ENVIRONMENTAL EDUCATION IN PORTUGUESE SCHOOL PROGRAMMES AND TEXTBOOKS IN TWO PERIODS: 1991-2000 AND 2001–2006.

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ABSTRAT

Environmental education (EE) is seen as a key instrument contributing for changing values, mentality and attitudes. This study intends to examine how EE addresses environmental education in the Portuguese school programmes in two periods, Time I: 1991/1992 – 1999/2000 and Time II: 2000/2001 – 2005/2006. We used the grids of analysis constructed within the BIOHEAD-CITIZEN project (CIT2-2004-506015). The analysis covered the national programmes and textbooks since the 1st grade (5/6 years-old pupils) up to the 12th grade (17/18 years-old pupils) by looking at the four pre-selected sub-topics: *Pollution, Use of Resources, Ecosystems and Biodiversity and Cycles*. Biodiversity is the sub-topic that had little presence in Time I but is nowadays (Time II) more present all along the school levels. In earlier years (1CBE) the textbooks follow the national programme very tightly. Major differences between the national programmes and the textbooks examined were found in the Secondary school (10th, 11th and 12th grade).

1.   Introduction

The concept of Environmental Education (EE) has had a remarkable evolution in meaning over time. In the beginning the concept of Environmental Education assumed a naturalist concept whereas currently it means a balance between the natural and man, with a view of building a future of sustainable development. Thus, environmental education should be seen as a key instrument contributing for changing values, mentality and attitudes to create a deep and abiding awareness in society of the problems associated with environmental issues (Morgado *et al*., 2000). According to Raposo (referre by Palma, 1997), In Portugal, only in 1986, with the entry into force of the Law of the Education System (Law nº46/86), were established school programmes for the implementation of environmental education in schools. Since then, some environmental education practices and consequent development of school projects were implemented: the School Area (allowed to carry out school overall projects), the Complementary Activities (gave the possibility to create clubs where pupils could experience the development of cross-curricular activities) and the discipline of Personal and Social Development.

The Law nº46/86 states that students' literacy skills must be analysed at the end of Basic Education (2001) and it focuses on the knowledge, reasoning, communication and attitudes. For the development of these skills science teaching was organized in the three cycles of basic education (Law nº46/86), around four organizing themes: (*i*) *Earth in space*, (*ii*) *Land in transformation*, (*iii*) *Sustainability on Earth* and (*iv*) *Live better on earth.* From these four themes, it is *Sustainability on Earth* and *Live better on earth* those that skills on environmental education in formal education are better expressed. Although the Portuguese school programmes address the skills development for the Environmental Education (EE), its implementation often collides with the dominant traditional curriculum. Some authors Stevenson (1987), Robottom (1987) and Bowers (2001) (referred in Adams, 2007:22) have described several reasons for the schools difficulties in developing pupils' skills towards the environment:

- *EE is supposed to be a holistic and cooperative learning, while school curricula tend to be atomistic;*

- *EE emphasizes the analysis of real problems, whereas traditional curricula emphasizes the abstract problems and pre-determined issues;*

- *EE aims at mobilizing knowledge for immediate implementation, which contrasts with the idea of knowledge for future use implicit in traditional curriculum;*

- *EE involves working methods and develop skills that require time, which makes it difficult to reconcile with the need for rapid acquisition of knowledge standard to be tested;*

- EE tend to conduct activities outside school, which is difficult to reconcile with the regular and financial constraints of schools as well as traditional teaching;

- EE proposes a model of school open to the community, creating partnerships, which is often discarded by the traditional school;

- EE seeks to alter the dominant values in society, while the purpose of schools is to maintain the existing social order.

These issues raise the problem regarding the implementation of EE in the curricula of schools not only in Portugal, but also in other countries, although the schools try to overcome these and other difficulties they face. The aim of the present study is to examine how EE addresses environmental education in the school programmes and textbooks in two different periods, **Time I**: 1991/1992 – 1999/2000 and **Time II:** 2000/2001 – 2005/2006, separated by a national program reform occurred in 2000/2001.

