1. International service-learning as a driver for sustainability competencies development

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1. INTRODUCTION

Sustainable development (SD) is fundamental to every human activity, and in the field of education it is considered essential (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2009). The interrelationship between education for sustainable development (ESD) and SD was understood even before they were formally defined, as early as 1972 in the Stockholm Declaration. Future decision makers will be those who are currently being trained in higher education institutions (HEIs). The literature reflects an important consensus on the important role HEIs have in achieving SD and establishing initiatives that generate sustainable livelihoods, a future for young people and the transformation of behaviours and practices (Mochizuki and Fadeeva, 2008; UNESCO, 2009; Yasin and Rahman, 2011).

Some authors consider ESD as a new paradigm: a social metamorphosis capable of restoring the balance between the social, economic and political systems using holistic strategies that place the natural environment in the foreground. Currently, the social, economic and political systems are part of the problem because they promote individualistic patterns as well as certain behaviour and consumption patterns (e.g., Wade, 2008). Pavlova (2009) proposes that ESD becomes a new paradigm in the curricula to respond to social needs. The Education Network for Sustainable Development defines ESD as ‘the process of acquiring the knowledge, skills and attitudes necessary to build local and global societies that are fair, equitable and live within the environmental limits of our planet, both now as in the future’ (Environmental Association for Universities and Colleges, 2013, p. 7).

Although many HEIs have begun their journey towards ESD, programmes are far from being fully implemented (Hanover Research, 2011; Waas, Verbruggen and Wright, 2010; Wright and Wilton, 2012). The conceptual complexity of SD, difficulty of implementing new concepts in the university environment and inertia for change (Ferrer-Balas et al., 2010; Jones, Selby and Sterling, 2010; Lozano, 2012) hinder ESD’s integration into university activities and curricula. Indeed, only 15 universities out of more than 14000 worldwide publish sustainability reports (Lozano, 2010).

According to Lee, Barker and Mouasher (2013), it is necessary to integrate ESD in all aspects of university life. This includes education, campus operations, community outreach, evaluation and reports, institutional frameworks and research (Lidgren, Rodhe and Huisinigh, 2006; Lozano, 2010; Fernández-Sánchez et al., 2014a). The main objective of a university towards ESD is to be a proactive agent by introducing the student and the entire university community to an educational process that facilitates a personal transformation and offers a different view of the world (Ortega, 2014). In this process, learning, teaching, practical applications and different social needs must be linked (Aguilera et al., 2010).

The skills, knowledge, habits, attitudes, aptitudes and values of SD are considered the main drivers for achieving ESD in HEIs (Murga-Menoyo, 2015). A consensus in the literature regards a set of key sustainability competencies based on critical thinking and systems thinking as well as communication and collaboration skills (Tarrant and Thiele, 2015, 2016; UNESCO, 2017).

The identification of competencies, however, is of no benefit for ESD unless students are given the capacity for their development. Murga-Menoyo (2015) explains the importance of identifying elements or components that interact with each other, which can be competing. When interacting, these elements lead to capabilities that will generate these factors or competencies. Observation of indicators (behaviours) allows for inferring of the existence of corresponding capacities. For these capacities to be useful in ESD, the development of competencies should be coordinated. Table 1.1 summarizes Murga-Menoyo's explication.

The qualitative systematic review of competencies in SD carried out by Muñoz et al. (2017) concludes that three competing axes are present: (1) knowing; (2) knowing how to do; and (3) knowing how to be present. Yet according to Muñoz et al., the axis of 'knowing how to live together' needs to be explicitly added to contribute to the development of alliances and value the interdependence of people, communities and cultures.

The Association for the Advancement of Sustainability in Higher Education (AASHE, 2012) evaluated 1777 publications related to ESD, a small number of which focused on the pedagogy of skills development. In the literature reviewed, there is a lack of studies on how to acquire sustainability competencies. Studies reviewed consisted chiefly of proposals on which competencies should be developed, the degree of acquisition, and methods for how to achieve competence. Research lacked empirical results on different improvements from diverse strategies for the acquisition of ESD skills. Only a few attempts are seen in the body of literature, such as analysing the integration of competencies in a specific curriculum (Lambrechts et al., 2013) or evaluating the acquisition of sustainability competencies qualitatively through surveys and interviews based on student comments (Barth, 2007; Staniskis and Katiliute, 2016; Steinemann, 2003). Murga-Menoyo (2015) established a basic competency matrix that identified the key indicators of each competency and the skills required to acquire them.

