

**PROMOTING DEVELOPMENT EDUCATION IN SPANISH
ENGINEERING STUDIES
A COMPREHENSIVE STRATEGY FROM THE NON
GOVERNMENTAL FIELD BASED ON A COLLABORATIVE
APPROACH WITH THE UNIVERSITY**

Agustí Pérez-Foguet

Federal representative for Development Education and
Research in the directive board of
Engineering without Borders
E.T.S. Enginyers de Camins, Canals i Ports de Barcelona,
Universitat Politècnica de Catalunya
C/ Jordi Girona 1-3, Campus Nord UPC – C2-210B, 08034, Barcelona
SPAIN
agusti.perez@upc.edu

Alejandra Boni

Group of Studies in Development, International Cooperation and Applied Ethics
Department of Engineering Projects
Polytechnic University of Valencia
Camino de Vera s/nº, Valencia, 46022
SPAIN
aboni@dpi.upv.es

ABSTRACT

The main goal of this paper is to present the concept of ‘Technology for Human Development’ (THD) as a conceptual and particular framework for promoting ‘Development Education’ (DE) programmes in engineering curricula. The proposal is based on the accumulated experience of the Spanish federation of Engineering Without Borders (ISF-Spain) since the mid-nineties, when the first specific proposals were consolidated, as well as the on-going work promoted by the network. Remarkably, ‘THD’ constitute a general framework not only for educational purposes but also for engineering practice in the international development and the co-operation fields. For ISF-Spain, ‘THD’ constitutes a strategic goal for overseas development programmes which necessarily include lobbying campaigns, engineering educational proposals, awareness-raising and research activities. As an example, the ‘DE’ state-level programme for 2005-06 is presented.

KEYWORDS ‘International Development Cooperation’, ‘Appropriate Technology’, ‘Human and Sustainable Development’, ‘Development Education’, ‘Engineering Education’, ‘Non Governmental Development Organisation’.

INTRODUCTION

The role of technology in international development and co-operation fields has increased both in terms of its visibility and its importance particularly since the year 2000. For instance, two recent annual reports of international governmental institutions highlight the role of engineering when analysing the ‘state of the world’ from a development perspective (UNDP, 2001: “Making New Technologies Work for Human Development”; World Bank, 2004: “Making Services Work for Poor People”). Similarly, UNESCO’s (2003) “Engineering for a Better World” and the InterAcademy Council’s (2004) “Inventing a better future”, focus on similar aspects, and, more recently, the ‘Task Force on Science, Technology and Innovation’ of the ‘UN Millennium Project’ has presented the work “Innovation: applying knowledge in development” (2005), which analyses how technology, infrastructure and engineering can contribute to achieving the ‘Millennium Development Goals’.

On the other hand, specific engineering-focused NGDOs and networks (as ITDG, Engineering Without Borders, Engineers for a Sustainable World, RedR, Engineers Against Poverty, etc...) and professional ones (as the World Federation of Engineering Organizations or the UK Institution of Civil Engineering), are gaining

strength in promoting ‘human development’ and poverty reduction. Moreover, they are consolidating their interconnectivity and thus creating potential synergies, thanks to the promotion and facilitation role assumed by UNESCO.

“Capacity development” (Baser and Bolger, 1996) is a key point in most of the actual proposals. However, the discrepancies on the understanding of the ‘development’ concept (Chambers 2004) as well as on practical strategies towards poverty reduction, make communication and common work between institutions and organizations difficult. Therefore, the real engineering impact is significantly reduced with respect to its practical potential. In order to overcome these difficulties, we present the approach based on ‘**Technology for Human Development**’. THD is based on the ‘Human Development’ paradigm, promoted by international agencies such as the UNDP since the beginning of the nineties, as well as on the questioning promoted in some forae addressing the common use of ‘Appropriate Technologies’ (AT) term used in an over reductionist way.

Approaching THD from a HD perspective implies **looking at technology from the following three points of view**: 1) THD should guarantee basic rights and access to basic services with equity and a minimum standard of dignity; 2) THD should assure a minimum level of production and of social participation capacities; and 3) THD should facilitate sustainability and empowerment. All three requirements apply to any technology, although, a particular one may be more related to one technology solution than to the others. One relevant contribution of this approach is the difference between security-based and sovereignty-based technological solutions (secure and equitable versus sustainable and empowering).

One of the applied ways of promoting THD is the **incorporation of DE activities in engineering education**. DE is a recognized tool of international development and co-operation sectors. It was defined by CONCORD General Assembly of November 2004 as “an active learning process, founded on values of solidarity, equality, inclusion and co-operation, [which] enables people to move from basic awareness of international development priorities and sustainable human development, through understanding of the causes and effects of global issues, to personal involvement and informed action”.

DE is closely related to other value-based educational approaches, such as sustainability, peace, gender, human rights and global citizenship. In this respect, since the mid-nineties, engineering education has been incorporating education on

sustainability (see, for instance, the Int. J. of Sustainability in Higher Education, which include experiences closely related to those involved in DE approaches: cross sector partnerships, case studies and problem-oriented learning activities). All these proposals push for including social and political reasoning in engineering practice and education (Prados, 1997). Remarkably, DE in engineering is also an economic-attractive proposal for the actual globalized society, which requires future professionals to have also “globalized” capacities (UNDP, 2004).

