Sustainable development: a challenge around the theme of water

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Abstract

Given its short history, it becomes relevant today to clarify - as much as possible - the concept of sustainable development and its subsequent operation. From a historical perspective and to clarify the terms of development and sustainability, the concept of sustainable development is understood to be based on four pillars - environmental, economic, socio-cultural and political. This paper is based on research that took place between 2008 and 2012, research that was sustained in the belief that education is the most effective mean that society has to face the challenges of the future, and sought to contribute to teacher self-training in education for sustainable development.
A virtual community of practice was created, composed by teachers of Basic Education of Physics and Chemistry from Portugal and from African countries where Portuguese is the official language, and also from different contexts. Education for sustainable development was the community purview. The water was the motivating and unifying theme because it established an ethical challenge simultaneously social, economic, environmental and political.
Today, in an era when the global perception of phenomena is meaningful, the priority of a fair and equitable distribution of water is urgent, to ensure consumption in quality and quantity to all mankind and all living beings. On the other hand, the fight against poverty is a major challenge to achieve equitable and sustainable development and water plays an important role here.
The research concludes that water is considered an essential asset to life and particular attention is now required to it due to environmental attacks to which is targeted, as well as economic, social and political attacks related to access and quality of drinking water. Consequently water is a unifying and motivating theme in the education for sustainable development.
The sharing of ideas made in the virtual community of practice, between European and African teachers, created a new approach and more diversified learning strategies on the theme of water and sustainable development issues.

Palavras-chave
Sustainable development; Water accessibility; Community of practice; Teacher self-training

Background

The term sustainable development appeared for the first time in the early 1970s at the time of publication of the Meadows team's report – "Growth limits" (1972) - commissioned by the Club of Rome at MIT. Since then, various world conferences (Stockholm in 1972, Rio in 1992 and 2012, Kyoto in 1997, Johannesburg in 2002) and various approaches and studies, from academic and civil society, have been presenting different definitions of sustainable development and to its operation in the present society with the consequent repercussions on future generations.

Given that the concept of sustainable development is somewhat open, and probably will remain so, this paper will start by clarifying the meaning of development and sustainability and thus of sustainable development.

Since the end of World War II, industrialized countries live according to a paradigm of economic development. This is the foundation of a highly optimistic ideology that advocates an indefinite economic growth, seen as a process of increasingly intensive use of capital, reducing labor force and extensive use of natural resources (Caporali, 1998). The economic growth after the war, and especially from the 1950s onwards, has brought great improvements in the standard of living and quality of life of the populations of industrialized countries but, together came the biggest environmental impact of human history

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and the widening gap between populations of countries with different levels of industrialization. From the 1970s onwards, people started to understand the limits of that dream.

Two solutions were then possible: to embrace a neo-liberalism and the consequent austerity policies, or accept the development of a new society, respectful of all people and of the biosphere that allows the society to exist (Villeneuve, 1998).”If the world's people decide to strive for this second outcome rather than the first, the sooner they begin working to attain it, the greater will be their chances of success” (Meadows *et al.*, 1972, p.24).

But today, the adaptation to a new sustainable development paradigm is still the great challenge to mankind! Not only due to the change in attitude needed by the industrialized countries, but also because the less-industrialized countries tend to repeat the path of the rapid and unsustainable economic growth of the more developed countries. It is necessary, therefore, to establish the distinction between growth and development. “When a country develops, it becomes different. The Earth’s ecosystem develops, evolves, but does not grow” (Daly, 1993, p.268).

It is established now that there isn’t any environmental problem, political, economic nor social does that belong to only one region or country, and therefore, any problem of development follows the same path. Development is always seen on a global scale and has global implications which, as stated by Villeneuve (1998), presents a challenge to the development of solidarity between people or individuals.