The initial tendency to respond to these challenges was the formal inclusion of SD competencies in university curricula through the development of theoretical projects and problem-based learning or the inclusion of new SD courses (e.g., Lehmann et al., 2008; Segalas, Ferrer-Balas and Mulder, 2009; Steinemann, 2003). A significant opportunity exists, however, to contribute to the development of such curricula through informal activities outside of class or by combining formal and informal learning processes.

There are several approaches in this regard, such as student internships in communities, companies and governments (Brundiers, Wiek and Redman, 2009), collaboration of students with neighbouring industries, businesses setting an example through their own management practices, serving as technical experts or acting as leaders in regional sustainability plans (Adomssent, 2013; Staniskis and Katiliute, 2016). To acquire SD skills, Lehmann et al. (2008) and Haan (2006) affirm the importance of academic exchanges and internships with local companies, international collaborations with other universities and work on case studies.

Service-learning (SL) can be considered as an integrated approach to formal and informal learning. SL is defined as 'a form of learning in which students participate in

Table 1.1 Basic matrix of competencies for sustainability

Competencies (UNESCO, 2014, p. 12)	Components ^a	Capacity
Critical analysis	Critical thinking Ethical commitment Intellectual commitment	To understand that knowledge is incomplete and subjective To understand that every system (conceptual, socioeconomic, etc.) presents dysfunctions that can be identified and corrected To recognize social and economic dysfunctions that oppose SD To propose alternatives for improvement
Systemic reflection	Relational thinking Holistic thinking Feeling of belonging to the community of life	To understand reality, physical and social, as a dynamic system of interrelated factors at global and local levels To understand the interrelationships between values, attitudes, social uses and lifestyles, and customs To look deeply into the causes of phenomena, facts and problems To understand the human being as an ecodependent being
Collaborative decision making	Argumentative skills Participatory skills Democratic commitment and universal human rights	To put skills to work collaboratively in diverse groups To recognize the right of people to participate in all issues that affect them and the processes of SD (endogenous processes)
Sense of responsibility towards present and future generations	Ethical commitment Social commitment Anticipatory thinking Synchronous and diachronic thinking Universal, synchronous, diachronic and differentiated responsibility Compassion	To understand the effects that individual behaviours have, in the medium and long term, on social uses and customs and, through them, on human collectives from the community and others To understand the consequences of individual behaviours and groups on the biological conditions necessary for life, present and future To care for intra- and intergenerational relationships with equity and justice To contribute to change for sustainability, adopting alternatives to unfair and unsustainable lifestyles

Note: a. The elements of the 'components' column, in one measure or another, are within the different competencies. They have been assigned to one or the other considering the significance of their specific weight in each case.

Source: Based on Murga-Menoyo (2015).

community service as part of the academic work of the course' (Lisman, 1998, cited by Hall et al., 2004, p. 37), where the voluntary service to the community and the learning of knowledge, skills and values are combined, establishing a close connection of the service and learning in a single activity (Martínez et al., 2008). In a more global approach, international service-learning (ISL) can contribute to the development of essential sustainability competencies. ISL has developed in different contexts (e.g., Bamber and Pike, 2013; Kiely, 2005) but has not been directly associated with ESD, although the concepts are related. Battistoni, Longo and Jayanandhan (2009) and Hall et al. (2004) stated that universities cannot escape global and local problems such as poverty, human development, health and safety, education, water and sanitation, local economy, rural development or the strength of local institutions. In light of these challenges, the conceptual framework of ESD and ISL converge to achieve the same objectives: to develop social and environmental sustainability in practice for a targeted area in which the current state is improved in a real, measurable way (Aramburuzabala, Cerrillo and Tello, 2015). Following Bamber and Pike (2013), ISL seeks to combine student learning with service for a more just and sustainable society, according to its definition:

