

Escola Superior de Educação, Comunicação e Desporto

Produção científica das docentes:

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Unidade Técnico Científica: Ciências Exactas e Experimentais

1.Participação, com comunicações ou posters, em Reuniões Científicas

1. Tracana, R.B., Laurent, C., Clément, P., Ferreira C., Ferreira, M.E. & Carvalho, G.S. (2008). “Analysis of Portuguese teachers’ and future teachers’ conceptions about Environmental Education”. (*poster*). BioEd 2008 – Sustainable Development, Ethics and Education for the 2020s: What challenges for Biology? Dijon, França, 24-28 de Junho de 2008.

Analysis of Portuguese teachers’ and future teachers’ conceptions about Environmental Education

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Abstract

Environmental Education plays an important role for improving citizenship and is strongly associated to socio-political contexts. With the European FP6 Biohead-Citizen

project on “Biology, Health and Environmental Education for better citizenship” we intend to analyse the potential differences among several countries by associating teachers’ and future teachers’ conceptions to controlled parameters, such as social context, religion, gender. For this, a questionnaire was constructed and, following a pilot test, the final questionnaire was applied to 6379 teachers and future teachers of 19 countries. In the present work we analyse specifically the Portuguese sample composed of 6 groups: pre-service teachers of (i) Primary school, (ii) Biology and (iii) Portuguese language; in-service teachers of (iv) Primary school, (v) Biology and (vi) Portuguese language. Results showed that teachers’ conceptions on Environmental Education are not dependent of age, gender, childhood context, academic level or training. Statistical multivariate methods were used as they are well suited to investigate complex data featuring the conceptions of many individuals, according to many topics. Two important axes emerged: “Sentiment-centric” and “Preservation/Utilization”. Significant differences were found between the pre-service teachers’ and the in-service teachers’ groups, by applying the *Between* analysis. The co-inertia analysis between environmental education and political/social variables showed that the “Utilization” position is associated to the “Direct democracy” and lack of “Solidarity” variables whereas the “Preservation” position is associated to “Believing in God”. Results will be further discussed.

Acknowledgements

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2. Ferreira C., TRACANA, R.B., Ferreira, M.E. & Carvalho G.S. (2008). “Analysis of the pollution topic in textbooks of 16 countries: socio-economic and ethical issues” (*poster*). BioEd 2008 – Sustainable Development, Ethics and Education for the 2020s: What challenges for Biology? Dijon, França, 24-28 de Junho de 2008.

“Analysis of the pollution topic in textbooks of 16 countries: socio-economic and ethical issues

Abstract

Environmental Education has been seen as a basic tool to contribute to the change of values, mentalities and attitudes. Global pollution problems having cumulative effects, such as the greenhouse effect, the ozone layer reduction, the acid rains or the loss of biodiversity have not always been perceived by the lay people as environmental challenges. Therefore, there is a broad academic and social consensus that environmental competences for the young generation represent an essential component of a long-term strategy fostering sustainable development.

Textbook analysis is a major element in the evaluation of how the educational goals are implemented at the school level where students must acquire knowledge, competences and develop appropriate values towards a sustainable environment. We analysed the topic of Pollution in textbooks of 16 countries, involved in European project FP6 Biohead-Citizen. The goal of this study was to analyse the frequency of *socio-economic* and *ethical dimensions*. Special attention was given to the progression since the first school year (5/6 years old) to the end of the secondary studies (17/18 years old) in these countries. A specific part of a grid constructed by the Biohead-Citizen project was used for the analysis of Pollution issues in textbooks. The *Socio-economic* dimension is consistently more present than the *Ethical* one. The diversity of approaches to these dimensions will be presented and discussed. More emphasis to the ethical controversies should be present in textbooks to raise pupils' awareness to the complex pollution problems.

3. Tracana, R.B., Ferreira, C., Ferreira, M.E., Carvalho, G.S. (2008). "Biodiversity in school textbooks of 13 countries." (*comunicação oral*). Seventh Conference of European Researchers in Didactics of Biology ERIDOB 2008, 16 – 20 Setembro.

BIODIVERSITY IN SCHOOL TEXTBOOKS OF 13 COUNTRIES

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Abstract

Biodiversity is the variation of [life](#) forms within a given [ecosystem](#), a [biome](#) or within the whole [Earth](#) and it is often used as a measure of the health of [biological systems](#). In this work we analysed how the topic “Biodiversity” is presented in textbooks from ten European countries (Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, Portugal, and Romania), two African ones (Morocco, Senegal) and another one from the Middle East (Lebanon), since the first grade (6 years old pupils) till the end of the secondary school (12 years old). We used a grid constructed in the context of a European Project “Biohead Citizen” (“Biology, Health and Environmental Education for better Citizenship”). The results showed that (i) textbooks highlight the beauty of nature instead of the preoccupation to preserve it; (ii) low importance is given to the preservation of the environment. It is necessary to give more attention to the textbooks in order to improve them to make them to contribute to make pupils aware of the importance of biodiversity for the future of the planet.