2. Methodology

This study took place under the research Project European BIOHEAD-CITIZEN (*STREP, priority 7 of FP6: Knowledge-based Economy and Society, CIT2-2004-506015)* entitled *"Biology, Health and Environmental Education for better Citizenship"* attended by the following 18 countries: five from the "old" EU (Portugal, France, Germany, Italy, Finland), who recently joined seven (Cyprus, Estonia, Hungary, Lithuania, Malta, Poland and Romania) and six countries of the International co-operation (INCO) (Lebanon, Tunisia, Algeria, Morocco, Mozambique and Senegal). In the case of this investigation we focus on the results of the analysis of Portuguese textbooks which was performed by content analysis, through the use of grid constructed within the BIOHEAD-CITIZEN project. The initial grids were tested earlier in the participating countries, thereby verifying the difficulties that entailed. After application and further discussion, these grids were modified to create an improved grid, which was tested in at least one of the manuals for each level of education. The final EE grid was divided into four sub-topics, allowing carrying out extensive analysis (Caravita *et al*, 2007). These four topics are *Pollution, Use of Resources, Ecosystems and Cycles, and Biodiversity.* Each grid has two main parts:

Part A is a cross-grid, similar to all BIOHEAD-CITIZEN grids of textbook analysis, covering the general characteristics of the textbooks;

Part B encompasses the four axes of analysis – "linear *vs.* Complex", "global *vs.* local", "individual responsibility *vs.* social responsibility", "humans as owners *vs.* human as guests" - which are specific for each sub-topics discussed.

Initially, this study focused on the content of school national programs to identify which school years treat the sub-topics of Environmental Education in both primary and secondary levels (5/6 years-old pupils up to 17/18 years-old pupils). The four sub-topics of EE were identified in each school level. They could be found in several disciplines such as Environmental Studies, Natural Sciences, Biology and Geography. For the selection of textbooks to be analysed, the Project-CITIZEN BIOHEAD had stipulated that in countries where there is no single book, as in Portugal, the choice of textbooks should comply with the criterion of "most used" in each school year in which each the sub-topic is taught. For this, the list with the books more used in the years 1991/2000 and 2000/2006 was asked to the Ministry of Education. Apart from the textbooks during the ongoing development of this study (2003/2006) we also looked for previous textbooks to have an historical approach. Since there was a curriculum change in 2001, we divide the historical analysis in two phases: **Time I**: 1991/1992 - 1999/2000 and **Time II**: 2000/2001 - 2005/2006.

Table 2.1: Portuguese textbooks analyzed in the Time I (1991/1992 - 1999/2000).

Environmental Education						
School year	Students year	Discipline	Editors	Textbook	Author	Year
1º	6/7	Environment Studies	Porto Editora	Bambi 1	Pinto, A. M. & Carneiro, A.	1995
2º	7/8	Environment Studies	Porto Editora	Bambi 2	Pinto, A. M. & Carneiro, A.	1997

3º	8/9	Environment Studies	Porto Editora	O Bambi 3	Pinto, A. & Carneiro, M.	1996
4º	9/10	Environment Studies	Porto Editora	Pequenos Curiosos	Marques, C. & Timóteo, N.	1999
5º	10/11	Natural Sciences	Porto Editora	Bioterra	Motta, M., Viana, M.A. & Isaías, E.	1996
6º	11/12	Natural Sciences	Porto Editora	Vida Mágica	Peralta, C.R. & Calhau, M.B.	1996
7º	12/13	Natural Sciences	Porto Editora	Planeta Vivo – Ciências Naturais	Silva, A.D., Gramaxo, F., Mesquita, J., Santos, M.E. & Cruz, O.	1996
7º	12/13	Geography	Lisboa Editora	A Europa	Lemos, E.S., Pedrão, M.A. & Pinheiro, M.C.	1995
9º	14/15	Geography	Areal Editores	O Mundo em Contraste	Ribeiro, I.J., Costa, M. & Carrapa, M.E.	1997
10º	15/16	Earth and life Sciences	Porto Editora	Terra, Universo de Vida	Silva, A., Gramaxo, F., Santos, M. & Mesquita, J.	1993
10/11º	16/17	Geography	Porto Editora	Geografia 10º Ano	Pimentel, M.A. & Almeida, C.R.	1996
12º	17/18	Biology	Porto Editora	Terra, Universo de Vida (Biologia) – 2ª parte	Silva, A.D., Gramaxo, F., Santos, M.E., Mesquita, A.F. & Baldaia, L.	1996
12º	17/18	Geography	Lisboa Editora	Introdução ao Desenvolvimento Económico e Social	Lemos, E.S., Gonçalves, F., Costa, I.A., Silvestre, M.M. Moinhos, M.R.	1995

Table 2.2: Portuguese textbooks analyzed in Time II (2000/2001 - 2005/2006).