ISL is a form of ecological commitment with aesthetic, moral and spiritual dimensions that is promulgated through the participation with the lives and 'worlds' of those who live in different countries and that allows ethical reflection, improves personal effectiveness and seeks to engender a more just and sustainable society. (Bamber and Pike, 2013, p. 536)

Currently, by focusing on students, research on SL tends to neglect the real impact on local communities (Kiely, 2005). As proposed by Hall et al. (2004), the SL approach is understood as service and learning objectives of equal weight. For this reason, this study incorporates the analysis of local achievements and their social importance for the community. Wiek et al. (2015) establishes three future challenges for research on ESD: (1) how to develop key sustainability competencies synergistically; (2) how to develop these competencies for real projects in actual contexts with future professional applicability; and (3) how complexity, stakeholders, location and other elements impact the acquisition of skills. Faced with these three challenges, linking ESD and ISL would serve as a guideline for the acquisition of sustainability competencies in real and complex environments in different locations. Analysing the impact on the local population where an intervention has occurred, including Muñoz et al.'s (2017) axis of 'knowing how to live together', will contribute to the development of partnerships and value the interdependence of people, communities and cultures.

1.1 Objectives and Scope

The objective of this study is the analysis of the importance of ISL as a useful strategy in the new ESD paradigm in HEIs. The starting hypothesis is that ISL can contribute to the development of sustainability competencies in a synergistic way through the integration of formal and informal learning. Formal learning would be included in the regulated education system and informal learning through an alternative extension of formal learning by proposals organized, in this case, within an international cooperation programme.

The main aims of this study are to: (1) apply ISL in a case study with a formal and informal learning approach; (2) evaluate from an ISL approach the achievements of

the service (local impact and subjective impact from a local point of view) and learning (acquisition of skills in volunteer students).

2. METHODOLOGY

The methodology proposed in this study is based on the ESD paradigm, the importance of competencies for SD and the way to develop these competencies by establishing links between ISL and ESD.

Based on a proposal by Brundiery et al. (2009), a volunteer student could follow the path outlined in Figure 1.1 where in the first and second year the student acquires theoretical knowledge from formal learning with an approach to the real world through practical classes on actual cases. In the third and fourth year, these students will apply the knowledge acquired in solving real problems in real contexts by participating in its implementation, combining formal and informal learning.

This method is the approach that has been applied at the European University (EU) of Madrid, Spain. The EU has a volunteer programme that has been carried out since 2009 for conducting ISL. In this programme, students from every year are incorporated into the ISL programme with the objective that the first- and second-year students make their first participation in the real world. Third- and fourth-year students participate in the resolution of real problems by completing and implementing final degree projects, thereby applying the knowledge acquired in the classroom through formal learning to practical cases within the scope of informal learning. In this project, the Brundiery model has been taken into account in terms of participation in the real world and in the capstone (object of the study to be published) and not so much in the integration of curricular sustainability and ESD in the degree.

The first project was carried out in Ethiopia with the design and construction of basic

Source: Based on Brundiery et al. (2009).

Figure 1.1 *Model for sustainability competencies development through international cooperation learning opportunity*

infrastructure identified as a priority for local society (construction of dams, implementation of water distribution networks, irrigation and sanitation) and the performance of work related to health in the environment of orphanages (studies of diseases, deformities, medication and health system). This project involved disciplines of civil engineering, physiotherapy, pharmacy and medicine. It was funded and supported by the Spanish Agency for Development Cooperation (AECID) and the University of Addis Ababa. Within this framework, professors decided to incorporate students of the project through a volunteer programme where students develop microprojects or final bachelor's or master's degree projects in real contexts. For the Ethiopia project, a total of seven end-of-degree projects or master's thesis projects were carried out in different disciplines (e.g., physiotherapy, information and communications engineering and civil engineering). Subsequently, five civil engineering students travelled to Guatemala to conduct a study on water distribution systems in the city of Tecpan to analyse different alternatives that would guarantee the supply of drinking water to the population. In Guatemala, two final degree projects were carried out.

