

1st INTERNATIONAL CONFERENCE ON

ENGINEERING EDUCATION FOR THE XXI CENTURY

New competences in Engineering Education in the area of sustainability and university social responsibility



Luis Cabedo
Teresa Guraya (eds.)

Universitat Jaume I
Castelló de la Plana
July 6th - 7th, 2017

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International Conference on Engineering Education for the XXI Century

(1.º 2017. Castellón de la Plana)

New competences in Engineering Education in the area of sustainability and university social responsibility [Recurso electrónico] / [co-organizado por la Universitat Jaume I y la Universidad del País Vasco]. – Datos. – Bilbao : Universidad del País Vasco / Euskal Herriko Unibertsitatea, Argitalpen Zerbitzua = Servicio Editorial, [2017]. – 1 recurso en línea : PDF (167 p.)

Textos en inglés y español.

Modo de acceso: World Wide Web

ISBN: 978-84-9082-642-3.

1. Ingeniería – Estudio y enseñanza – Congresos. 2. Aprendizaje servicio. 3. Mujeres en ingeniería.
4. Desarrollo sostenible. 5. Cooperación universitaria.

(0.034)62:378(063)



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Servicio Editorial de la Universidad del País Vasco

ISBN: 978-84-9082-642-3

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Editorial

On behalf of the organising committee, we are pleased and honoured to welcome you to the FIRST INTERNATIONAL CONFERENCE ON ENGINEERING EDUCATION FOR THE TWENTY-FIRST CENTURY, to be held in Castellón de la Plana (Spain) on 6 and 7 July 2017.

The conference is co-organised by the Jaume I University in Castellón (UJI) and the University of the Basque Country (UPV-EHU) and is intended as a forum for the exchange of ideas, opinions and experiences and debate on the subject of engineering education and ways in which it can be adapted to the new university paradigm. The central theme of this first conference is «*New competences in the area of sustainability and university social responsibility*».

The aim is to discuss the need to incorporate new transverse competences associated with sustainability and university social responsibility into the engineering curriculum. Teachers today face difficult challenges in this area. We need to identify and define these competences and find the best way of addressing them in the engineering curriculum. Taking part will be some renowned international colleagues from the areas of sustainability and social responsibility, who will help open the floor to deliberation and discussion. We will also hear from colleagues who are already working in this direction in their teaching practice, and whose experience will serve as an example and inspiration.

The conference is interested in works on education in engineering, particularly by those who are implementing some aspect of social responsibility and sustainability in undergraduate and postgraduate engineering studies. Communications are related to the creation of theoretical frameworks, application of new methodologies in the classroom, presentation of teaching experiences or any other activities related to engineering education.

The conference includes five main sessions:

- a) **Service-Learning and social commitment in engineering.**
- b) **Engineering and gender.**
- c) **Engineering and development co-operation.**
- d) **Environmental sustainability.**
- e) **Corporate and business social responsibility.**

The present book is the compilation of the abstracts submitted by the conference delegates as delivered.

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Application of the Service-Learning Methodology to the Development of the End of Degree Project in chemical Engineering

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ABSTRACT

The Bologna Process, with the new European Higher Education Area (EHEA) has provided an opportunity for methodological renewal in which, basically, the student is at the center of the teaching-learning process. This objective materializes with the tendency to use the so-called active and experiential methodologies that, together with the application of a continuous evaluation system, constitute the two main pillars of methodological renewal.

One of these methodologies is called Service-Learning (SL), whose foundation is based on the learning of curricular contents while providing a service to society from a perspective of reciprocal collaboration. The basic elements of an SL project or activity are: student leadership, attention to a real situation, connection with curricular objectives, project or activity execution and reflection.

This paper aims to demonstrate how the SL methodology can be incorporated into the development of the End of Degree Project (EDP) in a Bachelor Degree in Chemical Engineering, allowing the students, while performing the learning related to the degree and acquire the professional skills, develop entrepreneurship skills and meet social needs.

To demonstrate the effectiveness of this methodology, it has been applied to a real case of development of an EDP of the Bachelor Degree in Chemical Engineering at the University Jaime I of Castellón by a student during the course 2015-16. The EDP has

dealt with the solution of a problem of wastewater in a small town located in Castellón province near the University. The project relates to a tertiary treatment, using advanced separation techniques based on nanofiltration. Current, conventional wastewater treatment gives rise to a deputed water characterized by a persistent brownish coloration, as a consequence of the mixing of industrial wastewater coming from a textile factory to the urban wastewater circuit. Hence, it has been necessary to design a new purification system in order to obtain transparent water suitable for reuse. In short, by completing the EDP work the student has trained the skills of social entrepreneurship, experience on technical and economic balance and management of difficulties. In addition, this methodology has also allowed the student to make a first incursion into the research activity as well as to improve her communication skills.

Key words: Service-Learning (SL), End-Degree Project (EDP), Chemical Engineering, Membrane technology, Nanofiltration.