Environmental Education						
School year	Students age	Discipline	Editors	Textbooks	Author	Year
1º	6/7	Environment Studies	Porto Editora	Eu e o Bambi	Pinto, A. M. & Carneiro, A.	2003
2º	7/8	Environment Studies	Porto Editora	Eu e o Bambi	Pinto, A. M. & Carneiro, A.	2005
3º	8/9	Environment Studies	Porto Editora	Bambi 3	Pinto, A. & Carneiro, M.	2003
4º	9/19	Environment Studies	Gailivro	Estudo do Meio do João	Monteiro, J. & Paiva, M.	2004
5º	10/11	Natural Sciences	Porto Editora	Magia da Terra	Peralta, C., Calhau, M. & Sousa, M.	2004
7º	12/13	Geography	Texto Editores	Novas Viagens: Actividades Económicas	Rodrigues, A.	2005
8º	13/14	Natural Sciences	Porto Editora	Bioterra: Sustentabilidade na Terra	Motta, L. & Viana, M.	2005
9º	14/15	Geography	Texto Editores	Novas Viagens: Ambiente e Sociedade	Rodrigues, A.	2003
10º	15/16	Biology	Porto Editora	Terra, Universo de Vida – 2ª Parte	Silva, A., Gramaxo, F., Santos, M. & Mesquita, A.	2004
10/11º	16/17	Geography	Texto Editores	Geografia A	Rodrigues, A. & Barata, I.	2003
12º	17/18	Biology	Porto Editora	Terra, Universo de Vida	Silva, A., Gramaxo, F., Santos, M., Mesquita, A., Baldaia, L. & Félix, J.	2005

3. Results

The analysis of documents related to the national programmes of basic and secondary education showed that Environmental Education (EE) runs through the Portuguese education system, since the 1st grade (5/6 years-old pupils) throughout the 12th grade (17/18 years-old pupils). The Educational system is divided into the Basic Education and the Secondary School. The former is composed of three cycles: the 1st Cycle of Basic Education (1CBE), including the initial four grades; the 2nd Cycle of Basic Education (2CBE), including the 5th and 6th grades; and the 3rd Cycle of Basic Education (3CBE), including the 7th, 8th and 9th grades. The Secondary School (SS) has three grades: 10th, 11th and 12th grade.

3.1 Distribution of the four topics in the programs of the Elementary and Secondary Education

In a first approach we examine, in the school program of the Ministry of Education in which years of schooling are considered, four pre-selected sub-topics: *Pollution, Use of Resources, Ecosystems and Biodiversity and Cycles.* This was performed taking into account the two-period study, Time I (1991/1992 - 1999/2000) and Time II (2000/2001 - 2005/2006) as shown in Table 3.1.

Table 3.1: Addressing the four sub-topics in the programs of basic and secondary education at Time I (1991-2000) and Time II (2000-2006).

A: Relation between the sub-topic ***POLLUTION*** and years of schooling, at Time I and II.											
Time	**1ºCEB**				**2CEB**		**3CEB**			**Secondary School**		
	1º	**2º**	**3º**	**4º**	**5º**	**6º**	**7º**	**8º**	**9º**	**10º**	**10º/11º**	**12º**
T. I			X	X	X	X	X (G; S)		X (G)		X (G)	X (C;DES)
T.II			X	X	X		X (G)	X	X (G)	X	X (G)	X
B: Relation between the sub-topic ***USE OF RESOURCES*** and years of schooling at Time I and II												
T. I							X (S)		X (G)		X (G)	X (C;DES)
T.II			X				X (G)	X	X (G)	X	X (G)	
C: Relation between the sub-topic ***ECOSSYSTEMS AND CYCLES*** and years of schooling at Time I and II												
T. I			X		X		X			X		X
T.II			X		X			X		X		
D: Relation between the sub-topic ***BIODIVERSITY*** and years of schooling at Time I and II.												
T. I	X	X	X									X
T.II	X	X	X					X	X	X		X

