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Cooperation and Human Development Projects as Bachelor, Master and PhD Thesis: Evaluating an Internship Program

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Abstract

The Research Group on Cooperation and Human Development (GRECDH) of the Technical University of Catalonia (UPC) has long promoted Bachelor, Master and PhD Theses in the framework of sustainable energy projects in low income countries. In this way, students combine their work at UPC with tasks in these countries. The aim of this paper is to present and evaluate the program through the experience of several students who participated in sustainable energy projects in Central and South America.

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1. Introduction

During the last years, the role of technology in the international development sector has increased in visibility and importance (Pérez-Foguet, Oliete-Josa, & Saz-Carranza, 2005). Engineers are now expected to be socially responsible and to understand the social context in which they work (Colon, 2008). In this sense, taught modules and teaching materials for engineering students should include not only technological analysis and economic evaluation, but also environmental and social considerations (Perdan, Azapagic, & Clift, 2000). Human rights and development should be integrated in higher education in order to face the requirements of the current globalised international socio-economic context (Ratnajeevan & Hoole, 2002; Pérez-Foguet, Oliete-Josa, & Saz-Carranza, 2005).

For enhancing the education of engineers in sustainable development real case studies may be introduced (Perdan, Azapagic & Clift, 2000). The benefits of using case studies is that students can visualize how sustainable development could be applied to engineering decisions and train their capacity to understand social, environmental and economic considerations associated with each project. Showing examples of good and poor practices has proven particularly effective, since it can assist students applying these concepts to both their academic and practical engineering applications within employment (Davis, 2006).

Traditional engineering curriculum is weak in opportunities for students to experience the link between engineering and socio-economic impacts on population. Recent experiences show that viewing the problems through the eyes of affected inhabitants and working in projects in real communities is especially effective for achieving an inclusive and integrative understanding (Juisto, McCauley, & Stephens 2013). Concerning development cooperation, showing real case studies of non-governmental organizations (NGOs) working in the field is most illustrative and effective (Johnston, Caswell, & Armitage. 2007), and spending periods of fieldwork in developing countries may be even better (Dohn, Gausset, Mertz, Müller, Oksen, & Triantafillou, 2003). In these educational practices, key issues are how educational principles are contained and to ensure that academic objectives are achieved (Dohn, Gausset, Mertz, Müller, Oksen, & Triantafillou, 2003).

In this context, the Research Group on Cooperation and Human Development (GRECDH) is a multidisciplinary research group of the Technical University of Catalonia (UPC), with researchers from different knowledge areas, but common objectives with respect to research applied to Cooperation and Human Development (GRECDH, <https://grecdh.upc.edu/>). Among other areas, GRECDH members participate in research programs and projects in Sustainable Energy, promoting access to energy services in isolated rural regions of low income countries for household, community and productive end uses. Additionally, GRECDH members are involved in teaching activities, at UPC and abroad, on subjects related to Development Cooperation (specialization courses, postgraduate courses and master degrees). GRECDH members have long promoted a program on Bachelor, Master and PhD Theses, which are partly carried out at UPC and partly in low income countries where projects are to be implemented, as an internship with a university, research centre or NGO. For the student, this is a very interesting combination of academic, research, professional and personal experience in development cooperation.

The aim of this paper is to present and evaluate this program through the experience of several students who participated in sustainable energy projects in Central and South America, for electricity generation with micro-wind systems and biogas production through anaerobic digestion of organic wastes.

2. Methodology

Some of the available instruments for universities to introduce development education are Bachelor, Master and PhD Theses (Boni & Pérez-Foguet, 2005). These can be undertaken by means of internships in low income countries (destination country) in collaboration with NGOs (Dohn, Gausset, Mertz, Müller, Oksen, & Triantafillou, 2003, Pérez-Foguet, Oliete-Josa, & Saz-Carranza, 2005) and/or other institutions (host institution). At UPC, these internships may be partly funded by the Centre for Development Cooperation (CCD-UPC), covering travelling expenses. CCD-UPC is funded by UPC members who donate 0.7% of their salary or tuition fee.

Research activities are supervised by UPC researchers who periodically visit each destination country to first hand see the project needs and research context. However, on-site supervision in each destination country is guaranteed by the host institution staff, who are the actual project promoters and implementers, and are more aware

of the context. In this way, Theses have an academic and scientific guarantee, while ensuring their usefulness and applicability.