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4. Ferreira C., TRACANA, R.B., Ferreira, M.E. & Carvalho G.S. (2008). “Analysis of Pollution and the Use of Resources topics along the school textbooks of 17 countries.” (*poster*) Seventh Conference of European Researchers in Didactics of Biology ERIDOB 2008, 16 – 20 Setembro.

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

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Oral presentation

Abstract

This work was developed within the European research project “Biohead-Citizen” (Biology, Health and Environmental Education for a better Citizenship), with the participation of 19 European and African countries: Portugal, France, Germany, Italy, Cyprus, Estonia, Lebanon, Tunisia, Finland, United Kingdom, Hungary, Lithuania, Malta, Poland, Romania, Algeria, Morocco, Mozambique and Senegal. The goal of the present study was to analyse the progression of some conceptions in the textbooks of 17 countries that participate in this project, within the topics: *pollution* and the *use of resources*. The analysis of these topics showed that the following issues are highlighted: *i)* the planet is seen as a resource for humankind instead of a resource shared with other living beings; *ii)* it is given a much heavier importance to technologies in sustainable development rather than to changes of individual and social behaviour, specially in European western countries textbooks; *iii)* it is conferred unlimited trust in science and technology solutions instead of using the principle of precaution; *iv)* Concerning *ethical and socio-economic* issues, the ethical debate goes to a second plan when compared to the socio-economic one; *v)* Comparing Portuguese textbooks with Mozambique ones, concerning the conception *individual responsibility vs social responsibility*, about *use of resources* topic, Mozambique textbooks are rather more centred in a strategic perspective, essential to their economic expansion, based in the prevention of the waste of resources, and the preoccupation with sustainable use of resources; *vi)* Analysing images from textbooks, we verified that images from the textbooks give special attention to humans’ action or to the results of their action. There is not much emphasis given to ecological, social, and economic sustainability in the analysed textbooks. The findings of the present study show that a change of textbooks is recommended in order to give more emphasis to the human role in solving pollution problems and so contributing to improve pupils’ citizenship.

5. Tracana, R.B., Ferreira, C., Ferreira, M.E., Carvalho, G.S. (2008). “Poor approach to sustainable development: Lack of environmental management and scarce emphasis in behaviour change in textbooks of 13 countries.” (*comunicação oral*) XIII. IOSTE Symposium The Use of Science and Technology Education for Peace and

**Poor approach to sustainable development:
Lack of environmental management and scarce emphasis in behaviour
change in textbooks of 13 countries**

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Abstract

Nowadays natural resources are being used in an over exploration way, which implies vast environmental problems such as decrease of biodiversity, green-house effect, pollution. Therefore today it is important to look at the management of the natural resources in order to avoid such great over exploration. School environmental education plays an important role in the learning and awareness of children and young people for environmental issues. In this work we analysed the topic "Use of Resources" in the textbooks from thirteen countries from Europe (West to East: Portugal, France, Italy, Malta, Germany, Hungary, Romania, Lithuania, Estonia, Finland), from Africa (Senegal, Morocco) and from the Middle East (Lebanon), since the first grade till the end of the secondary school. We used a grid constructed in the context of a European Project "Biohead Citizen" ("Biology Health and Environmental education for better citizenship" STREP, CIT2-CT2004-506015, Carvalho *et al.* 2004). The results showed that the analysed textbooks give little importance to environmental sustainability as there is a general absence about the role of the society intervention in the management as well as of political sustainability. Although behaviour change towards the environment is scarce, there is some more emphasis given to individual change rather than to social change. This textbook weakness may impair young citizens getting aware of the needs for a sustainable development.

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6. Ferreira C., TRACANA, R.B., Ferreira, M.E. & Carvalho G.S. (2008). “Pollution in textbooks from 16 countries: Socio-economic and ethical issues; Individual or social responsibility?” (*comunicação oral*) XIII. IOSTE Symposium The Use of Science and Technology Education for Peace and Sustainable Development September, 21-26, 2008 IZMIR / TURKEY IOSTE.

Pollution in textbooks from 16 countries: Socio-economic and ethical issues; Individual or social responsibility?

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Abstract

In this study it was intended to analyse the progression of the socio-economic and ethical dimensions within the topic pollution, in the textbooks of 16 countries, along their school system, by looking at the *Socio-economic and Ethical Dimensions* as well as at the *Approaches to solve pollution problems*, within the conception *Individual vs social*.