In 2013, a new volunteer programme began in collaboration with the Cerro Verde Foundation (FCV). The project focused on a small village, Cerro Verde, in the Choluteca region, Honduras. The project was conducted from 2013 to 2016 and was selected as an ISL case study to achieve the first objective of this work: the application of formal classroom knowledge through informal learning in a specific environment.

The Cerro Verde study was carried out at the request of the FCV who, knowing the work carried out by the EU in Ethiopia and Guatemala, decided to establish a collaboration agreement to generate synergies between the needs of the local population and the EU's expert knowledge. The EU offered experience in the domain of international cooperation projects as well as technical expertise to solve problems and fulfil requirements of the local projects.

The village of Cerro Verde is in Southern Honduras – one of the most depressed areas of the country, without water or electricity. For some years, locals have suffered a severe drought that decimated crops and forced part of the population to emigrate to the United States and Europe. In this context, this project planned to collect data before and after the intervention through surveys and interviews with the local population to address the impact and perception of the project in the area. The researchers conducted a survey in 79 of the 96 inhabited houses in the village based on three fundamental areas, water, electricity and housing:

- **Water:** usual forms of water storage, quantities of water consumed per day, where it was obtained, the existence of latrines, the state of natural sources and the distance of each house to the water points.
- **Electricity:** determine the existence of solar panels or any type of batteries, distance from the street to the entrance of the house, number of bedrooms, initial state for the installation of conventional electrical energy.
- **Housing:** analysis of the type of enclosure, construction materials, roof, soil structure, number of occupants, size of the house, place of the kitchen and existence of a fireplace. Figure 1.2 shows the state of one of the houses in the village before the intervention, with plastic in areas where there should be adobe branches and aluminium where there should be some other type of coating.

Figure 1.2 House with plastic and aluminium plate

In addition, the survey analysed data related to road access to the area, education, demography, economy, work, safety, health and hygiene, community, nutrition, transportation, technology and well-being.

In the village of Cerro Verde, there are 426 inhabitants (146 are adult men, 127 adult women and 153 children). There are 103 buildings. There are 100 houses, of which there are 99 numbered houses, 96 of which are inhabited and three of which are uninhabited (house 19 – lives in Spain; house 17 – lives in the United States; and house 18b – used by the FCV). There is one unnumbered house. The other three buildings are: building 36 – cooperative; building 37 – church; building 49 – school.

Surveys were conducted in 79 households, or 81.44 per cent. A sample of more than 80 per cent indicates that the data obtained can be reliable, since it fits almost the entire population. The survey was divided into the following blocks: living space, demography, economy and work, education, safety, health and hygiene, water, electricity, community, nutrition, transportation, technology and well-being.

For the student learning goal of the project, the skills of EU students within the Curriculum Sustainability Plan 2012–16 related to SD were analysed to compare students' acquisition of skills obtained after the intervention in the volunteer programme. This analysis was executed through surveys and interviews. For this, eight competencies were selected, five of them taken from a study carried out by Fernández et al. (2014b) on the competency model in the civil engineering degree: critical thinking, problem solving, decision making, work in multidisciplinary teams and adaptation to change. The other three are linked to the experience gained from the years of volunteering with students in

Ethiopia and Guatemala: responsibility, time management and communication skills. Eighteen students of civil engineering, building engineering, industrial engineering, information and communications engineering (ICE) and medicine were involved.

2.1 Description of Practical Experience

As mentioned above, the EU volunteer programme in collaboration with FCV began in 2013 in Cerro Verde. The objectives of the FCV in the village are to provide electricity, drinking water and sanitation as well as promoting education for children and adults to provide better living conditions for the local population. The overarching objective of the project is to develop a sustainable village model that can be replicated in different villages in line with the philosophy of AECID. Lessons learned and knowledge from previous projects in Ethiopia and Guatemala were integrated into the project.

Between 2013 and 2016, 18 students of civil engineering, building engineering, industrial engineering, ICE and medicine were involved in the programme. Before travelling to the area, students were required to complete training on international development cooperation and a previous study to gather information about the area. Pre-deployment studies identified and analysed needs and main objectives of the FCV and the village, considering data relevant to the country, region, work areas, regulations and more. Teachers and students were then placed in the area for three weeks to generate maps and collect necessary on-site data related to local needs while working on the development and implementation of the projects. Before leaving the village, students generated reports of the tasks performed during the stay.

