

Analysis of Pollution and the Use of Resources topics along the school textbooks of 17 countries

Cláudia FERREIRA⁽¹⁾, Rosa Branca TRACANA.^(1,2), Maria Eduarda FERREIRA^(1,2) & Graça S. CARVALHO⁽¹⁾

1. LIBEC/CIFPEC, IEC, Universidade do Minho, Portugal

2. Escola Superior de Educação da Guarda, Portugal

bioclaudif@yahoo.com // rtracana@ipg.pt // eroque@ipg.pt // graca@iec.uminho.pt

Synopsis

1. Biological topic: This work concerns the topic of “Environmental Education and Biology Education.

2. Theoretical background and key objectives

The contemporary society lives a crisis related with several problems where we can highlighted the *pollution* problems and the resources over exploration, as the Brundtland Report refers “... *the sustainable development answer to the present needs without compromising the possibility of the next generations...*” (McKeown *et al*, 2002). Environmental Education has been seen as a basic tool to contribute to the change of values, attitudes and behaviours. The interactions between scientific knowledge (K), values (V) and social practices (P) (model KVP by Clément, 2006) is important in the didactic transposition and a useful tool to understand what is related to science and to values in a scientific presentation such as in textbooks.

In this work it was intended to analyse the didactical transposition in Environmental Education and Sustainable Development. More specifically, our key objectives can be formulated in the following research question: How are *pollution* and the *use of resources* topics addressed in textbooks of 17 countries, especially concerning the conceptions “*Individual vs social responsibility*”, “*Humans as owners of nature vs humans as guests*” and “*Humans and nature*”?

2. Research design and methodology

This study was developed within the European FP6 STREP project “Biohead-Citizen” (CIT2-CT-2004-506015). Analysis of current textbooks was carried out in each of the 17 countries by using a grid of analysis constructed within the Biohead-Citizen project on the topic Environmental Education and Sustainable Development. This topic is divided in four sub-topics – Pollution, Use of resources, Ecosystems, and Biodiversity.

In the present work we analysed only two topics, *pollution* and the *use of resources*, by looking at the conceptions “*Individual vs social responsibility*”, “*Humans as owners of nature vs humans as guests*” and “*Humans and nature*”. We focus in Portuguese textbooks, give particular emphasis to the comparison with Mozambican textbooks (as

this country has strong Portuguese influence due to the long colonisation period), and also make a general comparison among the 17 countries.

4. Findings

In Portugal, Environmental Education and Sustainable Development is referred through out the primary and secondary schools. Portuguese textbooks analysis showed that, among the four analysed sub-topics, *pollution* and *use of resources* are the most frequent items, being *pollution* the only one present in all levels (Fig.1).

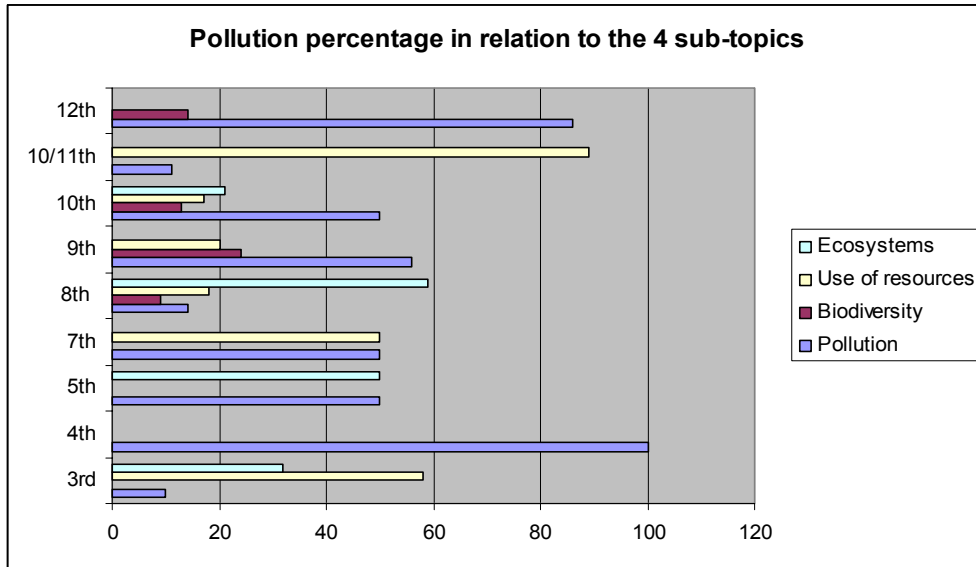


Fig.1: Proportion of the four sub-topics of Environmental Education and Sustainable Development in the Portuguese school system, from primary school (3rd grade) to the end of secondary school (12th grade).