But the development must be contained within the limits of what is sustainable (Grann, 1987), which brings us to the second component of the definition. A question can arise: what is it that we want to be developed sustainably? The answer is whatever leads to the satisfaction of human needs, present and future, taking into account the Earth's capacities. These needs are of type:

• Economic: employment, livelihood, adequate access to consumer goods, among others;

• Social, cultural and spiritual: including health, safety, education, equal opportunities, freedom of religious expression, among others;

• Environmental: protection against environmental disasters, access to natural resources such as water, soil or air, and

• Political: freedom, peace, civic participation, among others.

These four aspects represent the pillars of the concept of sustainable development, in our point of view. We have adopted as the basis of our definition of sustainable development the description presented by the World Commission on Environment and Development (WCED, 1987), in the report “Our Common Future”, better known as Brundtland Report.

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of 'limitations' imposed by the state of technology and social organization on the environment's ability to meet present and future needs” (WCED, 1987, p.43). “In essence, it is a guided process of change in which the exploitation of resources, the direction of investments, the technological development and institutional changes are in harmony and increase the present and future capacity of satisfying human needs and aspirations” (WCED, 1987, p.47).

It is a document that provides an overview of development including people, species of animals and plants, ecosystems, natural resources (water, soil, air and energy). It integrates concepts such as fighting poverty, population growth, and education for all, among others. In 1991, the International Union for Conservation of Nature (IUCN) includes these factors synthetically in the definition of sustainable development: sustainable development is intended to “improve the quality of human life within the limits of the capacity of ecosystems” (IUCN, 1991, p.10). In 2007, the Fourth Conference on Environmental Education held in Ahmedabad, India, has in its final declaration an even broader view: “Our vision is a world in which our work and lifestyles contribute to the well-being of all life on Earth. We believe that through education, human lifestyle that support ecological integrity, economic and social justice, sustainable livelihoods and respect for all life can be achieved. Through education we can learn to prevent and resolve conflicts, respect cultural diversity, create a caring society and live in peace” (UNESCO, 2007, p.1).

The different definitions of sustainable development have some common characteristics: the search for better quality of life, equity, environ-

mental preservation, the relationship with the economic and social development, the notion of global system and limit, intra and intergenerational implications and the recognition of a generational solidarity (Villeneuve, 1998). It is this vision that sets the course of this work, particularly in the education field, where the four pillars of sustainable development (environmental, economic, socio-cultural and political) provide to education for sustainable development (ESD) transversely throughout the curriculum. It is also the school's duty to create and develop the competencies, attitudes, skills, behaviors and values of its stakeholders so that everyone may have greater critical intervention and responsibility as citizen of a simultaneously local and global society, living in a specific time, but increasingly more aware of the future consequences of their actions and decisions.

Covering global issues such as employment, food, energy, water, health, population growth, natural resources and poverty eradication, ESD brings an education to values, where the human element, and its relationship with the natural environment, social, cultural, political and economic, is recognized as essential for the development of a sustainable society.

The water, the four pillars of sustainable development and energy

The International Conference on Freshwater, held in Bonn from 3rd to 7th December, 2001, presented "water as the key to sustainable development" (p.23), and recognizes its connection with the pillars of sustainable development. The United Nations World Water Development Report 2015 states that: "the sustainable use and management of water is vital for welfare of all mankind today, and it is essential for building the future we want for all" (Bokova, 2015, p.vi).

This year of 2015 is of great expectations and hope. It is the final year of the Millennium Development Goals and in which the different states define a new global agenda for development. "Water is inextricably linked to the development of all societies and cultures. At the same time, this development also places considerable pressure on water resources - agriculture, energy and industry all have impacts on the use and governance of water" (Bokova, 2015, p.vi). Given that, "The linkages between water and sustainable development are numerous, complex and often subtle" (Miletto and Connor, 2015, p.vii), we will briefly approach the relationship between water and the four pillars of sustainable development and between water and energy. The approach focuses on Europe and Africa, due the scope of the study.

Social

The access to water is a basic human need and a fundamental human right (Dervis, 2006). However, "around 748 million people today still do not have access to an improved source of drinking water, and water demand for manufacturing is expected to increase by 400% between 2000 and 2050 globally" (Bokova, 2015, p.iv). Statements like this prove that an approach to water issues must be taken within the social sphere.