Note that to promote and favour coexistence and an intercultural approach, both students and teachers live with the local population in their homes, sharing their day-to-day routines. The houses have a latrine, but no shower. Students and teachers had to fill a small container with water to use in their daily toilet. Water is limited, so it is key to be efficient in its use. The electricity supply is, of course, poor and limited to a few places that use solar panels.

3. RESULTS AND DISCUSSION

3.1 Objective Results in the Village for Service-learning

Work completed during the three years of the project has had a significant impact on the village of Cerro Verde. In 2013, students and teachers from the EU made a topographic map of the area and held interviews with the inhabitants of the village. In addition, researchers completed questionnaires on the three areas mentioned above – water, electricity and housing – and other relevant data for the analysis of the area.

The data obtained facilitated establishing the needs of the inhabitants and their priorities. The population obtained water from a natural source called ‘La Joya’, which they had channelled by gravity in a rudimentary way, generating numerous losses. The sourced water had no treatment to guarantee it was potable. The volume of water from the natural source was absolutely insufficient for the needs of the village, which meant that the population had to look for alternative water supply points in dry periods, forcing

Figure 1.3 Water filtration system

them to travel long distances. The small amount of water favours the transport of solid particles through such precarious distribution networks. As shown in Figure 1.3, this situation forced people to filter water.

Cerro Verde also had no electricity. Only a few houses had solar panels (Figure 1.4) that allowed them to charge batteries to illuminate a light bulb. The remainder of the population depended on the solidarity of the neighbours for power. The recharging of mobile phone batteries is crucial because many family members work away or even abroad, so the phones are their only way to maintain family ties.

The access to the town is through a steep dirt road that has already caused numerous accidents, especially after heavy rains. This type of precipitation generates furrows so deep in the ground and rockfall that prevents the passage of vehicles. When this happens, the town is incommunicado to road traffic until the government repairs it. The inhabitants can only access other populations on foot. These repairs can take months and are never final, which causes the situation to recur every time it rains torrentially.

For education, in 2013 the solitary school had a small classroom for kindergarten (children up to five years old) with a teacher paid by a local donor and two classrooms for all children in six grades, from first to sixth, with two teachers. Children aged six to 11 were divided into two classes.

Over the past three years, some of these issues have been resolved:

Figure 1.4 Solar panels

- Two successful water wells have been drilled, one of which is reserved for future use in anticipation of possible population growth. The other well, currently in use, feeds a water tank where it is chlorinated and from which it is distributed to each house in the village through a distribution network, thus ensuring water potability throughout the route. Figure 1.5 displays a test pump and Figure 1.6 shows the installation of the water supply network.
- A part of the electricity grid has been built. This project has benefited 60 per cent of the population and it is expected that by 2020 the extension of this network will be completed.
- The access road to the village has been repaired, reducing the time spent accessing the area, avoiding worrying isolation and minimizing the number of accidents.
- Finally, regarding education, an additional classroom has been built in the old facilities and three additional classrooms and a dining room were constructed on a new nearby plot. Younger students now have three classes from the first to the sixth year (six to 12 years old) with three teachers. And those in seventh, eighth

Figure 1.5 Test pumping

and ninth grade have three new classrooms with three teachers, according to the conditions established by the Honduran Ministry of Education. In addition, the school has separate bathrooms for boys and girls, drinking water and a septic tank. The school's extension affects not only school attendance in Cerro Verde but also children in small nearby towns that until now simply had no chance of attending school.

A schematic summary of the objective impact on the village is shown in Figure 1.7.

Project tasks were developed with the participation of the local population, where work groups coordinated work performed (e.g., wells, ditches for the installation of the water supply network, installation of the pipe network and the bases of the light posts). Also, the local population housed and maintained the university students.

Furthermore, adult training courses were provided in Cerro Verde. A line of collaboration was established between the FCV and the Food and Agriculture Organization of the United Nations (FAO) to improve crops and food habits. The goal of the collaboration was to optimize agricultural systems while preserving the use of traditional methods and introducing improvements in performance with less water. Courses in the trades, such as plumbing, masonry, sewing and crafts, were held to improve the employability of locals.