Following DE trends, engineering schools and engineering curricula should aim at developing individual, institutional and societal capacities, apart from technical ones, and include integral learning processes framed within a human development perspective. Engineering education has to adapt to the emerging approaches put forward by international development actors. In a globalized world, the work of future engineers will be carried out in many contexts. In the case of developing countries, the human development approach is increasing in importance, and in industrialized countries, the lessons learned from development projects can be used to contribute to a more sustainable engineering practice.

DE STATE-LEVEL PROGRAM 2005 – 2006 OF ISF-SPAIN¹

First experiences in promoting DE in Spanish engineering education appeared more than ten years ago, during the early nineties. Most of them were presented in the 2001 Congress “DE in the University”, organized by the University of Valladolid and ISF-Spain. However, despite the long trajectory accumulated, support for such initiatives in the university is still, in general, insufficient nowadays.

A brief description of the major lines of action of ISF-Spain’s Development Education Program for years 2005 – 2006 follows. Note that support to research on engineering applied to development is included in the DE program. This is due to the institutional vision that research and higher education should obey always to a common strategy. Remarkably, main financial support to the program is found in local

¹ ISF-Spain is an average size DNGO, for Spanish standards. It has strong links with universities and engineering schools, as well as with engineering associations, business, and other civil society organizations; and it has been one of the major promoters of DE in technical higher education, mainly in the Technical Universities of Catalonia, Madrid and Valencia. Remarkably, nowadays, ISF’s network connects most of the DE experiences in engineering, and not only at Spanish level.

governments and universities, as during previous years. State funding for the overall program is pendent.

- **Supporting the inclusion of DE principles into engineering education:** 1) Offering academic resources (Pérez-Foguet et al., 2005), experienced collaborators and diffusion channels for DE activities included in the curricula (supporting over fifteen specific courses academic year 04/05); 2) Offering training courses for university permanent faculty and collaborators.
- **Promoting volunteering and social participation in Spain:** 3) Promotion and institutional participation in cultural, social and environmental-focused university volunteering programs; 4) Offering specific volunteering training and internships in ISF-Spain's working groups.
- **Offering overseas internships:** 5) Short-term (two months) technical-based overseas internships in small groups, allowing to experience the living conditions of the communities with whom ISF-Spain and its partners collaborate; 6) Long-term (three to six months) technical-based overseas internships, usually linked to engineering final degree projects or MSc/PhD thesis work.
- **Offering complementary education on THD:** 7) Pushing inter-university Master's degrees on THD, mixing e-learning with expert seminars and overseas internships, and participating in related postgraduate courses promoted by other institutions; 8) Organization of an annual international conference in THD (together with the technical universities of Madrid and Catalonia), and several seminars and minor conferences in different schools.
- **Supporting research on THD:** 9) Editing the Spanish-written International Journal in THD and coordinating the national awards for final year projects and PhD theses on THD, together with professional engineering associations; and 10) Supporting university research groups focused in applied engineering to international co-operation and development, as well as promoting their co-ordination with the development programs pushed by ISF-Spain itself.

It is relevant to note that sharing experiences and efforts between different value-focused educational proposals has, nowadays, a special sense in Spain. The ongoing reform of the higher education system promoted from Bologna Treaty of the European Union offers interesting opportunities in this field (Boni and Lozano, 2004), although some problems regarding the actual formal structure of DE proposals have been also identified (Gómez et al, 2005).

ACKNOWLEDGMENTS

The authors would like to thank the support and efforts of volunteers, staff and partners of the Engineering without Borders' network, origin and execution arena of the THD approach presented. Moreover, the continuous support to the DE program given by the Generalitat de Catalunya and the Civil Engineering School of UPC at Barcelona are gratefully acknowledged.

REFERENCES

- BASER, H. and BOLGER, J. (1996), *From Technical Cooperation to Capacity Development: Changing Perspectives in CIDA* (Gatineau: Canadian International Development Agency)
- BONI, A. and LOZANO, J.F. (2004), Ethical learning in the new curricula. An approach to the Spanish case, *SEFI 2004 Annual Congress. The Golden Opportunity for Engineering*, Universidad Politécnica de Valencia, Valencia
- CHAMBERS, R. (2004), *Ideas for Development: Reflecting Forwards*, Working Paper 238, Institute of Development Studies, Sussex
- GÓMEZ, M. LL., CALABUIG, C., BONI, A., PERIS, J. and MONZÓ, J.M. (2005), *European Space for Higher Education: Opportunities and Risks for Development Cooperation from the University* (in Spanish) *Revista Española de Desarrollo y Cooperación*, (forthcoming)
- PÉREZ-FOGUET, A., OLIETE-JOSA, S., SAZ-CARRANZA A. (2005), Development Education and Engineering: A framework for incorporating reality of developing countries into engineering studies, *International Journal of Sustainability in Higher Education*, 6(3), (in press).
- PÉREZ-FOGUET, A. MORALES, M. and SAZ-CARRANZA A. (2005), *Introduction to Development Cooperation for Engineers* (in Spanish) (Barcelona: ISF – Universitat Politècnica de Catalunya).
- PRADOS, J.W. (1997), *Engineering curricula 2000 - A change agent for engineering education*, *Journal of Engineering Education*, 86(2), 69-70
- UNDP (2004), *Unleashing Entrepreneurship: Making Business Work for the Poor*, *United Nations Commission on the Private Sector and Development*, (New York: United Nations Development Programme)