"Poverty eradication is the greatest global challenge facing the world today and an indispensable requirement for sustainable development" (UN, 2012, p.1), and water plays an important role here (Heerden *et al.*, 2008). Water is considered one of the limiting factors to development (Aronson *et al.*, 2006), particularly with regards to the lack of access to freshwater and sanitation or access to water as a productive resource (WWAP, 2015).

Many regions of Africa suffer from irregular rainfall and water stress affects the lives of many of its inhabitants (Pinto, 2007; CEDARE-GWP, 2002; Santos, 2007; Bouguerra, 2005), in terms of food and public health, causing often seasonal or permanent migration of the population to urban areas with greater access to water and food (CEDARE-GWP, 2002; Blanc and Perez, 2008). In fact, water scarcity that many humans suffer is a violation of principles of social justice, in particular with regards to equal citizenship and civic participation, social minimum required to live, equal opportunities and fair distribution of goods (UNDP, 2006).

One of the social consequences and human rights abuse concerns gender equality. In many traditional cultures, the women, adult and young (Bouguerra, 2005), are the ones responsible for the collection and transportation of water intended for domestic use, to meet the family's needs: direct consumption, cooking, hygiene, health, agricultural production (Pinto, 2007). In many cases, women and possibly children, travel long distances (WWAP, 2015) without any help, and particularly if it is added the responsibilities of the management of home and family and agricultural production (Pinto, 2007), this does not allow them to participate actively in society (UNDP, 2006) or go to school. More-

over, the improper quality of drinking water - often obtained directly from rivers, lakes or tanks (WWF, 2010) frequently contaminated by pollution - and inadequate sanitation, cause various diseases such as cholera and childhood diarrhea (CEDARE-GWP, 2002). These diseases, plus death, prevent particularly children from enjoying their rights, namely education, and so the cycle of poverty is perpetuated (WWAP, 2015; UNDP, 2006; UN-W/A, 2006).

The issue of scarcity and many other problems associated with water are also due to the living standards of modern societies. In the UK, for example, each person spends 50 liters/day on average in discharges of toilet, more than 10 times of the total water available per person in many rural areas of Sub-Saharan Africa (UNDP, 2006). For a person living in a rich country, it is hard to imagine what it means to have insecurity of water with which many people live daily.

Economic

Not only water is an integral part of the Earth's ecosystem, it is a social and economic asset. It is therefore essential to maintain the life of aquatic ecosystems, while recognizing the environmental values of water protection, when making economic decisions on the distribution and use of water (Flint, 2004), since we have in account the impact that the health of ecosystems have on human health and on the socio-economic development. In fact, "economic development and water are intimately connected in many ways. Water is an essential resource for economic production and an 'enabler' of trade for most types of goods and services. Water is an essential input for the production of the food and electricity, as well as for many manufactured products. Investments in water infrastructure are key to unlocking therefore the full potential of economic growth" (WWAP, 2015, p.23).

The high exploitation that often seeks an agricultural production of high yield and short-term economic growth, has devastating consequences for the environment, causing a decrease in river water flows and the disappearance or drastic reduction of some lakes (Santos, 2007; UNDP, 2006), which in turn revert in serious economic consequences. These facts can be found scattered all over the planet, but frequently in emerging economies such as India and China (Santos, 2007).

Despite the possibility of some remedial action in areas of great ecological degradation, prevention is always more beneficial in terms of environment, social and economic. Exploration of hydrological reserves to environmentally acceptable levels, prevention of pollution in supply of water from the source to the consumer, control of water losses in the transport and supply systems (Santos, 2007), waste water treatment and other ways to combat water pollution are some of the possible actions (CEDARE-GWP, 2006).

Also, the implementation of good water management policies that take into account the environment, tax incentives and transparent subsidies that promote good water harvesting practices in the industry and agriculture have had positive results, economic as well as social and environmental (UNDP, 2006).

