Full d'experiències d'Innovació Docent en Educació Superior

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Adapting the Computer Engineering Degree to the EHEA

Introduction

This edition marks the beginning of a new collection of publications that will showcase the various educational innovations and experiments being implemented at the University within the framework of the European Higher Education Area (EHEA), specifically the courses that form part of the DURSI and UAB pilot plans.

Readers are invited to reflect on the innovations being introduced on our campus, as well as to share, generalise and adapt them to different educational contexts.

As we work towards the EHEA, we will discover new planning strategies, educational methodologies, learning styles, evaluation methods, etc. By sharing these new discoveries, we can enrich our educational reality. It will be shaped by both our individuality and the educational community as a whole. In a sense, it will become the educational reality of the entire university.

We hope that these experiences inspire you to discover new and different ways of teaching and learning.

We encourage your participation and welcome your suggestions.

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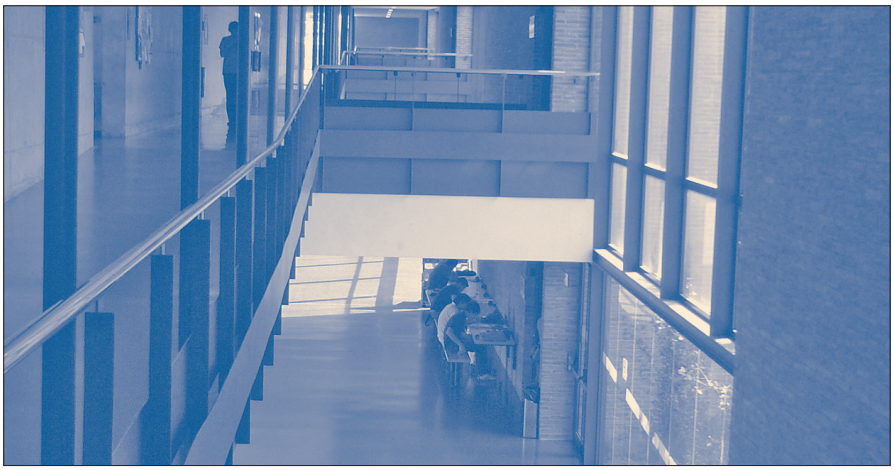

Educational experiences in the Computer Engineering course

The recommendations of the Bologna Declaration have inspired the countries of the European Community to re-examine their higher education systems.

In March 2004, prior to any relevant decrees by the Spanish Ministry of Education, Science and Sports, the Catalan Ministry of Universities, Research and the Information Society (DURSI) invited Catalan universities to adapt some of their degree programmes to the future European model while maintaining their current syllabuses. Under this Pilot Plan, each university created their own three-year undergraduate degrees that were recognised and supported by DURSI. The UAB defined and developed various degrees, including a Computer Engineering degree that was offered immediately.

We do not intend to describe the entire process of creating this new degree, its minor 'successes', its minor misfortunes, and the enthusiasm and long hours of work it required, since any educator who has been involved in a similar project is familiar with these experiences. However, we would like very much to share some of our educational experiences with colleagues who have worked on other degrees, in the hope that we can learn from one another.

In our view, based on the educational methods used at the School of Engineering, adaptation to the EHEA presents four main challenges:

1. Placing students at the centre of the learning process.

2. Imparting, as a necessary part of university education, skills that go beyond mere knowledge.

3. Overcoming the 'unpleasant' (though inevitable) limitations of the available educational resources.

4. Dealing with teaching staff who are resistant to – or outright opposed to – the philosophy behind EHEA adaptation or the educational innovations themselves.

Because the EHEA places students at the centre of the learning process, the new educational methods must be based on the students' work. The introduction of such methods requires teaching staff to become highly dedicated to the tasks of tutoring, correcting, evaluating, preparing case studies, etc – tasks which are directly hampered by the fact that educational resources are limited. To overcome this, we have taken action in the following areas:

1. Lectures vs 'theory' classes

Obviously, there is theoretical knowledge that students simply must learn; this does not mean, however, that it must be explained exhaustively in class. We have chosen a lecturing style that presents the basic concepts and directs students to complementary materials so that they may obtain the necessary knowledge independently. This lecturing style has two major benefits: 1) the number of face-to-face sessions can be reduced, and 2) educational resources can be 'recovered' and used for other tasks.

2. Practical sessions

Practical sessions are an essential part of any engineering degree. For most subjects, practical sessions consist of two parts: 1) work in a laboratory equipped with the necessary resources, and 2) preparation work, which can be equally or more complex. We chose to separate these two parts to the greatest extent possible. This approach has two goals: 1) to minimise the number of laboratory hours in order to conserve educational resources (ie, hours of the lecturers' time), and 2) to promote independent learning by forcing students to do as much work as possible without the direct supervision of the lecturer.

We also encourage lecturers to develop a series of practical sessions that each cover a small part of a large project that continues throughout the academic year. For example, in one subject students must design a control system for a lift. At the practical sessions, they are asked to work on different modules of this system that meet the various educational goals of the subject. We are conscious of the challenge of creating projects that are 'attractive' to students.

3. Seminars vs 'problem' classes

Seminars bridge the gap between theory and practice. The knowledge transmitted during lectures must be 'ripened' by students before they are able to apply it to practical work. The seminars are the 'ripening' stage. We discourage lecturers from formulating closed, artificial statements of problems (provided, obviously, that this is possible and appropriate). By presenting the problems as 'cases', we are able to explore various possible solutions.

This course has a large number of students and comparatively few lecturers, so we were unable to split groups up for problem classes. As a result, some problem classes had (and in some cases still have) up to 80-100 students.
By using the resources saved by redefining our approach to practical sessions and lectures, we have been able to create new seminar groups of 40-50 students.

As you can see, there are many aspects that deserve closer attention, but unfortunately the number of words in this paper is also a limited resource, so let me simply outline a couple of ideas related to points 2 and 4.

The lecturers are concerned about the introduction of skill-based teaching, among other reasons because they are not used to this concept. Certain skills seem easy to apply, such as 'ability to work in a group' and 'oral and written communication'. We can more or less agree that, by having students carry out their practical work in groups, present reports and make public presentations, we can help them attain these skills (although whether this is the best approach is still open to debate). But how can we teach 'interpersonal relationship skills' or a 'multidisciplinarity'? The way in which students acquire skills varies from one course to the next. Nevertheless, we feel that the systematic sharing of experiences among the lecturers at our university – and other universities, for that matter – could be highly beneficial.

Finally, I would like to comment on the scepticism and enthusiasm of the teaching staff. We have all come across colleagues who are resistant to – or flat-out against – educational changes. However, many lecturers are willing (though not necessarily able, due to time constraints) to do the impossible to ensure that their teaching methods 'reach' students. Both groups are necessary: the former to push forward, and the latter to keep us from losing control. We need to listen to everyone, because even those who are 'flat-out against' change are right in many regards.

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