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Abstract:

Education for a Sustainable Development (ESD) is more and better implemented around the world. We first define the competences in ESD, including values and practices that can sometimes strongly differ from those of teachers. Recent inquiries show significant differences among the teachers' conceptions on ESD, linked to their disciplines, with difficulty to consider the three dimensions of ESD (economical, social and environmental). Other more qualitative research approaches identified several teachers' postures, as more or less neutral, interventionist or critical.

ESD includes human rights as equality of all the human beings independently to their gender, ethnic group, religion or sexual orientation. To analyse teachers' conceptions on environment and on human rights, a large survey has been done in 24 countries, showing strong differences among these countries. In the less developed ones, the teachers' conceptions are more anthropocentric, reveal less awareness of the problematic limit of resources in our planet, and less reticence to use GMO (genetically modified organisms). These teachers are more fervent believers in God, deeply practising religion. They also agree more than others with propositions as: *"It is for biological reasons that women more often than men take care of housekeeping*", or with statements justifying racism or homophobia. These points illustrate that some socio-cultural traditions may hinder values

which are relevant components of ESD (e.g. some of the universal human rights).

Key-Words:
Environment – Teachers - Values – Human Rights – Gender - International surveys – Education for a Sustainable Development (ESD) -

IMPLEMENTATION OF ESD AROUND THE WORLD

Education for a Sustainable Development (ESD) is more and more implemented around the world since the Brundtland report (1987), the Rio Summit and the Agenda 21 (1992). ESD is promoted in most of the national politics of education and curricula (UNESCO, 2009a, 2009b), even if some countries still avoid to use the word "development" arguing, as in Brazil" (Governo federal Brazil, 2008) a possible confusion with "growth", and still use the appellation "Environmental Education" already dedicated, in these countries, to the three classical perspectives of ESD (social, economical and environmental). In fact, "Development" is not necessarily "Growth"; it can be a transformation, a metamorphosis of our societies and environments to keep living in the future. The resources of our Planet are limited and cannot sustain the today level of consumption of US for all the countries; in the most developed countries, the sustainable development probably implies a "sustainable decrease" (Latouche, 2006). The notion of sustainability is central in ESD. In Australia, ESD is called "Environmental Education for Sustainability"[1].
Nevertheless even when the national policy clearly claims a priority for ESD, the implementation in the school practice is not so clear (Clément & Caravita, 2011). In several countries, the first step is to include more and better ESD in the curricula, for all the school levels (students from 6 to 18 years old) and all the matters of secondary schools.
In some countries, including ESD objectives in syllabuses is just in course (Clément & Caravita, 2011; Caravita & Valente, in press).
The values underlying ESD can be highlighted by making reference to the existing literature in educational and social studies (synthesis in Caravita *et al.,* 2008). Several of these values are also underlying Education for All, Education to Citizenship and Human Rights : e.g. for the equality of all the human beings independently to their gender, ethnic group, religion or sexual orientation (UNESCO, 2009a, page 9). Other values, more focused on Environment and Sustainability, are specific to ESD.
ESD is facing a challenging problem: taking into account the local socio-cultural specificities, but also the universal values, mainly related to science and citizen-

[1] http://www.environment.gov.au/education/publications/sustainable-future.html

ship. To face this question, it is important to develop international projects aimed at making surveys in different socio-cultural contexts.

COMPETENCES IN ESD

The initial tendency in cognitive sciences was to discriminate among ways of defining competences which focused on cognition or performance or on knowledge domain (specific or general) (Weinert, 2001). The DeSeCo project (OECD, 2002) aimed at achieving a consensus on an operational definition of competence in the educational field. « *The conceptualization adopted in DeSeCo is holistic in the sense that it integrated and related external demands, individual attributes (including ethics and values) and context as essential elements of competent performance"*. ESD is focused on students' acquisition of the capacities to react successfully to the demands of complex problem, therefore attitudes and values are altogether important than knowledge. Each competence is structured by a request, situated in a precise context, and has an internal structure characterised by different attributes: knowledge, cognitive capacities, practical skills, attitudes, emotions, values and ethics, motivations (Jonnaert, 2002; Jonnaert et al., 2006). Competences are dealing with the five pillars of Education: learning (1) to know, (2) to do, (3) to live together, to live with others, (4) to be and (5) to transform (myself, the society, and environment). The fourth one are coming from the Delors' Report (1996), and the fifth from ulterior works (Black, 1999). Developing students' competences requires an adequate pedagogy, characterized by active and responsible involvement of students in projects, debates, concrete realisations or actions.