Note: S= Science; **G**= Geography; **ESD**= Introduction to the Economic and Social Development

Table 3.1 shows that the sub-topic most frequently mentioned in both times is the *Pollution*, followed by the *Use of Resources*, *Ecosystems and Cycles*, and eventually emerges *Biodiversity*. At the level of the **1CBE** (primary school), *Pollution* appears in textbooks of the 3rd and 4th years for both Time (I and II). The sub-topic *Use of Resources* is not present in any textbook of the primary school of Time I (T.I) but it appears in textbook of the 3rd year in Time II (T.II). *Ecosystems and cycles* only appears in the 3rd year (in both T.I and T.II), and *Biodiversity* in the first three years of schooling (T.I and T.II), as shown in Table 3.1 (A, B, C and D). In **2CBE**, only appear two sub-topics: *Pollution* and *Ecosystems and Cycles* appear in the textbooks. At the 6th grade *Pollution* is the only sub-topic that appears in textbooks from Time I, as it is shown in table 3.1 (A, B, C e D). In **3CBE**, *Pollution* and *Use of Resources* are the sub-topics that appear in the three years of this Cycle of studies, except in the 8th grade of Time I where none of the topics appear (Table 3.1-C). The sub-topic *Ecosystems and cycles* only appears in textbooks of 7th grade (T. I) and 8th grade (T. II). Finally, *Biodiversity* is not present in any year of schooling in Time I, however it appears in the 8th and 9th grade of Time II. In the **Secondary School** all the sub-topics appear in the textbooks analyzed. *Pollution* appear in the textbooks of all the grades except in the 10th grade of Time I (Table 3.1-A). The *Use of Resources* does not appear in the textbooks of grade 10th of Time I, or in the 12th grade, Time II (Table 3.1-B). However, *Ecosystems and Cycles* and *Biodiversity* are absent in the textbooks of 10/11th grade (Table 3.1-C e D). At 12th grade, at Time II, the discipline called Geography, was called Introduction to the Economic and Social Development - ESD, in Time I (1991/1992 - 1999/2000). In the Geography textbooks the sub-topics referred are only *Pollution* and *Use of Resources*, which are present in 3CBE and Secondary School in both Time I and Time II.

3.2 Analysis of the school programmes and textbooks of Basic Education and Secondary School

1st Cycle of Basic Education (1CBE)

Confronting the school programmes with the analysed textbooks, we found that, in general, there is conformity between what appears in the current programme of primary education (1CBE) and what appears in the current corresponding textbooks. Comparing the Time I (1991-2000) with Time II (2000-2006) we found that both sub-topics *Pollution* and *Ecosystems and Cycles* appear in both periods, at 3th and 4th grade. However, the sub-topics and *Biodiversity* and *Use of Resources* only arises in Time II (Table 3.1-B and -D), indicating the intention now (Time II) of treating these topics earlier in the education system than before (Time I).

2nd Cycle of Basic Education (2CBE)

The analysis of national programmes of 2CBE showed that the programmes of the 5th grade (Time I) refer the three sub-topics: *Pollution*, *Ecosystems and cycle,* and *Use of Resources*. However, the *Use of Resources* does not appear in the analysed textbooks, showing a discrepancy in relation to the national program. In contrast, *Pollution* as well as *Ecosystems and Cycles* appear in the textbooks in a tight association to what is prescribed in the national programmes.

3rd Cycle of Basic Education (3CBE)

Some discrepancy was found between the national programmes and the textbooks for the 3CBE of studies (7th, 8th and 9th grade) in Time I. This discrepancy was detected at the 7th grade, where there was no reference to the *Biodiversity* sub-topic in the textbook, but it is referred in the programme for this school level. Today (Time II) the syllabus of the 8th grade, deals with environmental issues only, therefore the entire textbook is dedicated to the four sub-topics mentioned above (Table 3.1).