These improvements and the expansion of the school allow children to study until they

Figure 1.6 Citizen participation in the network installation

Figure 1.7 Work in the village

are 16 without leaving the village, which allows them to combine household chores with studies and avoid having to leave school early. Adults now benefit from a water supply network and the possibility to connect to the electricity grid; therefore, they have been encouraged to establish small businesses, including a new corn grain mill and basic supply stores, which they call grocery stores.

3.2 Results from Surveys and Interviews in the Village

The last survey, conducted in July 2015, allowed us to evaluate the population's perception of the impact of the project. The interviews and surveys can be summarized as follows:

- Most houses are made of adobe and tree branches. Roofs are made of plastic sheets or metal tiles and floors are almost always made of clay. The houses do not have bathrooms.
- A total of 96 people (24 per cent of the population) work for others. In 15 per cent of households, women obtain money by selling basic products while simultaneously caring for their home and family.
- Only 11.3 per cent of respondents can save money, which corresponds to those families who have one or more family members working abroad.
- Although the educational level in the town is low, many have studied at least until the sixth year. Participating in continuing studies involves walking to the nearest larger town, at least one hour. In general, everyone agrees that studying is relevant, and they recognize the significance of the opportunity for their children to attend school as much as possible. Textbooks are a common good and are shared among students. The literacy rate is 67 per cent of the population.
- An initial diagnosis in the healthcare centre is free; however, travel, medications, tests and treatments have a major cost that most of the population cannot afford. Respiratory problems afflict 33 per cent of the populace. The lack of chimneys for cooking is identified as probable cause. In addition, 66 per cent of waste is burned within the town.
- The basic food is corn pancakes. Sixty-eight per cent of the population eats, almost exclusively, these pancakes.
- The arrival of the water distribution network to all households is considered a vital change in their lives. The survey coincided with the installation of the water distribution network; therefore, the population had not had enough time to enjoy it.
- Electricity is available to 33 per cent of the villagers but they are still reluctant to turn on a light bulb when it gets dark or plug in the cell phone battery. Some people bought a TV.

As shown, there is still a lot of work to do. The interviews with the villagers reflect an apparent general public satisfaction with the project. Locals have improved their living standards to some extent. About 70 per cent of the population interviewed look forward to the development opportunities generated by the project. The new context favours its survival and development. Though recognizing the improvements made, approximately 30 per cent of the population have such an extreme lack of resources that they consider their situation irreversible.

The arrival of water and electricity has contributed to the establishment of a new 'pulpería' (small grocery store) in house 19 and a new mill for corn grain in house 26. With increased production, prices have decreased. In general, people believe that these improvements can reduce both internal migration to larger cities and external migration to other countries, promoting family reunification for those who had to emigrate in the

Table 1.2 Acquisition levels of competencies for SD

Competencies for SD	Volunteer Students		Non-volunteer Students	
	Average	Typical Deviation	Average	Typical Deviation
Critical thinking	4.2	0.7	4.0	0.6
Responsibility	4.4	0.7	3.9	0.9
Problem solving	4.3	0.7	4.1	0.6
Decision making	4.3	0.7	4.0	0.9
Time management	4.1	0.8	3.6	1.0
Adaptation to change	4.6	0.7	4.0	0.8
Teamwork	4.2	0.8	4.1	1.0
Communication skills	4.4	0.7	4.1	0.9

past. It may also happen that people who have been forced to emigrate now look to the future with new hope and genuinely consider returning home.

3.3 Results from Students' Survey

A survey was conducted with 40 respondents in 2015, nine of whom were volunteers who travelled to the village during the three years and 31 are non-volunteer students of similar grades (who have no experience in volunteering). The objective of the survey was to analyse the level of acquisition of competencies for SD. The skills assessed were the five defined as essential for graduates in an ESD context: critical thinking, problem solving, decision making, teamwork and adaptation to change (Fernández-Sánchez et al., 2014b). Three additional key competencies linked to the experience gained in the years of volunteering with students in Ethiopia and Guatemala were included: responsibility, time management and communication skills. Note that there was already a sustainability curriculum integrated into the EU degrees, so skills were developed in the classroom through project-based learning in at least one course per year.