Nevertheless, teachers are generally not well prepared to bring real life back into the classroom for consequently changing the teaching/learning of subject matters. Challenging features are implicit in ESD: knowledge contents that are not always well stabilized, awareness of the different facets of an environmental problem (mostly outside their mono-disciplinary training), importance of teaching critical choosing rather than choices, relevance of being aware of values implied in each choice, development of projects that deal with problems having no a priori known solutions, openness to facilitate discussions with respect of diverging opinions, willingness to open their classrooms and even their school to interactions with external partners in their territory, etc. Sometimes, the values and practices underlying ESD can strongly differ from the teachers' values and practices. Therefore, when looking more closely to actual experiences, ESD objectives are not so well implemented correspondingly to the Ministry's official declarations.
That is why we focus this paper on conceptions and postures of teachers when they are facing ESD, on one side, and the envisaged competences to develop, on the other side, having the perspective to improve their training.

TEACHERS' POSTURES

An important problem of teachers when confronted with ESD is the necessity of a multidisciplinary approach to take into account the ecological, social and economical dimensions of ESD; on the other hand, their professional training usually deals with only one of these dimensions in most of the countries.
In a large inquiry recently done in Sweden (Borg & Gericke, 2012), 3229 upper secondary teachers from 223 schools (teaching science, or language, or social science, or vocational and esthetical practices or other disciplines) answered an online questionnaire with mostly Likert-scale questions and some multiple choice questions. The results show that differences in the way ESD is understood are linked to the subject taught. E.g. natural science and social science teachers think to a lesser extent that economic growth is important, compared to language, vocational and esthetical–practical teachers. The ecological perspective is the perspective singled out by most teachers as integral to the concept of SD. This study points to the need for teacher education to provide a holistic understanding of SD including all perspectives.

A similar trend concerning the conceptions of ESD was also shown in France by Lange (2008) from an inquiry of 165 pre-service teachers (of biology-geology, or physics-chemistry, or history-geography), the answers to a questionnaire being completed by 8 interviews and some focus groups. The results show significant differences among the disciplines, and also different postures of teachers to introduce ESD.

Qualitative approaches can bring a deeper understanding of teachers' postures related to their neutrality of engagement for a SD.
Case studies of ESD are often descriptive. Some of them are analyzing the teachers' competences (UNECE 2010) and only few are focused on the teachers' more or less impartial postures (e.g. Kelly, 1996; Gayford, 2002; Cotton, 2006; Sadler et al., 2006).
Kelly (1986) defined three different postures that teachers assume when they are implied in ESD: (1) a *neutral impartiality* focused on only scientific contents in order to avoid to promote their own opinions; (2) an *interventionist educational aim* to make students aware of the environmental emergencies; (3) a *critical educational model* which does not avoid controversies about problems and promote students' responsible decision-making.
Analyzing interviews of eight high school biology teachers involved in teaching global climate change in France, Urgelli & Simonneaux (2012) found the same three types of teachers' postures, the third one being more frequently adopted by teachers when several of them (of different scholar disciplines) are co-present in debates with students or when they collaborate in a project.

TEACHERS' CONCEPTIONS OF ENVIRONMENT AND HUMAN RIGHTS

Most of the research of Science Education dealing with Environmental Education is focused on the analysis of students' conceptions and conceptual changes and, more recently, on analysis of sequence of teaching, mainly as socio-scientific issues (SSI).

Few research was done at an international level, with nevertheless some exceptions as Schultz & Zeleny (1999) who compared students' conceptions (values and attitudes) in 14 countries (2160 college students), mainly in North and South America. Schultz et al. (2000) analyzed on the same sampling a relation between Judeo-Christian religious belief and attitudes of environmental concern. They showed a consistent pattern across countries, students who expressed more literal beliefs in the Bible scoring lower on ecocentric environmental concerns, and higher on anthropocentric environmental concerns.

An international survey of teachers' conceptions was undertaken by the Biohead-Citizen project of research ("Biology, Health and Environmental Education for better Citizenship", coordinated by Carvalho, Clément & Bogner[2]). This project was focused on six topics: evolution, human genetics, human brain, sex education, health education, ecology and environmental education. We were coordinating this last topic. For each topic, syllabuses and school textbooks were also analyzed (Caravita et al., 2008, 2012; Caravita & Valente, 2012; Clément et al., 2006, 2008; Carvalho et al., 2011; Quessada et al., 2008).
The research project aimed at identifying the eventual interactions between scientific knowledge and values in teachers' conceptions (as suggested by the KVP model: Clément 2006, analysing conceptions as possible interactions between scientific knowledge, K, values, V and social practices, P). What are the teachers' conceptions, and mainly their values implied in competencies for ESD, in a variety of different countries? More precisely, is there some correlation between their values related to environment (as ecolocentric or anthropocentric ethics) and their values related to some human rights as equality among all the human beings, independently to their gender, ethnic group, sexual orientation, or religion?

