural and geological heritage. This is why we have chosen to speak of *environmental heritage* in such a way that encompasses both the geological and the biological and provide for human interaction, giving a systemic perspective of it. We understand how environmental heritage, *"not only biodiversity and geodiversity of living things and materials but also the result of the interaction between biological heritage, geological heritage and the action of man, the latter being another agent geo-morphological landscape and therefore the environmental heritage "*(Fig. 3)

The environmental heritage is here understood not only as the mere addition of elements or variables, natural or human, but the enhancement is by a culture and society of a set of environmental elements through which feel represented and identified these environmental elements with a range of codes and symbols that are understood in a particular social or cultural group, not having to be shared by other groups in this regard have identity value for a particular human group.

2.4 From environmental heritage to the Comprehensive Environmental Education

Since our conception systematic and holistic comprehensive heritage and the environment share a common conceptual basis. However, there are nuances and for us to work from a CHP involves working with heritage elements that have a symbolic-identity value. This *symbolic-identity* value emerges when establishing connections with different attributes (connections with different areas, disciplines, geographical environments, with different content-knowledge, attitude and skills, and different types of assets) where heritage are working on a "three dimensional" object or content, use and purpose, this symbolic-identity gives the heritage significance to the individual, to create a bond of ownership, proximity to a company or person, legacy and hence of value. In this sense, from our perspective, the teaching of heritage is not an end in itself, but must be integrated in the educational process (Wilson, 2007), within the large targets for formal education, for their relevance to the development of environmental education, scientific literacy and citizenship education (Estepa, Wamba and Jimenez, 2005)
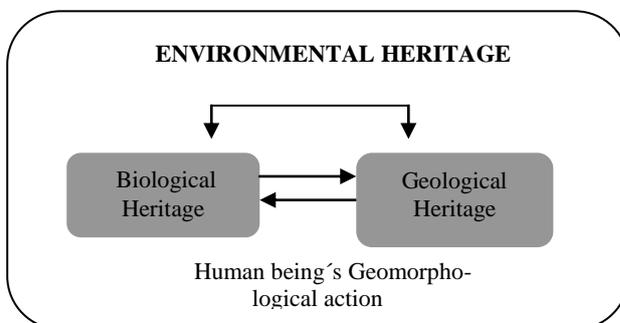

Figure 3: The environmental heritage like environmental system.

Therefore teaching from a CHP from heritage elements promotes a deeper and more meaningful learning by giving an identity value of belonging and therefore the need to conserve and preserve the legacy and consider it as a proper element of a cultural society or collective. In this sense, if we work from a CHP environmental education from environmental elements heritage building relationships with its environment, culture, different areas etc, we will speak of a *comprehensive environmental education* (Fig. 4) where the environment is given a new symbolic value-identity that encourages critical attitudes towards the environment and sustainable considering it as a heritage / possession, the result of the dialectic of human beings in their environment. So we can talk then, social and cultural systems that create and maintain the environmental heritage in balance with its lifestyles, promoting the survival of first and final address to Sustainable Development.