In this work we analysed textbooks from sixteen countries from Europe (West to East: Portugal, France, Italy, Malta, Germany, Hungary, Poland, Romania, Lithuania, Estonia, Finland, Cyprus), from Africa (Senegal, Morocco, Tunisia) and from the Middle East (Lebanon), since the first grade till the end of the secondary school. We used a grid constructed in the context of a European Project “Biohead Citizen” (“Biology Health and Environmental education for better citizenship” STREP, CIT2-CT2004-506015, Carvalho et al. 2004).

About socio-economical and ethical issues, results showed that: i) these dimensions are completely absent in the textbooks of 6 of the 16 analysed countries; ii) among the countries where both dimensions are present (predominantly in the Western European countries), the *Socio-economic* dimension is consistently more present than the *Ethical* one. Concerning the *Approaches to solve pollution problems*, countries that highlight changes in technologies in detriment of changes in individual behaviour are also the same ones that give more attention to socio-economic and ethical controversies.

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This work had the financial support of the European project FP6 Biohead-Citizen CIT2-CT-2004-506015. We thank all the teams that have participated in this work.

2. Artigos publicados em Actas (*ficheiros em anexo*)

- 1. Tracana, R.B., Ferreira, C., Ferreira, M.E., Carvalho, G.S. (2008).** “Poor approach to sustainable development: Lack of environmental management and scarce emphasis in behaviour change in textbooks of 13 countries.” *In: Proceedings of the XIII IOSTE Symposium – The use of Science and Technology Education for Peace and Sustainable Development.* Ankara: Palme Publications & Bookshops. p.35-40.
- 2. Ferreira C., TRACANA, R.B., Ferreira, M.E. & Carvalho G.S. (2008).** “Pollution in textbooks from 16 countries: Socio-economic and ethical issues; Individual or social responsibility?” *In: Proceedings of the XIII IOSTE Symposium – The use of Science and Technology Education for Peace and Sustainable Development.* Ankara: Palme Publications & Bookshops. p.41-46.

3. Artigos por extenso em Revistas (*ficheiros em anexo*)

- 1. Tracana, R.B., Ferreira, C., Carvalho, G.S. & Ferreira, M.E. (2008).** “Pollution in Portuguese primary and secondary textbooks of Biology and Geography”. *International Research in Geographical and Environmental Education*, 17(3), 199-211 (<http://cats.informa.com/PTS/go?t=rl&m=316994>).

2. Tracana, R.B., Ferreira, C., Ferreira, M.E. & Graça G.S. (2008). “Análise do “Uso de Recursos” nos manuais escolares Portugueses e moçambicanos.” *Revista da ESEG-IPG*, pp. 113-132.

4. Projectos

Título do projecto	Identificação	Instituição proponente	Outras instituições
Análise de manuais escolares em Educação para a Saúde e em Educação Ambiental no contexto do modelo KVP: Conhecimento, Valores e Práticas sociais	FCT PTDC/CED/65224/2007-2010 (36 meses)	Universidade do Minho	Escola Superior de Educação da Guarda Universidade de Aveiro
FP6 European Project BIOHEAD-CITIZEN (Biology, Health and Environmental Education for better citizenship)	Comissão Europeia CIT2-CT-2004-506015 2004-2008 (42 months)	Universidade do Minho	Escola Superior de Educação da Guarda Instituições de 18 países

Análise de manuais escolares em Educação para a Saúde e em Educação Ambiental no contexto do modelo KVP: Conhecimento, Valores e Práticas sociais

Resumo

Em estudos anteriores financiados pela FCT (2003-2006: “Identificação de dificuldades de aprendizagem em biologia humana e formulação de propostas pedagógicas para as ultrapassar” POCTI/CED/44187/2002) identificámos concepções prévias das crianças antes das primeiras aprendizagens formais (3º ano do 1º Ciclo do Ensino Básico) bem como obstáculos de aprendizagem. Os resultados destes estudos evidenciaram claramente a importância que os manuais escolares têm não só na positiva mudança conceptual mas também como fonte de obstáculos de aprendizagem. Estes obstáculos didácticos de aprendizagem resultam de uma inadequada apresentação do tópico ou até mesmo de erros científicos presentes em diversas edições, sendo as imagens de manuais a fonte primordial destes obstáculos de aprendizagem (Carvalho et al. 2004, 2006; Carvalho & Silva 2005; Carvalho & Clément 2006).

O manual escolar constitui um elemento relevante na Transposição Didáctica (Astolfi et al. 1997) uma vez que:

- Reflete o Programa Nacional que provém do Ministério da Educação e resultando de diversos actores influentes no sistema educativo (partidos políticos, associações de pais, sindicatos, igrejas).
- Reflete estratégias das editoras dos manuais escolares (interesses comerciais) e dos autores (representando, em princípio, os interesses dos professores e dos alunos).

