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PRIMARY SCHOOLS TEACHERS' CONCEPTIONS OF ENVIRONMENT. A COMPARISON BETWEEN AUSTRALIA AND FRANCE.

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Abstract: Both Australia and France are similarly developed countries with comparable egalitarian societies but differ in some issues such as energy generation, agricultural and mining history, GMO cultivation, immigration. Both countries have implemented Education for a Sustainable Development (ESD) in their respective education systems. This paper explore primary teachers' conceptions of the environment, and how these relate to the broader national socio-scientific differences.

Using the questionnaire of the European research project Biohead-Citizen, we compared, by multivariate analyses, conceptions of 98 Australian and 272 French primary school teachers.

The Australian teachers' conceptions significantly differ from those of French teachers, mainly being more pro-GMO, more anthropocentric and believing more that some animals can feel happiness. The most anthropocentric and pro-GMO conceptions are correlated with more belief in God, practising religion, and trusting more in private than in public institutions, for schools, for health services and pensions. They also agree more with the propositions: "*It is for biological reasons that women more often than men take care of housekeeping*", "*Ethnic groups are genetically different and that is why some are superior to others*" and "*There are too many foreigners in my country: the government should limit immigration*".

Some hypotheses are proposed to interpret these differences, such as resistance to GMOs in France and Australia's immigration history. The greater endorsement in the Australian sample of values against equality between men and women, or among ethnic groups, is more difficult to explain, but may possibly relate to education or to characteristics of the local sociopolitical contexts.

Key-Words: Education for Sustainable Development – Teachers – Environment – Values – Human rights –

INTRODUCTION

Australia and France differ in relation to some socio-scientific issues likely to be associated with differences in environmental and socio-political views. For example, Australia was the

last country to ratify the Kyoto protocol, is the world's largest coal exporter, and in contrast to France generates no nuclear power. Both countries have a strong agricultural sector, with Australia having rapidly cleared much of its native vegetation for agriculture and mining. Although GMO cultivation (of maize) has been banned in France, GM canola has just been introduced to cultivation in Australia. Australia has seen rapid large scale immigration since colonisation by Europeans only 223 years ago and currently 25% of the Australian population is foreign-born in comparison to 8.9% of the French population (OECD 2010). The gender gap in unpaid work is larger in Australia than France (Craig & Mullen 2010).

Education for Sustainable Development (ESD) is well implemented in the school curricula of the two countries. Australia has a very strong policy framework for ESD – although the extent to which this is implemented by schools is variable and arguably threatened by recent moves to national high-stakes literacy and numeracy testing. Environmental Education for Sustainability policy in Australia is also, on the face of it, more focused on values than in France (<http://www.curriculum.edu.au/values>). In France, Environmental Education has mainly been developed since the 90s, becoming in 2004 Environmental Education “to” and then “for” Sustainable Development, and ESD (“Education au Développement Durable”) since 2007. In France as well as in Australia, the best examples of ESD are found in Primary Schools, where the same teacher can encompass all the dimensions of ESD, and there is more possibility of interdisciplinarity, and pedagogical innovations, than in the more tightly circumscribed secondary school systems.

RESEARCH QUESTIONS

In consequence, the present work aims to explore differences in Australian and French primary schools teachers' perceptions of nature, the environment and environmental education. Specifically we are investigating:

- their ethics and values relating to the utilization and/or preservation of the environment (Wiseman & Bogner 2003), corresponding to anthropocentric and / or ecocentric values;
- their opinions about genetically modified organisms (GMOs) and their use;
- their opinions about the ability of all animals to feel or not feel happiness;
- if the teachers' conceptions differ significantly according to variables such as gender, age, level of instruction, religion;
- whether there are correlations between the teachers' conceptions of environment and their socio-political and religious opinions, and their conceptions related to human rights and equality.

METHODS

We used the questionnaire constructed for the Biohead-Citizen research project (2004-2008), where most of the questions are focused on possible interactions between scientific knowledge and values (Clément & Carvalho, 2007). Examples of questions will be given below with the results. Each teacher filled out the questionnaire in a totally anonymous context. The sample comprises 98 in-service and pre-service primary school teachers in Australia (New South Wales), and 272 in France (Rhône-Alpes and Languedoc-Roussillon). The data were analysed by multivariate analyses (Munoz *et al.* 2009, with the free software “R” and the collaboration of the statistician Charline Laurent).

MAIN RESULTS

A PCA (Principal Components Analysis), as well as a Hierarchical Ascendant Classification, defines 4 categories of conceptions of environment:

1 – A pole more focused on utilization of resources, with an anthropocentric ethic, and more acceptance of GMOs.

2 – An opposite pole more focused on preservation of environment, with an ecocentric ethic, and more reticence against GMOs.

Inside these two poles, there are two groups of conceptions, which differ according to whether teachers think that animals such as frogs, snails or flies can feel happiness or not.

A Between Analysis, completed by a randomisation test (Monte-Carlo type), shows that Australian teachers' conceptions significantly differ from those of French teachers ($p < 0.001$), mainly being more pro-GMO for the four questions related to GMO (e.g. A12 & A39: table 1), more anthropocentric (e.g. A32: table 1) and believing more that animals such as frogs and snails can feel happy (e.g., A29: table 1). A somewhat larger proportion of Australian than French teachers think that Environmental Education should be more focused on providing knowledge than developing responsible behaviour (17.3% vs. 5.5%).