Investments in the creation and improvement of hygiene conditions and quality of water distribution always have a high return potential (UNDP, 2006) in the quality of life of populations, particularly in health and productivity. "Investing in improved water management and services is a prerequisite to reducing poverty and achieving sustainable economic growth" (WWAP, 2015, p.21).

Environmental

Deforestation, water shortages, declining of biodiversity and climate change has put the welfare and development of all nations at increasing risk (WWF, 2008). "Aquatic ecosystems are at the centre of all life and all forms of development" (WWAP, 2015, p.28) and the availability of drinking water is probably the biggest prerequisite to human life (Blanc and Perez, 2008). Only 1% of water on Earth is accessible for direct human use (Flint, 2004; WWAP, 2006) but even so, there is enough water available to meet human and environmental needs (UNDP, 2006; WWF, 2010). Nevertheless, in 2010, 43 countries were in moderate to severe hydric stress (WWF, 2010). It is expected that this number will increase due to the growing demand of water (WWF, 2010) for food, for human consumption and for sanitation, and due to decreasing water supply (reserves) attributable to climate change (Kundzewicz *et al.*, 2007). In 2030, it is expected that "half of the world population will be living in high water stressed areas" (UNESCO-IHP, 2014, p.2), with the intrinsic implications on the health of ecosystems, food production (Blanc and Perez, 2008; WWF, 2008), quality of available water (CEDARE-GWP, 2002; Santos, 2007) and energy resources (UNESCO-IHP, 2014).

The challenge is large and urgent. Some priority actions are the preservation of pollution of the water supply systems; waste water treatment, for both domestic and industrial effluents, which implies investment in sanitation that protects from water pollution and reduce health risks; reuse and recycling of waste water (CEDARE-GWP, 2002); the battle against desertification, with protection of fertile soils, practice of non-intensive agriculture and other forms of ecological and environmental promotion. "We all live at the water's edge, whether we are at the end of a pipe or the bank of a river. We need water for our basic survival, for cultivating crops, for generating energy and for producing the goods that we use every day" (WWF, 2010, p.50). However, sometimes, the use of water is exploited. One example of this is the irrational consumption of water on agriculture, industry or for domestic use.

One of the major environmental problems related to water still remains the pollution: in agriculture (Flint, 2004) due to non-biodegradable agrochemicals (CEDARE-GWP, 2002; Bouguerra, 2005); and also to effluent discharges into rivers and lakes as "natural sewage" and/or inadequate treatment of waste and domestic/industrial water and poor sanitation, especially in Africa (CEDARE-GWP, 2002). The results of the degradation of water quality attributable to pollution is the degradation of agricultural soil and the consequent abandonment of land (especially in less industrialized countries), the economic burden on remediation processes, the reduction of drinking water needed to sustain ecosystems and future needs of water and the onset of diseases related to water (CEDARE-GWP, 2002). Diseases caused by water pollution are estimated to kill more than five million people per year. In terms of human life, this is undoubtedly the most serious problem of pollution of a natural resource (Santos, 2007).

Political

Water is a fundamental right for all mankind and a governance priority: defend the quality of water resources, manage the existing water so it can be reached to those in need, ensuring sanitation and waste water treatment, safeguard water supplies in quantity and quality for the consumers of today and tomorrow and all species dependent on them, among others. Whatever the socio-economic situation of the country, among the various political decisions that it are necessary to take on, water and the distribution of water resources, the equity in access and use of water and sanitation are priorities (CEDARE-GWP, 2002; UN-W/A, 2006; MAOTDR, 2007; UN, 2011; UN-W/A, 2000).

Considering the local political involvement, people need to be effectively involved in the decisions of management and governance concerning water resources (CEDARE-GWP, 2002). The more knowledgeable the population is, the more effectively they can contribute to policy decisions that are centered on real needs of the population. People can also contribute to policy development.