The teachers' conceptions were analysed from their anonymous answers to a long questionnaire, elaborated and validated collectively during two years, using previous interviews, pilot test, etc (Clément & Carvalho 2007). 27 questions are related to nature, environment and environmental education, other questions dealt with the eventual biological justification of differences related to the gender, to ethnic

[2] Biohead-Citizen (2004-2008). *Biology, Health and Environmental Education for better Citizenship*, STREP CIT2-CT-2004-506015, E. C., Brussels, FP6, Priority 7

groups or to sexual orientation; other questions concerned personal information, including political and religious opinions.

In each country, the sampling was well balanced: 1/3 primary schools teachers; 1/3 secondary schools teachers of biology; and 1/3 secondary schools teachers of language. In each sample, there were half of in-service teachers, and half of pre-service teachers (end of their training). The countries were chosen from their diversity: 18 for the Biohead-Citizen project (13 in all Europe, 4 in Arabic countries and 1 in sub-Saharan Africa).

Since 2008, the inquiry was extended to other countries, and we briefly present here some of our results coming from 24 countries. New data have been collected in other 7 countries: 2 European countries (Denmark and Serbia), 2 countries belonging to sub-Saharan Africa (Burkina-Faso and Cameroun), Brazil and Australia. The number of the interviewed teachers in each of the 24 countries is reported below in the figure 1 (total = 8 749).

The analyses done inside each of the countries participating in this research showed three trends in the teachers' conceptions, that we called: ecolocentric, anthropocentric and sentimentocentric, which had already emerged from inquiries carried out by using a different questionnaire in France, Portugal and Germany (Forissier 2003, Forissier & Clément 2003). Some of our results have been published, concerning Lebanon (Khalil et al., 2007), Algeria (Khammar et al., 2008), Morocco (Khzami et al., 2008) as well as Poland (Clément et al., 2011) or when comparing two countries as France and Australia (Quinn & Clément 2012).
Munoz et al. (2009) took into account only two sets of questions related to environment included in the Biohead-Citizen questionnaire and compared the data from 16 countries. They observed two trends (ecolocentric and anthropocentric) that are corresponding to the 2-MEV model of Wiseman & Bogner (2003): utilization and preservation of environment.
We shortly present below new results produced by the application of the Biohead-Citizen questionnaire in 24 countries, and we will consider all the questions related to environment together with the questions included in the topic "human genetics" related to human rights (equality of all the human beings independently to their gender, ethnic groups of sexual preferences).
The distribution of answers inside each of the 24 countries can be illustrated by histograms as in figure 1. The data were analysed with different multivariate analyses (presented in other works as in Munoz *et al.,* 2009). A between analysis was used to identify the answers which discriminate the countries most, and a test of randomisation (Monte Carlo type) shows that the difference among the countries is very significant ($p < 0.0001$).

The following questions mostly discriminate teachers' conceptions and countries, in terms of anthropocentrism: A16 (figure 1: *"Our planet has unlimited natural resources"),* A17 *("Society will continue to solve even the biggest environmental problems"),* A18 *("Human beings are more important than other living beings")*, A39 *("Genetically modified plants are good for the environment because their*

cultivation will reduce the use of chemical pesticides (e.g. insecticides, herbicides)").

As illustrated by the figure 1, teachers of the less developed countries display more anthropocentric conceptions, minor awareness of the problem of the limit of resources in our planet, and they are less reticent to use GMO (genetically modified organisms). These conceptions probably can be related with the importance of poverty in these countries, and the urgent necessity of a better economical development. The implementation of ESD in these countries has to take into account this specificity, and should not propose the same situations in the didactical projects as in developed countries where inverse problems are a priority (to avoid wasting and excessive consumption).