2.5 How we have analyzed the environmental heritage in textbooks?

The books selected were of secondary school of the subjects of Natural Science (1 and 2 of the ESO), Biology, Geology and Physics-Chemistry (3 ° and 4 ° ESO) and the Social Sciences: Geography and History (from 1 ° to 4 ° ESO). Furthermore, different publishers of different regions have been used as well. Before analyzing these books, has been selected for the pilot study Edelvives publisher, in order to validate the tools for collecting and analyzing information.
Content analysis is performed using a checklist according to a system of categories, with three categories and eight sub-categories (variables) which in turn would be used to analyse the information.This instrument was designed for a previous project (*Heritage teaching and dissemination in schools and visitor centres*). This project recognises three levels of development i n participants thinking about conceptual and educational aspects of heritage. These follow a hypothesis of development from reductive to complex in respect of interpretative capability and/or systematisation regarding its components, recognising increasing degrees of complexity and depth in the treatment of heritage education. To construct the gradient we considered the different levels of teachers' and administrators' reflection regarding professional development.
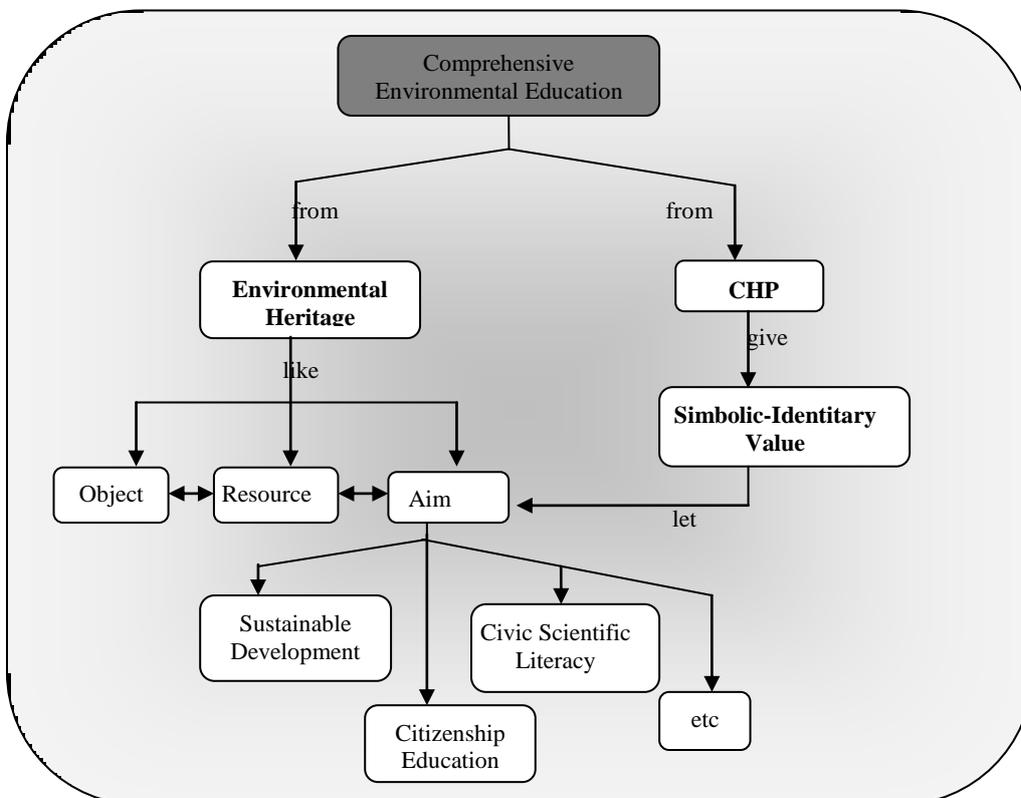

Figure 4: The integrated environmental education from a CHP.

The initial level of the gradient, which we have called 'reductionist', was defined by simpler, m ore static and a critical conceptualisations of heritage and its teaching- learning, whilst the intermediate ('applied') and ultimate ('integrated) levels were characterised by conceptualisations of an increasingly investigative, complex, critical and constructivist nature, and we reconsiered more desirable in that they superseded the limitations of previous levels (Cuenca, 2003).

- Category I: *Concepts and typology of heritage*, this category comprises two variables Perspectives on heritage and Heritage types.
- Category II: *Model of heritage teaching*, this category comprises four variables: Role of heritage in Educational programmes, role of providers and beneficiaries in heritage education, integration of contents and aims of heritage education and dissemination (academicist, Practical-conservationist or Critical).
- Category III: *Heritage and identity*, this category comprises two variables; Identity scales and Heritage typology and identity. So this category is highly relevant, since not all patrimonial elements compiled into textbooks have this symbolic-identity value that appears to the number of established relationships / connections between heritage and the different items and subitems of the above categories.

However not only this allows us to find that checklist didactic treatment accorded heritage textbooks or what is the same as promoting heritage perspective, but there are other parameters or indicators such as the *formal aspects* of the textbooks and the *frequency* or the number of times they appear such assets. Likewise, it is necessary to take into account the structure of textbooks (formal aspects) Such as, the use of images, amount and type, content, sections and supplements expansion, etc, which depend on each publisher and influence the treatment heritage is, the value we attach to it. Specifically in relation to *where* it appears the heritage, must be taken into account if these heritage elements are in, the presentation, development, and final extension and accessories, and if they appear in these sections that make up the textbooks or only some of them.

3. SOME RESULTS

Based on the categories that make up the checklist we present the following outstanding results of the analysis of SSCC books and SSNN:

- *Category I:* we note that the given heritage vision is monumental, exceptional and undisciplinary, which suggests that patrimonial elements that appear in textbooks are valued only by attributes of stylistic beauty, rareness, singularity and from other attributes more complex and rich as can be from its richness or diversity or social importance. However, there are differences in the treatment of environmental aspects for SSNN economic and social sciences, as these items such as spaces, species and landscapes tend to be valued on the books of SSNN for its rich biodiversity and supporting the idea of system, while SSCC books dominated by a static idea of such items valued for their beauty and monumentality and associated with an undifferentiated view of the environment and without interaction. In addition, these environmental elements are valued as equity partners mainly in the areas of Geography for SSCC and issues related to Biology and Geology for SSNN, so that neither the subjects of physics and chemistry and history working with elements environmental heritage.
- *Category II:* we see that these environmental heritage elements are worked by both disciplines as a teaching resource, with the mainstream. Sometimes they are treated by a simple educational level, that is anecdotally, compared to other more comprehensive level, suggesting that assess environmental heritage items from an educational perspective richer and more complex. In this sense, environmental heritage elements are usually treated academic associated with knowledge content, but point the difference between the two areas (SSCC and SSNN) SSNN we note that, from a practical-conservationist, will also treat jointly with other attitudinal content, valuing the importance of conservation and importance to humans and the environment. This relationship appears conceptual content-collection mainly attitudinal: activities they want to find a critical attitude, in topics related

to environmental conservation, or when content is linked to cultural and ethnological themes, close to the students by motivation or geographic proximity. By contrast, in the order book is academicians SSCC, transmitter only of information, which supports a vision of heritage anecdotal and of little educational value.

