

TEACHING ELECTRONICS IN ENGLISH: A NEW EXPERIENCE AT THE ENGINEERING COLLEGE OF VALENCIA

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Abstract ^{3/4} A new educational experience was initiated in the Technical Industrial Engineering School of Valencia (EUITIV) in September 2001 when specific subjects in the electronics bachelor degree course were taught, for the first time, in English. This experience was part of the Europa Project introduced in the Universidad Politécnica de Valencia (UPV). The authors belong to the Electronic Engineering Department of the UPV and have begun teaching some subjects in English, or directly collaborate in this teaching.

This paper shows the results of the first year. During the 2001/2002 academic year, two subjects were taught in English: Power Electronics and Advanced Industrial Electronics Systems.

We describe the advantages and problems experienced by students and teachers. We also discuss future possibilities and others aspects such as continuous evaluation, the type of student attending these classes, and the main fears encountered.

Key words: ^{3/4} Teaching experiences, European convergence, Student exchange programs, International education.

INTRODUCTION

During the 2000 academic year, the 'Europa' project was introduced in the UPV. The main objective was to improve educational quality by encouraging the active participation of teachers and students. The Europa project includes many programs and is divided into five blocks:

- Complementary programs for teaching support (ACE)
- Programs for educational organization support (ADO)
- Programs for the integral student training (AFI)
- Programs for learning improvement (AMA)
- Programs for teaching improvement (AME)

Programs included in the AFI block attempt to expand university student training possibilities. Specifically, program AFI-4 promotes teaching in English at the UPV.

This could lead to the creation of a whole degree taught in English at the UPV. This project accords with Bologna declarations on the European space for higher education.

All the programs included in the Europa project receive support (economic, credits, etc.) in order to motivate student and teacher participation. As far as program AFI-4 is concerned, the UPV offers each school extra credits to allow the training of English language groups. Teachers involved in this experience can also obtain some support – such as translation help – from the university. As a first step, teachers wishing to teach in English were asked to volunteer to take part in the program. The school then compared the available extra credits with the number of volunteer teachers, and created additional groups to be taught in English and form part of the AFI-4 program.

The AFI-4 program was started during the academic year 2001/2002 and included 52 subjects at the UPV. Some six of these 52 subjects were taught in the EUITI (see Figure 1). In the electronic engineering bachelor degree course, two subjects were selected by the electronics engineering department: Power Electronics and Advanced Industrial Electronics Systems. The results obtained from this first year follow below. Some improvements for next year are also proposed, as this program is being expanded to include key subjects from the first and second-year course.

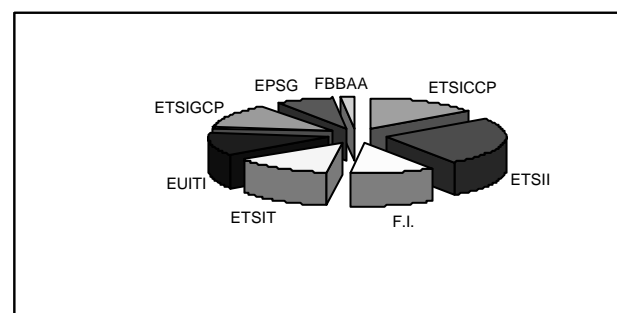


Fig. 1- Distribution of all subjects taught in English in the different UPV schools.

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TEACHING IN ENGLISH – FIRST EXPERIENCES

Power Electronics and Advanced Industrial Electronics Systems are third-year subjects in the electronic engineering bachelor degree course. Both subjects were taught in English during the 2001/2002 academic year. The main features of these subjects are:

- Power Electronics is an obligatory and year-long subject. Students attend 60 hours of theoretical classes and 30 hours of laboratory classes. The main contents are power semiconductors, static converters, control of switch converters, and protection elements used in power electronics.
- Advanced Industrial Electronics Systems is an optional and year-long subject. Students attend 90 hours of theoretical classes and 30 hours of laboratory classes. The main contents are microcontrollers and their industrial uses (control of AC and DC motors, control of switch converters, and renewable energies).