An important aspect are the laws and strategies established among countries sharing the same water resources (groundwater, rivers, lakes, watersheds ...). In fact, according to the World Charter of aquifers, published by The United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2008, 273 existing aquifers on the planet are shared by more than one country (UNESCO, 2008). Twelve African countries receive more than half of its water sources from outside their borders that puts them in a situation of great interdependence (UN-W/A, 2006). The development of mutual strategies and long-term commitments and sharing and joint research, are important in this area. It should be noted the need for legislative regulation to safeguard that the projects take into account the protection of the environment and the social benefits of the people involved.

The more comprehensive the policy decisions and the management of water resources are, the more likely it is to generate a true sustainable development. It also should take into account the water interrelationships with "climate change, desertification, biodiversity, wetlands, dams, marine environment and sustainable forests", as well as mechanisms that should balance competing demands and the social, economic and environmental values of water. Moreover, they should reflect the links between surface and groundwater and between inland and coastal waters, the increasing urbanization, the land use planning, and the need to maintain the integrity of the ecosystem and the threat of desertification and environmental degradation.

At the level of supranational policies, like for example, the efforts to make a success of the Millennium Development Goals (MDG), although not fully achieved as 748 million people still lack access to safe water, made it possible for "more than half the world's population, almost 4 billion people, now has a piped water connection at

their homes. Concerning sanitation, from 1990 to 2012, almost 2 billion people gained access to improved sanitation and 77 countries have met the MDG target on basic sanitation" (UNESCO-IHP, 2014, pp.1-2). We should also highlight the preparation of the Global Agenda of Development post 2015 and the Goals of Sustainable Development. "UNESCO-IHP proposes a standalone sustainable development goal dedicated to water to ensure Water Security for Sustainable Development" (UNESCO-IHP, 2014, p.4).

The relation with energy

The sustainability of the development paradigm we live in now and its extension to a growing number of people is dependent on the current development models to the regional and global scale and how to face problems concerning the exploitation of natural resources. In this context, the energy is of particular importance because of its central relevance on models of social and economic development. The satisfaction of the energy demand required for the development of the next hundred years is probably the most important and difficult challenge facing us at the beginning of 21st century (Santos, 2007).

Our dependence on fossil fuels is enormous. The use of fossil fuels (coal, oil and natural gas) toward primary energy sources is 80% (Santos, 2007). This dependence has the disadvantage of generating a serious environmental problem of air pollution on a global scale, increasing of greenhouse gas emissions and consequent climate changes.

Moreover, the energy production based on fossil fuels or nuclear power requires large water consumption, especially for cooling systems (WWAP, 2015). In terms of the impacts on water, wind energy and solar energy are the most sustainable.

As for renewable energy sources hydro power accounts only for 2.2% of energy production. Hydro power is one of the primary forms of energy that produces less pollution and is safer. The use of water for electricity production contributes to the tightening of CO_2 emissions and also of SO_2, NO_x and ash, some of these containing radioactive elements (Madureira and Baptista, 2002). Nevertheless, the need to build dams has as main impacts the loss of soil that can be used for agriculture and ecosystems that may be rich in biodiversity, and the retention of sediments transported by rivers (WWAP, 2015; Santos, 2007). On the positive side, dams are important for the storage of water resources and the regulation of flows of rivers and streams associated, thus avoiding the reduction of grave effects caused by droughts and floods. Thus, dams contribute to the quality of water and life on the river and hence to the quality of life of the population that depends on it (Madureira and Baptista, 2002) and dams can also be recreational sites for populations (WWAP, 2015).

The main question in the energy issue is to assure that users have energy at the time and place where it is necessary and under the appropriate form (Santos, 2007). However, about a third of the world population still doesn't have access to commercial electricity and must rely on biomass for heating and somatic energy to provide the mechanical energy. In 2014, more than 620 million of people (2/3 of the population) in Sub-Saharan Africa still lack the access to electricity, although the region is rich in energy sources: solar throughout Africa, in many countries hydro power, wind in coastal areas and geothermal in the valley of the East African Rift (IEA, 2014).