- *Category III:* both disciplines coincide in relationship heritage and identity that give textbooks to the elements heritage, for the establishment of links between environmental heritage elements of a society, a culture or identity is not common. Also, when this happens is social, is related to ethnological or historical aspects of art. On the other hand, the environmental heritage elements that are compiled by the books from this perspective symbolic identity are those heritage elements globally recognized, ie, those figures have legal protection as a World Heritage Site, Biosphere Reserve, etc. with excellent reputations or mediatic load. Also, these elements are not related to heritage references nearby, moving from the global to local scale without establishing links or similar exemplifications in the nearby environment (local, regional, etc).

Eventually if we consider the formal features or the structure of textbooks, we can observe that these heritage elements usually appear mainly in the expansion and complements sections engaged in environmental education and to a lesser extent in the development of units or activities. Furthermore, this heritage seems to identify with images (drawings, photographs real or mixed) of landscapes, spaces and species and scarcely seems as content collected in the books. Likewise it is noted that these books contextualized in the regions such as Andalusia, the highest number of heritage elements in the three categories analyzed (concept, communication and identity) in the specific sections of the book dedicated to andalusian context.

4. CONCLUSIONS AND QUESTIONS FOR DEBATE

In view of the results and from a CHP which we have defined, we can summarize this study in the following information.

We note that regardless of discipline or area (SSNN or CCSS) there is not much difference with how they deal environmental heritage elements, only at certain times it seems that from the SSNN gives a higher value on environmental heritage elements and therefore approaches a CHP when establishes connections with its environment (shown in context to an autonomous community) and connections between content giving a more holistic view of heritage and even sometimes reaches a symbolic vision-identity. So we can infer that the geographic proximity and territorial context in textbooks, is crucial because it favors the establishment of identity symbolic relationships with environmental elements or what is the same as the textbook omitted the geographical references heritage environmental elements, these have a processing the poorest in the categories analyzed and away from the CHP. This support our holistic view of heritage as a system and its relationship to the concept of environment as the heritage is articulated by different systems and relationships as well as the environment and so also is reflected in the textbooks, where the heritage works as a system and has a symbolic-identity value when appears in content related to the environment in the books of SSNN.

The system of categories and parameters as the formal aspects and context, indicate that the environmental heritage is worked in a predominantly academic valuing such space, species, landscapes etc, for their beauty or grandeur, being commonly recognized worldwide environmental elements, legislated or mediatic loaded. Besides this heritage often worked as an object but also as a resource primarily associated with knowledge content. This lack of connections between areas, unidisciplinary heritage vision, etc., indicates that from the point of view of the teaching and learning is working on a surface learning. This view of heritage leads us to infer that from the environmental education deals not only to promote values or critical attitudes toward the environment, but content associated with nature, human beings without making interactions between the environment, so turn these textbooks work with a conception of undifferentiated environment (environment as a set of disparate elements) and simplistic. This perspective is supported when we look at heritage that these environmental heritage elements are not

worked transversely throughout the book but in timely manner with some units and they are usually at the end of the unit to expand or add sections.

By contrast, we note that the book does not usually work from a CHP, since the category III (where the heritage has symbolic value, identity) is not usually collected by virtually no environmental heritage element appears in a timely manner and any related monumental vision of heritage. This leads us to infer from education that fosters a deeper learning process could be achieved through the CHP that provides connection and significance to the content and promoting sustainable critical attitudes toward the environment.

Finally conclude that it seems that the textbooks do not treat from a CHP which promote comprehensive environmental education, so the environmental heritage is not valued as an inheritance or bequest which implies from the teaching and learning that these knowledges are less significant value for students, this hinder promoting critical and sustainable attitudes for the environment. As a result of these findings we can design activities and propose actions teachers working from a CHP from environmental heritage elements by establishing connections and relationships between different attributes such as content, areas and disciplines, hence from a context interdisciplinary perspective, systemic and holistic of the heritage.

ENDNOTES

[1] These acronyms mean; innovation, develop and research.
[2] The European Landscape Convention (ELC) has been ratified by Spain on March 1, 2008.

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