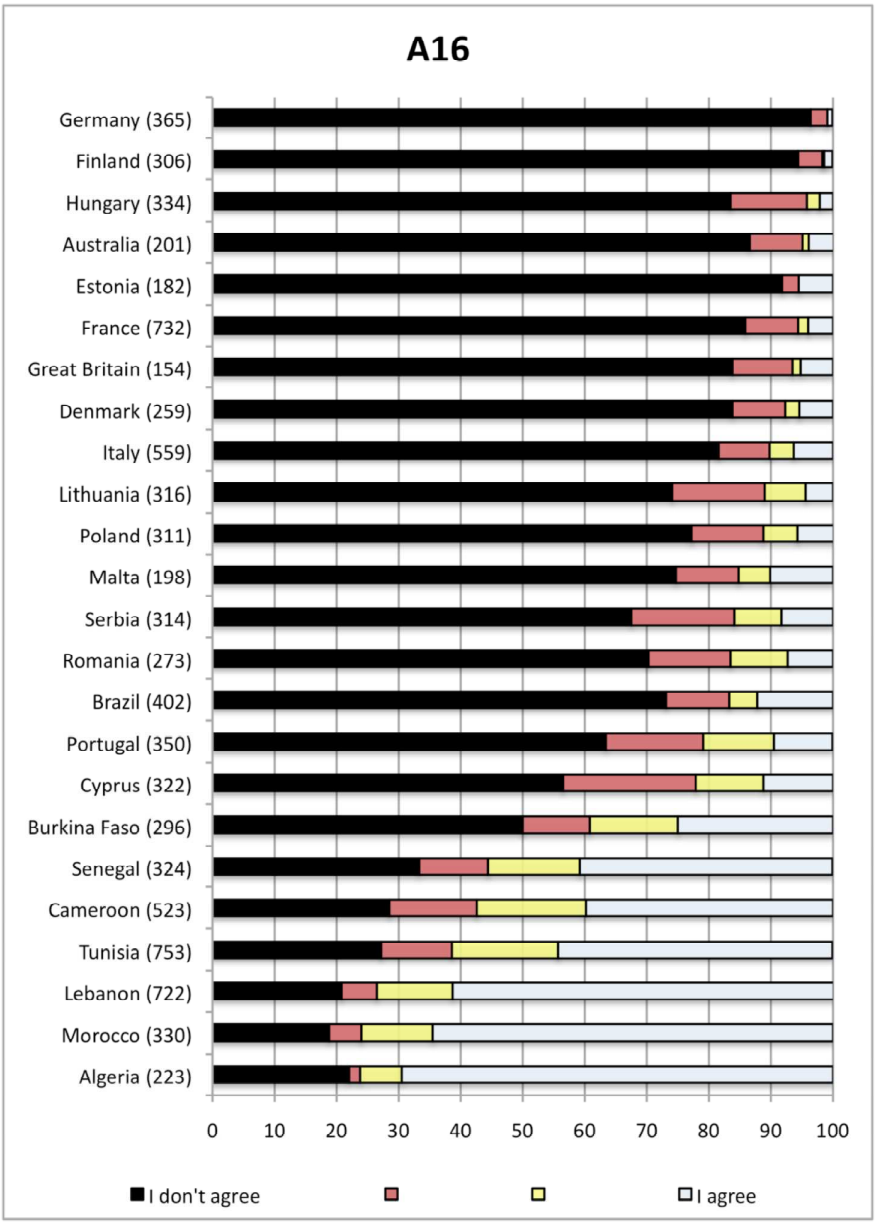

Figure 1 – Answers of the 8 749 teachers (grouped by country) to the question **A16 - *"Our planet has unlimited natural resources***