Comparing the *use of resources* in Portugal and Mozambique primary schools textbooks (3th, 4th and 5th grades), we observed that biodiversity is present only in 4th grade of Mozambique (Fig.2). Ecosystems are present in 3th grade of Portugal, and 4th grade Mozambique, and in 5th grade of Portugal. *Pollution* is present in the three analysed Portugal textbooks but absent in Mozambique; the *use of resources* is present in the three analysed textbooks of Mozambique and only in the 3rd grade of Portuguese textbooks (Fig. 1 and Fig.2).

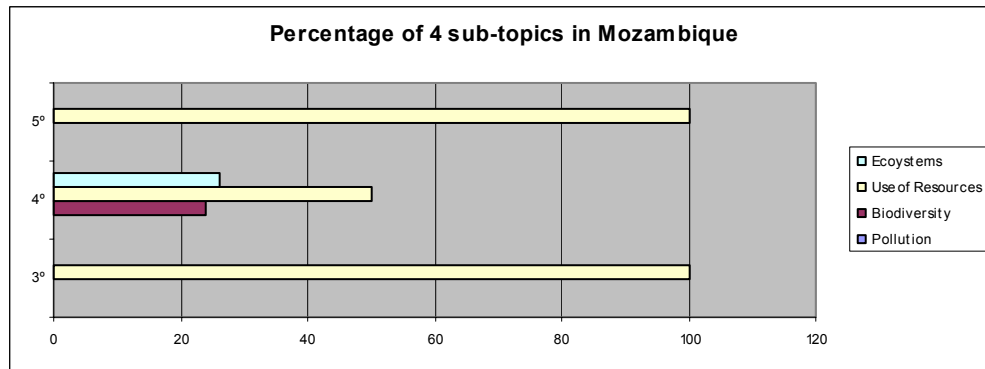


Fig.2: Proportion of the four sub-topics of Ecology and Environmental Education and sustainable development in the Mozambique school system

4.1. Individual responsibility vs social responsibility

The conception “*Individual responsibility vs social responsibility*” was analysed in *pollution* and *use of resources* topics, in textbooks of 17 countries.

Concerning the approaches to solve *pollution* problems, “changes in technologies” are more referred in textbooks rather than “changes in individual and social behaviour”, as it can be seen on Table 1. It also shows that the emphasis on technologies is consistently more present in western countries textbooks.

Table 1: Frequencies of four indicators within “Approaches to solve *pollution* problems” in textbooks of 16 countries.

Country	N Analysed textbooks	Changes in individual behaviour	Changes in social behaviour	Changes in interaction between individual and social behaviour	Changes in technologies	N° of occurrences by textbook			
						Changes in individual behaviour	Changes in social behaviour	Changes in interaction between individual and social behaviour	Changes in technologies
Portugal	10	15	18	5	75	1.5	1.8	0,5	7.5
Finland	1	2	1	1	7	2.0	1.0	1.0	7.0
Germany	3	3	2	3	13	1	0.7	1.0	4.3
Cyprus	2	1	1	2	7	0.5	0.5	1.0	3.5
Italy	9	3	9	3	21	0.3	1.0	0.3	2.3
Lebanon	22	26	11	5	47	1.2	0.5	0.2	2.1
Malta	2	0	0	0	4	0	0	0	2.0
Senegal	1	0	0	0	2	0	0	0	2.0
Estónia	2	3	2	1	3	1.5	1.0	0.5	1.5
Poland	1	1	1	1	1	1.0	1.0	1.0	1.0
Romania	1	1	0	0	1	1.0	0	0	1.0
France	11	5	10	6	9	0.5	0.9	0.5	0.8
Tunisia	4	3	2	2	2	0.8	0.5	0.5	0.5
Hungary	5	1	2	0	0	0.2	0.4	0	0
Morocco	3	2	0	0	0	0.7	0	0	0
Lithuania	2	0	0	0	0	0	0	0	0
Total	79	66	59	29	192	---	---	---	---
Average	---	---	---	---		0.8	0.7	0.4	2.4

In the textbooks of the different countries involved in the project, the socio-economic issues are consistently more present than the ethical ones (Table 2). Debates of socio-economic nature seem to work within dichotomies that do not challenge the logic of the *modus operandi* of the mainstream social and economic system. As an example, one can read in a Malta textbook: “*Claims that cars would not run so well on unleaded petrol, or that it would cause increased engine wear are not soundly based. It would be neither difficult nor expensive to provide alternatives to leaded petrol.*”

Such controversies, in their essence, do not challenge the expectations that the individual already has in face of himself and the society, nor challenge the more mainstream values.