Secondary School (SS)

Major differences between the national programmes and the examined textbooks were found in the SS, particularly in Time I (1991-2000): *(i)* Although the 12th grade programme does not refer *Pollution*, it appears in the analysed textbook; *(ii)* in the 12th grade Science textbook the two sub-topics *Biodiversity* and *Use of Resources* appear but they are not mentioned in the programme; and *(iii)* the 10th grade Geography textbook refers *Pollution* but it is not mentioned in the programme. For the Time II there is agreement between the syllabus and the analysed textbooks. The four sub-topics are treated in the secondary school textbooks (Table 3.1).

4. Discussion/Conclusion

Environmental education should be mainly driven by and for the promotion of values, the environmental ethics. Should have an inter-and transdisciplinary approach to promote critical thinking and developing skills that allow teachers to decision making in order to have an equilibrium with the environment in which the individual falls is. In Portugal, it was only in post-revolutionary period of 1974 that EE was introduced in the curriculum of the 1st cycle of basic education, the area of Physical and Social Environment with the aim of encouraging the development of responsible attitudes to create respect for life and for the conservation, protection and improvement of the environment (Teixeira, 2003). Our study shows that EE is currently addressed throughout schooling, from the 1st year up to the 12th years, over the areas of Physical and Social Environment (1CBE), Natural Sciences (2CBE), Natural Sciences (3CBE), Biology and Geography (SS). This study also showed that the national programme makes the external didactic transposition (Clément, 2006) along the Time I and Time II periods. Thus, through the efforts of the National Environmental Commission and the publication of the Law of the Education System in 1986, EE was recognized to be a school matter with the new goals of training students at all levels of education. The national guidelines and teachers' training have been better assured, and the institutionalization of the 'School Area' and 'Complementary Activities', became spaces for opportunity used by teachers to implement EE in actual living experiences of school communities (Teixeira, 2003). We may say that we went from a preoccupation with the natural systems for a work focused, for example, to food security, urban quality, climate change, desertification, green consumption, biodiversity and environmental ethics (Teixeira, 2003). These situations are reflected in the syllabus studied and textbooks for the periods 1991-2000 (T.I) and 2000-2006 (T.II) where, as we found in this study, it gives a greater emphasis on *Pollution*, followed by the *Use of Resources*, *Ecosystems and Cycles* and finally *Biodiversity*. We noted also that the topic of *Biodiversity* is addressed in most textbooks of T.II. In fact, the 2000/2001 reform met the growing concern for biodiversity conservation of our planet, thereby helping to pay attention to resource use and sustainable development, which Teixeira (2003:66) expressed as follows: *"... everyone should take responsibility for their impact on natural systems, not affecting the biodiversity or ecological processes or over-exploiting renewable resources."* An in interesting aspect when analyzing the subject of EE in all the textbooks in our study is that there is an over-identification between EE and the Natural Sciences or between EE and Ecology which is in agreement with those found by Almeida (2007) in their studies. Dias (1998) in turn, argues that we should distinguish between EE and Ecology, considering that the latter was initiated at an earlier stage, when there was an overlap between EE and nature conservation, an idea that Dias (1998:23) considers passed out, stating that: *"[However] the textbooks continue torturing the teachers and students with the tedious and inefficient approach to the biological sciences related to Ecology."* In this sense, the EE cannot be limited to addressing the content of Sciences, or ecological knowledge it is needed to improve the knowledge of Economics,