The data obtained from these surveys indicate that the level of acquisition of these competencies with an international service and learning approach in a non-formal learning environment seems to be greater than that acquired in the classroom with formal teaching methodologies applied in the EU (Table 1.2).

As one student pointed out, 'such projects encourage personal growth'. Another student, who has travelled twice in the last two years, was so affected that he is now professionally engaged in development cooperation: 'My stay in cooperation projects has changed my life. It has affected my way of seeing life and has generated a significant change in my priorities and in the approach that I want to give to my professional career.' There are other students who have already completed their studies and who continue to collaborate with specific actions, such as technical advice or financial donations. Another student mentioned that:

[L]iving with the local population and collaborating with this cooperation project of the Cerro Verde Foundation has led me to get personally involved in donations that have allowed part of the expansion of the school. Waking up and seeing the faces of these children and the few

opportunities they have just to be born in this place has changed my perception of the important things in life.

Another student developed the water distribution and supply network as a final degree project, which was executed in 2015. One of his comments was that ‘It is a great satisfaction to have had the opportunity to participate in a project to provide access to water I drink to a population and thus improve the standards of life and health with my final degree project and its final implementation.’

During the three years of the project, students from different disciplines participated, spending all of their time in the village, conducting interviews, designing and managing training in waste management and hygiene, playing with children and making ‘gymkhanas’ (public places) for garbage collection. According to their speciality, each student became more involved in some subjects than others. For instance, civil engineers participated mainly in topographic studies and hydraulic and sanitation projects. Medical students covered subjects related to health, investigating the most prevalent diseases and their causes, as well as the medical management system existing in the country and region. Building engineers analysed construction materials used and their availability, durability and efficiency, the stability of buildings, possible improvements and the properties of local materials. Telecommunications engineers designed different ways to monitor water quality.

Results indicate that volunteering and cooperation promote awareness and professional and personal development of the student. It is also an excellent way to acquire new knowledge and competencies while working to improve the lives of disadvantaged populations to solve real problems and needs.

4. CONCLUSION

In a global context in which the mobility of international students is increasing (Rizvi, 2011), the strategy of HEIs focused on ESD can consider ISL as an interesting and powerful tool to develop competencies for SD, which can respond to some of the challenges proposed by Wiek et al. (2015) in the area of ESD research.

In this study, an ISL programme was applied in the EU in a similar way to other existing international experiences (e.g., Bamber and Pike, 2013; Kiely, 2005). However, in this case, the ISL approach has been analysed from two perspectives: the students’ perspective and the local population’s perspective. A remarkable improvement in the development of the perceived SD skills is shown when comparing volunteer and non-volunteer students. An average improvement of 8.5 per cent is achieved in all skills for sustainable development (SD) compared to non-volunteers. Qualitatively, the feelings and values of volunteer students are in the same direction as the findings of other authors with a deeper qualitative study (such as Bamber and Pike, 2013), changing the way students perceive the world and life.

When comparing these results with traditional methods, Ferreira, Lopez and Morais (2006) found that competencies such as teamwork, communication skills, the ability to adapt to changes, responsibility and ethical values are much more developed by participation in the project, followed by practical learning and theoretical classes. Following Barth

et al. (2007), four elements can characterize the processes of voluntary learning for the acquisition of skills: (1) volunteering and individual responsibility; (2) ethically oriented learning in real-life situations; (3) involuntary but conscious learning; and (4) interdisciplinary collaboration. In this type of voluntary learning, sustainability competencies are promoted – mainly interdisciplinary collaboration, planning, implementation skills and motivation. The results of our study are also aligned with these findings, combining formal and informal learning.