	Country	I don't agree			I agree
A12 – “Genetically modified plants will help to reduce famine in the world”.	Australia	14.3%	27.6%	37.8%	20.4%
	France	36.4%	39%	20.6%	4%
A39 – “Genetically modified plants are good for the environment because their cultivation will reduce the use of chemical pesticides (e.g. insecticides, herbicides)”.	Australia	16.3%	35.7%	35.7%	12.2%
	France	40.4%	39%	16.9%	3.7%
A32 – “Humans have the right to change nature as they see fit”.	Australia	65.3%	22.4%	9.2%	3.1%
	France	91.2%	6.2%	1.5%	1.1%
A29 – “Frogs are able to feel happiness”.	Australia	15.3%	29.6%	28.6%	26.5%
	France	39.3%	27.6%	22.1%	11%

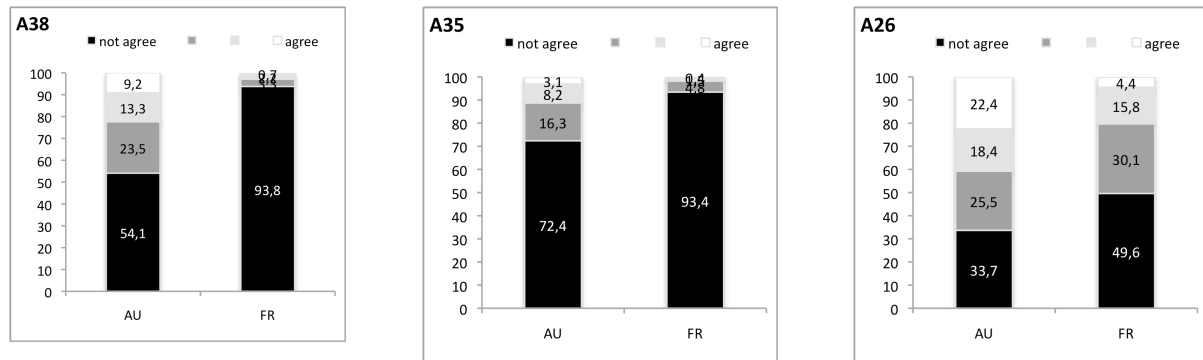
Table 1 - Answers of the 98 Australian teachers and 272 French teachers to some of the propositions of the questionnaire.

A Co-Inertia Analysis crossing the PCA from the variables Environment with a PCA from the socio-political and religious opinions shows that the most anthropocentric and pro-GMO conceptions are correlated with more believing in God, practising religion, and trusting more in private than in public institutions, for schools, for health services and pensions; and that these positions are more frequent in Australia than in France.

Another Co-Inertia Analysis crossing the PCA from the variables Environment with a PCA from the variables “human rights”, shows a significant correlation: the teachers with the most anthropocentric and pro-GMO conceptions, also agree more often, for example, with the propositions A38 (“It is for biological reasons that women more often than men take care of housekeeping”), A35 (“Ethnic groups are genetically different and that is why some are superior to others”) and A26 (“There are too many foreigners in my country: the government should limit immigration”): figure 1. That means that in Australia somewhat more teachers

than in France wish to limit immigration (A26) and justify some inequality between men and women (A38) or between ethnic groups (A35) on biological grounds.

There are no significant differences among teachers' conceptions related to most of the other known parameters (gender, level of instruction, religion), except a little effect of age linked to the knowledge tested by item A49 – “*If a person eats genetically modified plants, his/her genes can be modified*”. The younger the teachers, (in both Australia and France) the more they disagree with this proposition.



A38 – “It is for biological reasons that women more often than men take care of housekeeping”

A35 – “Ethnic groups are genetically different and that is why some are superior to others”

A26 – “There are too many foreigners in my country: the government should limit immigration”

Figure 1 - Answers of the 98 Australian teachers (AU) and of the 272 French teachers (FR) to the above propositions (in black: “I don’t agree”, in white: “I agree”)

DISCUSSION

Although the differences between Australian and French teachers are quite small, when compared to other countries in the world (see Clément & Caravita in this symposium, with the comparison between 24 countries), they are significant and raise several issues.

The finding that Australian primary teachers have significantly greater anthropocentric views with associated environmental utilisation ethic and acceptance of GMOs is likely to reflect broader national cultural differences outlined earlier in this paper, perhaps related to the relatively recent and lucrative history of utilisation of land for agriculture and mining in Australia. While GMOs are contentious in Australia, they are still being cultivated and there does not seem to have been the same widespread public opposition to the extent that has been experienced in France.

The Australian teachers' greater opposition to immigration may relate to the much higher proportion of immigrants in the Australian population and current concerns and media coverage about the arrival of ‘illegal immigrants’ and long standing fears of being “swamped by Asians”.

More surprising is the greater number of conceptions in Australia justifying inequalities between men and women, and between ethnic groups on biological grounds. This raises the question whether this is a lack of biological knowledge, or also a justification of ideological positions on gender roles.

That fewer Australian than French teachers see Environmental Education as about developing responsible behaviour also signals a mismatch between the explicitly action-and behaviour-oriented EE policies in Australia and what is happening in Australian classrooms.

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