Sociology and Psychology to help us understand the causes of the environmental crisis, as well as to develop individuals' and companies' attitudes and behaviours (Almeida, 2007). The school curriculum does not simply make a selection from available content in a particular historical period, should also make them actually transmitted, so converting them into subject teaching. In addition to textbooks and other educational resources, it should be emphasized the importance of teachers' work in the classroom, making the process of internal didactic transposition (Gazzinelli, 2002). One aspect that has marked the Portuguese education system is the several curriculum changes that have occurred over the years. The latter curriculum revision led to the establishment of three new curricular areas - *project area*, *study skills* and *civic education.* The reorganization of the curriculum in the 1st Cycle of Basic Education focused on skills known as "knowledge in action" and was intended (DEB, 2001:15): *"to build an identity and awareness of personal and social participation free, responsible, critical solidarity and civic life, respect and appreciation of diversity of individual and group (...), construction of an ecological awareness which leads to the appreciation and preservation of natural and cultural heritage, the enhancement of relational dimensions and ethical principles that govern the relationship with others. "* Environmental education is seen as cutting across all disciplines and with the globalizing features of the entire school, as advocated by Menezes (2003:146): *"the effectiveness of an environmental education project depends on the involvement of the whole school as an area where acquisitions in terms of knowledge, attitudes and skills can be put into practice, contextualized and reinforced by all players in the educational process.* This curriculum reorganization, which occurred in 2001 and 2002, assumes a more active role of the student in the classroom and a different teaching way, where the teacher acts as a facilitator of learning and not only as a transmitter of knowledge (Freire, 2005). One of the inconsistencies that we found in our study was the discrepancy between what is advocated in the program and what is stated in textbooks analyzed in some disciplines, with respect to the Time I (1991-2000), but not at Time II (2000-2006). It is important that textbooks meet the goals and objectives, but with no need of being restricted to the national programmes. Rather, the way they are and develop the content and activities, the textbook provides the acquisition of basic knowledge and skills, exceeding the programmes. They are also important means of strengthening, deepening and integration of several acquisitions as well as pupils' personal development, social and cultural development (Bárrios *et al.*, 2000). Textbooks are still the dominant teaching tool in the classroom, and teachers are usually very dependent on them (Duarte, 1999). Indeed, textbooks, as the main reference in the classroom, represent the current curriculum since they determine the selection and sequence of topics to be taught and help teachers to implement the several subjects.

5. References

Almeida, A. (2007). Que papel para as Ciências da Natureza em Educação Ambiental? Discussão de ideias a partir de resultados de uma investigação. *Revista Electrónica de Enseñanza de las Ciências*, Vol. 6, Nº 3, pp. 522-537.

Caravita, S., Valente, A., Luzi, D., Pace, P., Khali, I., Youssef, R., Valanides, N., Nisiforou, O., Berthou, G., Kozan-Naumescu, A., Clément, P. & Sarapu, T. (2007). Construction and validation of textbook analysis grids for ecology and environmental education. In Proceedings of IOSTE Conference "*Critical analysis of school sciences textbooks*", Tunisia, 7-10 Fevereiro.

Clément P. (2006). Didactic Transposition and KVP Model: Conceptions as Interactions Between Scientific knowledge, Values and Social Practices, ESERA *Summer School*. IEC Univ. Of Minho, Braga (Portugal), pp. 9-18.

Decreto-lei 47/2006, de 28 de Agosto – Define o regime de avaliação, certificação e adopção de manuais escolares do Ensino Básico e Secundário.

Dias, G.F. (1998). *Educação ambiental. Princípios e práticas*. (5ª Edição). São Paulo: Editora Gaia.

Duarte, M.C. (1999). Investigação em ensino das ciências: influências ao nível dos manuais escolares. *Revista Portuguesa de Educação*, 12(2), pp. 227-248.

Freire, A.M. (2005). Educação para a sustentabilidade: implicações para o currículo escolar e para a formação de professores. Texto apresentado no *III EPEA*, Ribeirão Preto, Brasil.

Gazzinelli, M.F. (2002). Representações o professor e implementação de currículo de educação ambiental. *Cadernos de pesquisa*, nº 115, pp. 173-194.

Menezes, I. (2003). Ambiente e transversalização curricular : potencialidades e limites da educação ambiental na escola. In: *Educação, Sociedade & Culturas*, Educação e Ambiente, Temas Transversais. CIIE.

Ministério da Educação (2001). *Currículo Nacional do ensino básico -Competências essenciais.* Lisboa: Direcção Geral do Ensino Básico e Secundário.

Morgado, F., Pinho, R., Leão, F. (2000). *Educação Ambiental. Para um ensino interdisciplinar e experimental da Educação Ambiental*. Plátano Edições Técnicas.

Palma, I. (2005). *Educação Ambiental: a Formal e não Formal. Contributos dos Centros de Recursos de Ambiental para a Formação das Crianças do 1º Ciclo do ensino Básico.* Tese de Mestrado em Estudos da Criança. Braga: Universidade do Minho.

Teixeira, F.(2003). *Educação Ambiental em Portugal – Etapas, Protagonistas e Referências Básicas*. LPN – Liga para a Protecção da Natureza.