

Declaration of Barcelona

Final Version October 2004

Preamble

We live in an increasingly complex world and we are at a critical juncture at which humanity must make some serious choices about the future. Our current model of development poses significant challenges when it comes to achieving a more just society based on respect for nature and human rights, and demands a fairer economy and greater solidarity towards different cultures and future generations.

Ignoring this reality when educating and informing future citizens, and therefore future professionals, could have severe consequences. It is undeniable that the world and its cultures need a different kind of engineer, one who has a long-term, systemic approach to decision-making, one who is guided by ethics, justice, equality and solidarity, and has a holistic understanding that goes beyond his or her own field of specialisation.

Education supports a process of self-discovery and learning about the world, encourages personal development, and helps individuals find their roles in society. However, education is also a commitment to improving society by strengthening communities and stimulating social progress. This reality forces us to reconsider the purpose of our role as social actors, in particular as educators, and to construct a way of responding to these challenges.

Education, and particularly higher education, is a vital tool to be used for facing today's challenges and for building a better world. Higher education is essential if we are to achieve sustainable development and therefore social progress. It also serves to strengthen cultural identity, maintain social cohesion, reduce poverty and promote peace and understanding.

Higher education institutions must not restrict themselves to generating disciplinary knowledge and developing skills. As part of a larger cultural system, their role is also to teach, foster and develop the moral and ethical values required by society. Universities need to prepare future professionals who should be able to use their expertise not only in a scientific or technological context, but equally for broader social, political and environmental needs. This is not simply a matter of adding another layer to the technical aspects of education, but rather addressing the whole educational process in a more holistic way, by considering how the student will interact with others in his or her professional life, directly or indirectly. Engineering has responded to the needs of society and without a doubt, today's society requires a new kind of engineers.

We declare that

Today's engineers must be able to:

- Understand how their work interacts with society and the environment, locally and globally, in order to identify potential challenges, risks and impacts.
- Understand the contribution of their work in different cultural, social and political contexts and take those differences into account.
- Work in multidisciplinary teams, in order to adapt current technology to the demands imposed by sustainable lifestyles, resource efficiency, pollution prevention and waste management.
- Apply a holistic and systemic approach to solving problems and the ability to move beyond the tradition of breaking reality down into disconnected parts.

- Participate actively in the discussion and definition of economic, social and technological policies, to help redirect society towards more sustainable development.
- Apply professional knowledge according to deontological principles and universal values and ethics.
- Listen closely to the demands of citizens and other stakeholders and let them have a say in the development of new technologies and infrastructures.

Engineering education, with the support of the university community as well as the wider engineering and science community, must:

- Have an integrated approach to knowledge, attitudes, skills and values in teaching.
- Incorporate disciplines of the social sciences and humanities.
- Promote multidisciplinary teamwork.
- Stimulate creativity and critical thinking.
- Foster reflection and self-learning.
- Strengthen systemic thinking and a holistic approach.
- Train people who are motivated to participate and who are able to take responsible decisions.
- Raise awareness for the challenges posed by globalisation.

In order to achieve the above, the following aspects of the educational process must be reviewed:

- The links between all the different levels of the educational system.
- The content of courses.
- Teaching strategies in the classroom.
- Teaching and learning techniques.
- Research methods.
- Training of trainers.
- Evaluation and assessment techniques.
- The participation of external bodies in developing and evaluating the curriculum.,
- Quality control systems.

These aspects cannot be reviewed in isolation. They need to be supported by an institutional commitment and all decision makers, in the form of:

- A redefinition of institutions' and universities' missions, so that they are adapted to new requirements in which sustainability is a leading concern.
- An institutional commitment to quality.
- An institutional support for changing educational paradigms and objectives research funding.

Universities must redirect the teaching-learning process in order to become real change agents who are capable of making significant contributions by creating a new model for society. Responding to change is a fundamental part of a university's role in society. There is evidence that sustainable development has already been incorporated in engineering education in a number of institutions around the world. The United Nations Decade on Education for Sustainable Development (2005-2014) offers a great opportunity to consolidate and replicate this existing good practice across the international higher education community.

Universities now have the opportunity to re-orient the traditional functions of teaching and research, by generating alternative ideas and new knowledge. They must also be committed to responding creatively and imaginatively to social problems and in this way educate towards sustainable development.