The analysis of the *use of resources* in Portuguese textbooks showed that only 8th and 10th grades of Natural Sciences have references concerning *use of resources* “waste management”. Both Natural Sciences (8th and 10th grades) and Geography (10/11th grades) present “sustainability resources strategies” but none of them refer “food production sustainability”. These results show that there are no significant differences between Natural Science and Geography textbooks on the presentation of the topic of *use of resources*.

Like in the Portuguese analysed textbooks, in Mozambican ones there is some emphasis in individual responsibility concerning the “strategies to prevent the waste of resources”, but in Mozambique this concerns are extended to the *use of resources* sustainability.

The *use of resources* in textbooks of 13 countries since the first grade until the high school showed that there is a higher emphasis on individual behaviour changes than in social and political changes.

Table 2: Analysed textbooks in each country, and corresponding frequencies of the occurrences of socio-economic and ethical dimensions.

Country	Analysed Textbooks (n)	Socio-economic dimension frequency	Ethic dimension frequency	Occurrences by textbook (n)	
				Socio-economic dimension	Ethical dimension
Malta	2	6	2	3.0	1.0
Tunisia	4	9	4	2.3	1.0
Senegal	1	2	0	2.0	0
Germany	3	4	1	1.3	0.3
France	11	12	2	1.1	0.2
Estonia	2	2	2	1.0	1.0
Hungary	5	5	2	1.0	0.4
Italy	9	8	2	0.9	0.2
Portugal	10	5	1	0.5	0.1
Finland	1	0	2	0	2.0
Cyprus	2	0	0	0	0
Lebanon	22	0	0	0	0
Lithuania	2	0	0	0	0
Morocco	3	0	0	0	0
Poland	1	0	0	0	0
Romania	1	0	0	0	0
Total	79	53	18	---	---
Average	---	---	---	0.7	0.2

4.2. Humans as owners of nature vs humans as guests

In the conception “*Humans as owners of nature vs humans as guests*”, *pollution* in Portuguese textbooks of Biology and Geology is referred through examples of its

“impact on humankind” and “impact on ecosystems”. Analysing the *use of resources*, it was observed that the 8th Natural Sciences and the 10/11th Geography textbooks are the ones with more references to “resources availability”. Concerning “sustainability”, both 8th grade Natural Sciences and 7th grade Geography textbooks are the Portuguese textbooks presenting higher number of occurrences. “Equity” is present in 8th and 10th grades Natural Sciences and 7th grade Geography textbooks. So, we can conclude that there are some differences concerning “Humans as owners of nature vs humans as guests”, between natural sciences and geography textbooks.

Comparing the *use of resources* in Portuguese and Mozambican textbooks, the former (in 3rd grade) refer to finite/limited resources availability, economic availability and ecological availability (Fig.3) whereas the latter (4th grade) emphasise the economic, social, and ecological sustainability (Fig.4) but also mention (5th grade) limited resources availability.



Fig.3: Ecological Sustainability: forest protection. Textbook “Bambi 3”, 3rd grade, Natural sciences, Portugal. Ana Pinto e Maria Aurélia Carneiro (2004), Porto Editora



Fig.4: Ecological Sustainability: fire control Textbook “Natural sciences”, 4th grade, Natural sciences, Mozambique. Benilda Reis, Laura Loforte, Zita Baúque, Amélia da Conceição (1985), INDE Editora

4.3. Humans and nature

In Portuguese textbooks, “Humans and nature” images concerning *Pollution* give special attention to human activities and to the results of their action. Humans are represented as the centre of the environment, in an anthropocentric perspective. Concerning the images related to the *Use of resources* in the analysed textbooks of all countries, human activities are presented as a priority (like in *pollution*) whereas ecological, social or economic sustainability is not emphasized.

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