Despite the significant growth in recent years in proportion to conventional energy, renewables remain underdeveloped and under subsidized in comparison to fossil fuels (WWAP, 2015). In Sub-Saharan Africa renewable energy correspond only to 2% of the total. According to the scenarios of the International Energy Agency (IEA) it is unlikely that hydro power is the solution to replace fossil fuels, although its contribution to electricity production is very important (Santos, 2007). "Renewables, such as wind, solar PV and geothermal energy can make a substantial contribution to energy supply and freshwater demand at the local or national scales, even if remain marginal at the global scale" (WWAP, 2015, p.56).

Methods

A research that we conducted between 2008 and 2012 aimed to contribute to the self-training of teachers of Physics and Chemistry in ESD. It created a virtual community of practice composed of teachers of basic education in Physics and Chemistry of Portugal (Continental and Azores) and African Portuguese-speaking countries (Angola, Mozambique and Guinea Bissau). The community consisted of eight teachers who initially did not know each other and were from different contexts.

The virtual community of practice was the basis of this experimental research. It was cre-

ated in January 2008 to enhance the interaction between the teachers to engage them in building a module on the water, for pupils of primary and secondary education. This activity should provide the training in education for sustainable development to the same teachers.

Given the physical distances among different members of the community, a space in a computer platform was created (Platform Odyssey - Open University URL: http://www.odisseia1.univab.pt/cursos/DesenvSustentFis) as virtual site of interaction for the members of the virtual community of practice. This also allowed the teachers the possibility to access the digital network that limited the choice to schools in urban areas, especially in Africa. In the invitation, each teacher was given access to this platform through a user name and a password. The community was active until the end of 2010.

Education for sustainable development was the community purview. The water was the motivating and unifying theme. What is the reason for choosing the theme of water? Answer: to establish an ethical challenge, simultaneously social, economic, environmental and political. In fact water, which is variously distributed over the surface of the Earth and unevenly distributed along the year, is a priority of all ages and cultures. Today, in an era when the global perception of phenomena is evident, the priority of a fair and equitable distribution of water is urgent, to assure consumption in quality and quantity, to all mankind and all living beings. We developed a study on the relationship of water to the four pillars of sustainable development and the relationship of water with energy.

From the outset of the study, every member of the virtual community of practice was requested to search for teaching materials such as articles, films or other, on education for sustainable development and on drinking water and introduce them on the platform. The central proposal for the work to be developed by the community consisted of a module on the water that should later be taught to the students of the teachers involved in the research. The platform had also available a portfolio with some scientific articles, videos, news, legislation and even a list of bibliography, videos and websites on water. The portfolio intended to be a theoretical reinforcement that could increase the self-training of each teacher belonging to the community in the theme of ESD and specifically on drinking water. The completion of the module, with experimental and testing activities took place in June 2010.

The platform made the interaction among community members possible by exchanging and sharing experiences with teachers who live in other cultures and different contexts, although numerous technical and communication constraints persisted.

During the period of the study, the researcher visited the different participating countries and met the teachers involved. In this way, she examined the problems concerning water consumption. She also observed local realities concerning the relationship of water with energy. For example, in Angola, one of the places visited was equipped with a small hydroelectric power station placed in the river passing the village. This had energy autonomy and a plumbing system of rainwater. With the civil war, the village had been practically destroyed. Unfortunately, the reconstruction process has not yet implemented a distribution system of drinking water or basic sanitation. Since 2013, the village regained power - albeit with some problems of distribution - but using a fuel generator (since it is an economic resource in Angola). The researcher encouraged the local administrator to recover the hydroelectric power station – that so many residents took pride in former times - but the economic infeasibility and the lack of support of the Angolan state, not allowed it to until now.

Results and discussion

During the research, the teachers who formed the virtual community of practice deepened their knowledge on water and sustainable development through formal and informal sharing on the computer platform. The chat, the forum, the exchange of emails, the questions to each other and a portfolio with scientific articles and multimedia materials were the basis for teacher training. As sharing among the different members of a virtual community of practice translates into learning (Wenger, 1991; Wenger, 1996; Wenger, 1998; Wenger et al., 2002), a learning taking place “from the own lives of the people who are learning” (Rodriguez Illera, 2007, p.119) and is inherent in practice (Lave and Wenger, 1991), classroom practice was deemed crucial to this investigation. Teachers were invited to create a teaching module on water and teach it to their students. The module was built together and the results of the construction and application were placed on the platform.