This study has a limitation, which is not measuring the initial situation – a lesson learned for future applications. The surveys were carried out on the students' return, considering that the feedback survey was more positive, not during the activity, but when completed and everyone had returned. However, there was a problem of the non-response in some cases, given that for some students it was their last course and it was very difficult contact them on their return. Although the sample is small, we do not consider that the key to the study is in a quantitative statistical question, but we understand the study presented more from the anthropological-qualitative point of view. In this regard and considering the basic matrix of competencies for sustainability established by Murga-Menoyo (2015) in the field of volunteering, the development of the eight competencies used for the study is promoted:

- Critical thinking: the EU is one of the most expensive Spanish private universities; therefore, the profile of students and their environment is significantly different from the reality that is lived in the village. Through the vital experience of the student in this environment, the student generates a deep analysis of poverty, its origins and connection with SD.
- Troubleshooting: without water and light, any inhabitant not already habituated has a problem to solve. Students are accustomed to an Internet connection to gather technical information and connect with their loved ones. The shortage of electricity makes these options difficult. When a challenge is considered, a solution is sought from the means available, but when resources are scarce and the budget is low, ingenuity is required to solve any issues and, you also have to do it from the perspective of the SD so that when you leave others can find those spare parts that preserve the service. Adaptive and innovative skills for SD are required that are not obtained in a classroom yet are essential to reach the most appropriate solutions for a local context.
- Decision making: the student's project is the one that is going to be implemented and any errors or failures may significantly damage a vulnerable population. Each decision regarding the project design, types and quality of materials, implementation procedures, useful life and maintenance are key to the SD of the local population.
- Working in multidisciplinary teams: students work in interdisciplinary environments with inhabitants of the local population who are from another country. Locals may have work methodologies totally different from the students' a language that, although having the same roots, has semantic nuances that lead to misconceptions on many occasions. In this environment, the skills necessary to ensure that the work meets the original objectives set in the field of SD of the local population are fundamental.
- Adaptation to change: the change experienced by the student has already been

mentioned and it is significant. Students live in a village in Southern Honduras, with no water, electricity or Internet connection. The students stay in local houses with a population they do not know who have completely different customs, are in dire poverty and consume a diet of mostly corn cakes and beans. Note that the students in this context live in critical situations and slowly adapt to change. It is a favourable situation to reflect on the change of society towards sustainability and the importance of adopting alternatives to face the challenges of unsustainable lifestyles.

- Responsibility: students have a great responsibility because the proposed project is going to be implemented. Students must ensure the village attains the SD linked to their project, which depends on the technical rigor of the programme and its calculation.
- Time management: students are only in the area for three weeks. In that short time, they are required to adapt to the environment, analyse the needs of the population, study the possibilities to achieve the SD with the technical and economic means available and obtain all the data needed for the study.
- Communication skills: there is currently an important function – that is, knowing how to live. For this, it is essential to know how to communicate. The cultural shock that occurs is significant. Knowing how to communicate with the inhabitants of the village and with the members of the FCV is crucial for all aspects of the project.

From the local approach, objective and subjective improvements were achieved, including improvement of the perceived quality of life, expectation of further improvements in the medium term and new or adapted infrastructure (accessibility, education, energy supply, water and sanitary network). FCV achieved these results between 2013 and 2016 with the close cooperation of the EU. These projects received an award from the National Congress of Honduras in December 2015.

This study explicitly links ISL with ESD, since they are synergistic areas with similar primary objectives. Results indicate the great potential to enrich each other as an integral and global strategy for any university towards a more sustainable world. A global framework that considers local and regional SL will be necessary and also ISL, integrated into the ESD strategic framework in future research. In addition, more evidence is needed from qualitative studies of change in both local communities and universities. Future research is needed on the acquisition of skills from different approaches to prioritize and balance future curricula while preparing future professionals and decision makers to achieve sustainability and SD – a fairer world.

The impact of this international service and learning approach is not obvious. From one perspective, this project has been developed by the FCV. The added value given by the university, professors and students, is important but not necessary. The biggest challenge is that the experience for students is normally in the month of July, but the need for help and project planning is not just for that month but throughout the year. The value given to the local community and the FCV is important, but it is merely anecdotal considering the whole project. Service-learning in practice is more learning (as a live experience) than service. To balance the importance of the service, an important commitment would be needed to be deployed whenever necessary, which is not an easy task with real curricular programmes.

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