Da análise de conteúdo de manuais é possível encontrar interpretações pessoais dos autores (ou editoras) relativamente aos objectivos do programa nacional, através das propostas de ensino-aprendizagem neles apresentadas (Valente, 1989; Carvalho & Clément 2006). No presente projecto, a análise crítica de manuais escolares proceder-se-á no quadro conceptual do modelo KVP desenvolvido por Clément (1998, 2004). Neste modelo, cada concepção (C) é considerada resultante da intercepção de três pólos: Conhecimento (K), Valores (V) e Práticas sociais (P).

Neste projecto pretendemos analisar e comparar diversos MANUAIS ACTUAIS relativos a quatro tópicos que estão intimamente associados a Valores e Práticas sociais:

- Educação para a Saúde;
- Educação Ambiental;
- Reprodução e Educação Sexual;
- Genética Humana.

Também pretendemos analisar a EVOLUÇÃO ao longo do tempo da apresentação destes tópicos nos manuais escolares de diferentes editoras portuguesas. Quando apropriado, proceder-se-á a uma análise comparativa com manuais franceses equivalentes.

O trabalho desenvolver-se-á nos manuais escolares que apresentem os tópicos em estudo, desde o 1º Ciclo do Ensino Básico até ao final do Ensino Secundário. O projecto desenvolver-se-á pelo período de três anos e as actividades estão organizadas em

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tarefas:

Tarefa-1. Identificação dos 4 tópicos nos Programas Nacionais [meses 1-3]
Tarefa-2. Construção das grelhas de análise e teste preliminar das mesmas [meses 4-7]
Tarefa-3. Análise de conteúdo dos manuais actuais [meses 8-12]
Tarefa-4. Comparação dos manuais escolares actuais com os Programas Nacionais [meses 13-15]

Tarefa-5. Comparação dos manuais escolares actuais com os equivalentes franceses [meses 16-19]

Tarefa-6. Evolução dos tópicos desde a sua entrada nos manuais [meses 20-24]

Tarefa-7. Propostas para melhoria dos manuais portugueses [meses 25-27]

Tarefa-8. Avaliação das novas propostas em estudo quasi-experimental [meses 28-33]

Tarefa-9. Avaliação do projecto [meses 34-36].

Espera-se ainda que o modelo KVP ajude a tornar explícitas as razões para a selecção ou não de alguns sub-tópicos, bem como para a forma como nos manuais são apresentados aos alunos.

No seu todo, espera-se que este projecto contribua para a melhoria dos manuais escolares nos tópicos em estudo: Educação para a Saúde; Educação Ambiental; Reprodução e Educação Sexual; Genética Humana.

Referências:

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Carvalho, G.S. & Clément, P. (2006) Relationships between Digestive, Circulatory and Urinary Systems in Portuguese Primary Textbooks (submetido – Science Education International).

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didactical obstacles in the construction of science concepts: the example of digestion. ESERA Conference 2005.

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FP6 European Project BIOHEAD-CITIZEN (Biology, Health and Environmental Education for better citizenship)

Environmental Education for better citizenship)

Project summary

The aim of this project is to improve understanding of how different aspects of citizenship, including affective and social dimensions, are promoted or may possibly be promoted through Biology, Health and Environmental Education. We will develop a critical analysis of syllabi and schoolbooks as well as of teachers' and teachers-to-be' conceptions (social representations: systems of values as well as scientific knowledge) in order to answer to the following questions:

Are there reductive simplifications in teaching issues related to our selected topics on Biology, Health and Environmental Education, like "1 gene \rightarrow 1 character"; "1 microbe \rightarrow 1 disease" ? Do such teaching issues present or might they present notions of regulation, cycles, complexity? Are there implicit values, ideologies, in the curricula, syllabi and school textbooks?

What are the teachers' systems of values, including social and affective dimensions, about nature, body and health, sexuality, biologic determinism, evolution? Are their values interacting with their scientific knowledge? Are there differences among countries? Such differences, can they be associated to controlled parameters (gender, disciplines, religion, socio-economic context, recent history of the country, etc.)?

This work will be largely comparative across the 18 countries involved in the project, using the same concepts and methods coming from science education, epistemology and sociology / psycho-sociology, through two approaches as much extensive as possible:

Critical analysis of the selected topics in syllabi and schoolbooks of primary and secondary school as well as in teachers' training courses.

Analysis of teachers' and teachers-to-be' conceptions from questionnaires regarding implicit values related to each topic.

Altogether, the results obtained from this project will be published in scientific papers, delivered as appropriate to policy-makers, to national and European teachers' associations and to the general public in order to contribute to promote citizenship' scientific literacy and to improve citizenship in scientific knowledge based societies.