In the micro-wind systems (Fig. 1) and biogas production fields (Fig. 2), most internships have so far been promoted in Central and South America, in collaboration with Engineers Without Borders (Spain, working in Peru and Bolivia), Practical Action (Peru, Bolivia), Ciudad Saludable (Peru), Institute for an Alternative Agriculture (IAA, Peru), National Agricultural Research Institute (INIA, Peru), National University of Cusco (UNSAAC, Peru), University of San Andrés (UMSA, Bolivia) and AsoFenix (AsoFenix, Nicaragua). Since 2007, 12 Bachelor Theses, 6 Master Theses and 2 PhD Theses have been conducted on micro-wind systems or biogas production (GRECDH, <https://grecdh.upc.edu/>). The internship duration varies between 2-6 months for Bachelor and Master Thesis and between 12-18 months for PhD Thesis.



Fig. 1. UPC students and professors participating in the micro-wind projects in Cajamarca (Peru).



Fig. 2. UPC students participating in the biogas digesters project in Cajamarca (Peru).

The evaluation of this experience can focus on different aspects (Dohn, Gausset, Mertz, Müller, Oksen, & Triantafillou, 2003), such as: the efficiency and effectiveness of the project result; the student supervision and mentoring; and the effect on the students education. Our students were asked the following information: 1) The degree of compliance with academic, personal and professional goals; 2) The training and mentoring received before and during the project; 3) The internship personal experience; 4) If the Thesis result would be executed or at least contribute improving the project; and 5) Whether they would continue being involved in development cooperation activities.

3. Results

The results of the evaluation are presented according to the responses to each of the questions.

3.1. The degree of compliance with academic, personal and professional goals

All students completed their Bachelor or Master Thesis, so academic objectives were satisfactorily met. Indeed, results of some Bachelor, Master and PhD Theses were published in relevant peer reviewed journals of the field (see for instance, Ferrer, Garfí, Uggetti, Ferrer-Martí, Calderón, & Velo, 2011, Bachelor Theses; Garfí, Ferrer-Martí, Pérez, Flotats, & Ferrer, 2011; and Ranaboldo, Ferrer-Martí, & Velo, 2014, based on Master Theses; or Ferrer-Martí, Domenech, García-Villoria, & Pastor, 2013, based on a PhD Thesis). Table 1 summarizes the number of Bachelor, Master and PhD Theses and published articles based on them.

Table 1. Bachelor, Master and PhD Theses and published articles in the field of micro-wind systems and biogas production development cooperation projects.

Year	Bachelor Theses	Master Theses	PhD Theses	Articles in indexed journals	Articles in other journals
2007	2				
2008	3				
2009	3	1		2	2
2010	3	1			1
2011				5	
2012				2	
2013	1	3	1	2	
2014		1	1	5	

Some Bachelor students continued their internships as Master or PhD Thesis, which allowed them to go deeper into the work developed and suggests that their personal experience was really satisfactory. Moreover, some students tried to continue in the development cooperation and research areas professionally, although not all of them managed to do so due to the economic crisis. Nevertheless, such an interest reaffirms the success of the program.

3.2. The training and mentoring received before and during the project

Most students were satisfied with the supervision received by UPC researchers. However, mentoring received from host institution was uneven. It was improved over the years, as the relationship between the host institution and UPC was strengthened, and especially when students continued to work on topics already started by former colleagues.

3.3. The internship personal experience

Even if mentoring by counterparties was uneven, the personal experience of the students was always positive, for getting to know a new country and context. In this sense, it helped that students often shared experiences with colleagues from UPC and other institutions from the same or a different country having collaboration agreements with the same host institution. Moreover, carrying out such an applied and useful academic study was also a personal satisfaction.

3.4. If the Thesis result would be executed or at least contribute improving the project

Most students, rather than seeing their project executed saw how their work would contribute improving future projects to be executed. Thanks to their evaluations and investigations, knowledge about the performance of on-going projects could be considered and incorporated in order to improve the following ones.

3.5. Whether they would continue being involved in development cooperation activities

Many students initiated or continued development cooperation activities after the internship, mostly as volunteers in NGOs. Some of them also wanted to work in the sector, however as already mentioned the Spanish context in the development cooperation sector is nowadays particularly complicated.

4. Conclusion

In summary, the results of the program evaluation show how these internships meet all academic goals and expectations of Bachelor, Master and PhD students. Moreover, their personal experience makes them enroll this kind of internships again after the first time. Also, most of them have continued development cooperation activities as volunteers and some of them even professionally.

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