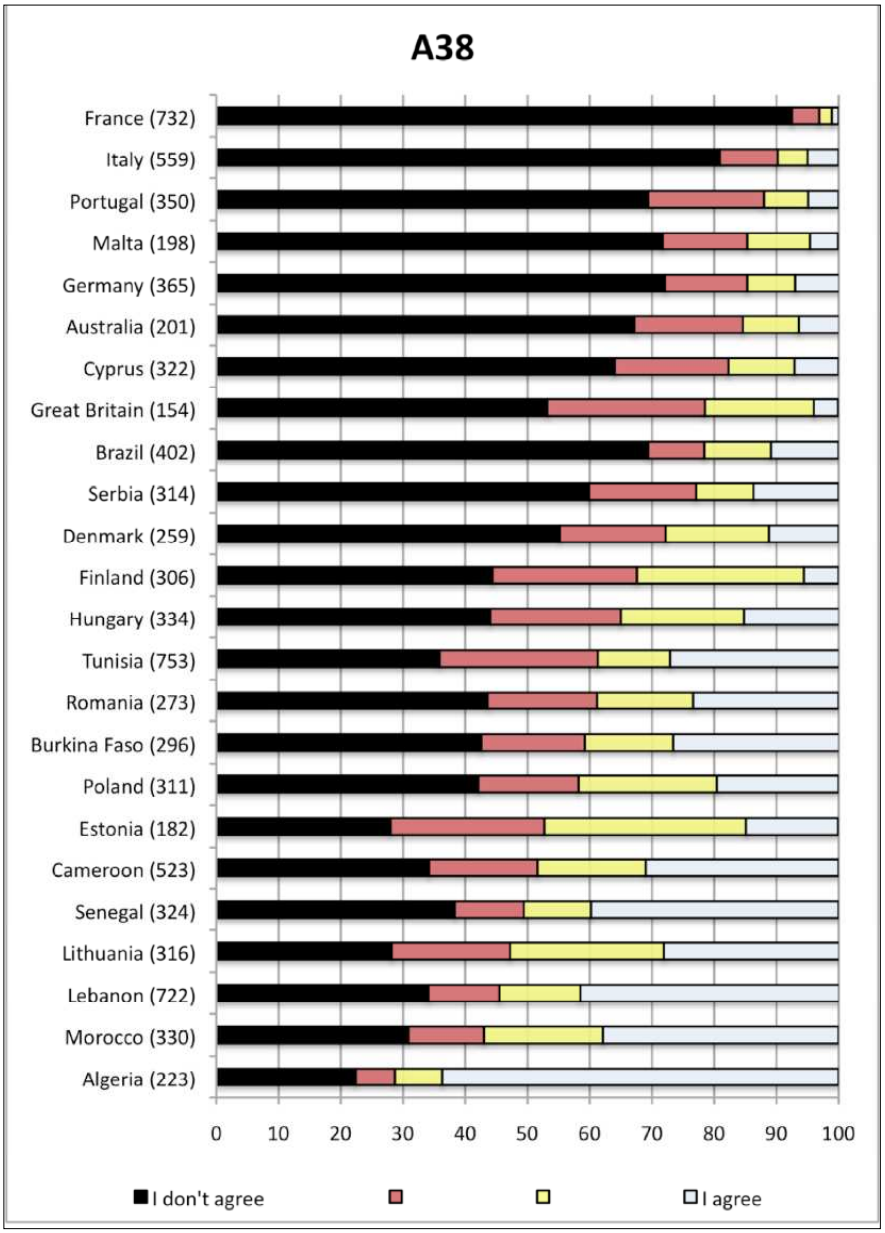

Figure 2 – Answers of the 8 749 teachers (grouped by country) to the question **A38 –** ***"It is for biological reasons that women more often than men take care of housekeeping"***

A significant correlation between anthropocentric values and some religious and socio-political parameters was revealed by a Co-Inertia analysis The teachers showing the most anthropocentric conceptions declare to share strong belief in God and to practice their religion, independently from the kind of religion (e.g. in figure 1, A16 : most of the teachers in Cameroon are Christian, while >90% of them are Muslim in Senegal).

These results are convergent with those of Schults & Zeleny (1999) for Christian students in 14 other countries, though they did not observe differences among countries that are very significant in our results. Our analyses also show relationships with political positions: the most anthropocentric teachers are inclined to support *"a strong central power", are "against the separation between science and religion",* and in favour of *"laws to help firms"*. All these parameters are probably linked to the lower level of democratic development of their countries, correlated with stronger religious practices.

A second Co-Inertia Analysis shows another set of correlations. The teachers displaying the most anthropocentric conceptions express their high agreement with propositions such as: A38 (*"It is for biological reasons that women more often than men take care of housekeeping*": Figure 2) and A35 ("*Ethnic groups are genetically different and that is why some are superior to others*"), and high disagreement with A41 ("*Homosexual couples should have the same rights as heterosexual couples"*). The figure 2 illustrates the great differences among the 24 countries, with a ranking of countries more or less similar in figures 1 and 2.

The biological justification of superiority of men or of some ethnic groups is today considered as an ideological and not scientific argument; as an interaction KV (knowledge and values) justifying some still actual social practices (P). The interpretation of these positions emerging from a large part of Christian or Muslim teachers in Arabic countries, in sub-Saharan Africa, but also in some countries of North and East Europe, deserves deeper investigation and reflection. These points, as other comments of the figures 1 & 2, and of all our results, will be presented and discussed in further publications. They will analyze more precisely how some socio-cultural traditions are correlated with some values of ESD, related to anthropocentrism as well as with some universal human rights.

The attainment of a higher consistency between knowledge, values, and practice is probably only an elusive goal which nevertheless help us to reflect upon our own conceptions.
An increased awareness of these factors and of their dynamics can enable educated citizens to be better prepared for the public arena. It should become part of teacher's education to enable them to consider the influence of conceptions on didactic method and in school manuals rather than letting them unconsciously impact their teaching and student discussions. Openness to discuss alternative conceptions is also connected with higher consciousness of their nature and of the arguments that sustain them.

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