Because of experiences that are motivated by different cultural and geographical contexts, teachers of African countries showed more interest to real situations experienced by them, re-

ferring to issues of drinking water as essential to daily life, including their quality and access for human consumption. On the other hand, teachers of Portugal were more sensitive to the problem of water as an asset to be preserved, in order to ensure their quality and quantity to all people and ecosystems, now and in the future. The sharing among different teachers enhanced a more diversified approach and learning of the water theme and sustainable development issues.

"I felt the motivation to inform my students about the importance and care of water, especially for consumption. (...) The concept of consumption of drinking water is very diverse in various regions of the world. Speaking specifically of Africa and in particular in Angola, it can be seen that over 90% of the population has no access to drinking water. Since water cannot supplied to the entire population, it makes the inhabitants of many areas consume river water and other sources directly (...). This theme is very relevant when it comes to sustainable development, as the water is source of life and all living beings depend on water" (A teacher of Angola).

"As a teacher, I should mention that this topic has already been discussed in some of my classes and shall continue to be a recurring theme, taking into account its importance for life. It is important that students know that in a number of areas of the World there is a shortage of water resources and that our water resources must be properly treated and cared for be consumed safely and have good quality" (A teacher of Portugal).

Teachers revealed, from the beginning, the concept of the importance of personal and collective responsibility for sustainable development. The notion of global and local implications of the decisions made and the actions taken did not emerge as evident. The study also allowed the teachers involved to develop competencies in sustainable development.

"It was found that when faced with problematic situations in a personalized and individualized way, students get scared. They showed a lack of enthusiasm to personal/ individual commitment and awareness to the need for a rational management; it is not enough to preserve the quality (...) for those who bathe every day while others die of thirst or drink sewage-type of water (...)" (A teacher from Portugal).

"You can tell that our young people are not aware of the need to save water because they do not need to do it!!!" (A teacher from Portugal).

"In several occasions, the TVM program "View Mozambique" showed reports where you can see mothers and children who walk 5 to 30 km in search of water; in the same program is shown populations using water from rivers or ponds created by rain tor own consumption, water without any treatment; still this program showed the abusive use of water in cities, barely closed taps, constant disruptions of the tubes transporting water, (...) Have you thought how you use water to brush your teeth, to wash your clothes and dishes, taking a bath? What is the relationship between the lack of water pressure in your home and the irregular use of water in your neighborhood?" (A teacher of Mozambique).

"*For me, sustainable development concerns social and technological development of a society, responding to its needs, but without jeopardizing the environment and the future of resources, which, if exploited in excess, could not exist for the next generation"* (A teacher of Portugal).

The results of this research are in agreement with the proposals of the International Conference on Freshwater held in Bonn, of the World Water Council (WWC, 2006) and of the World Conference on Education for Sustainable Development (UNESCO, 2009a; UNESCO, 2009b). In fact, the theme of water is revealed suitable for training in ESD because:

- It is essential to people's lives and ecosystems;
- Deals with issues concerning the relationship with the everyday life, urging concrete actions of citizenship;

• Concerns global and local dimensions simultaneously, cross time and space, that raises solidarity with all the inhabitants of the planet;

• Has a didactic scope and competencies to develop.

Conclusions

The research found that water is considered an essential good to life and particular attention to it is now required, due to environmental attacks to which is targeted, and attacks on economic, social and political aspects concerning the access and the quality of drinking water. Consequently, water is a unifying and motivating theme in education for sustainable development, both for teachers and for students.

As supported by the United Nations Conference (Rio + 20) "water is at the core of sustainable development as it is closely linked to it to a number of key global challenges" (UN, 2012, p.23), our study also reveals the theme of water is relevant in the context of sustainable development, in particular in education issues, and it gives the possibility to address the four pillars of sustainable development.

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