While the classes in English started this year, the decision to begin was not taken until the start of the academic year in September, and few students attended the first classes. The main problems were:

- Lack of information for students at the moment of registration about the existence of English groups.
- Class times for the English groups were set late in the day and were therefore unsuitable for many students.
- Students were nervous about changing language in complicated subjects.

During the two first weeks of the academic year, teachers who taught in English informed the Spanish language groups about the existence of English groups and encouraged them to join. In the end, an average of five students attended the English groups in Advanced Industrial Electronics Systems and an average of nine students attended in Power Electronics. All the students were Spanish and, in general, their English level was intermediate.

Teachers who participated in this experience tried to make the subject understandable for the students and avoid making language an obstacle. As all the students were Spanish with an intermediate English level, the following teaching method was followed:

1. Teachers spoke English during the class. However, when any concept presented greater difficulty for the students, a Spanish explanation was given after the English – if the students requested it or the teacher thought it was necessary.

2. As teachers were unaware that this project was going to be introduced until the beginning of the academic year, slides and complementary documentation were not translated into English. Students could therefore follow the explanations, even if they did not understand some spoken words.
3. Everything on the blackboard was written in English.
4. Students could ask questions in either English or Spanish.

These methods were used to encourage the maximum number of students to attend the English groups. Other factors motivating students to attend were:

- Students could obtain a certificate of attendance for the English classes, which could be included in their curriculum vitae.
- English groups were small and therefore students received personal attention.
- The EUITIV office of international relations gave students attending English classes priority over other students in choosing a foreign university destination under the Socrates program.

At the end of the academic year, students who attended English groups were questioned about their general impression of the experience and asked to propose possible improvements for the following year. The opinion poll showed a high level of satisfaction, although some improvements were proposed. The majority of the students said that less effort was required than they had initially imagined. They also stated that some of their colleagues attending the Spanish groups would have chosen English classes if they had been able to try the experience at an early stage. As for improvements, they suggested that the teachers also translate the complementary documentation into English, although there was no agreement about translating the slides. They also requested more convenient class times.

FUTURE PERSPECTIVES AND POSSIBLE IMPROVEMENTS

For the 2002/2003 academic year, the UPV has decided to widen the number of subjects taught in English. In particular, the EUITIV section of the electronic engineering department will now teach five subjects. In addition to the subjects presented in Section 3 (Advanced Industrial Electronics Systems and Power Electronics), these additional subjects will also be taught in English (all being compulsory subjects in the electronics bachelor degree course):

- Electronic Technology: this is a second semester subject with 60 hours of theoretical lessons and 30 hours of laboratory classes. The basic concepts of

electronics are introduced: basic semiconductor components (diodes, transistors, etc.), basic semiconductor circuits, signal amplification (with transistors and operational amplifiers), and an introduction to combined digital circuits.

- Analog Electronics: this is a third semester subject with 45 hours of theoretical lessons and 15 hours of laboratory classes. Analog circuits based on operational amplifiers are presented and analyzed. Tools to design analog signal processing systems are studied.
- Electronic Instrumentation: this is a fourth semester subject with 60 hours of theoretical lessons and 30 hours of laboratory classes. The basic concepts of instrumental measurement are introduced. Sensor related signal conditioning techniques are analyzed and analog-to-digital and digital-to-analog converters are presented.

One of the mid-term objectives of this project is to teach in English all the compulsory subjects given by the electronic engineering department in the electronics bachelor degree course. To reach this goal, the subject of digital electronics should be included. This subject, which is taught during the third semester, together with analog electronics, has not been included because of the limited number of credits granted to the centre by the university academic bureau for the 2002/2003 academic year.

Since the new subjects to be taught in English are first and second year subjects, it is expected that these classes will be attended by foreign students coming to the EUITIV on exchange programs. These students usually register for first and second year subjects. This fact will probably force a review of the teaching methodology used during the 2001/2002 academic year and the complementary use of Spanish will probably disappear.

To avoid the difficulties encountered during the first year, several initiatives have been started with a twofold goal:

- To properly advertise the option of classes in English.
- To gather information regarding the opinion of the students about the experience.

First and second year students (200 in total) were asked to fill-in a questionnaire. The results are shown below. Firstly, we attempted to discover what students believe their English level to be. The results are shown in Figure 1.

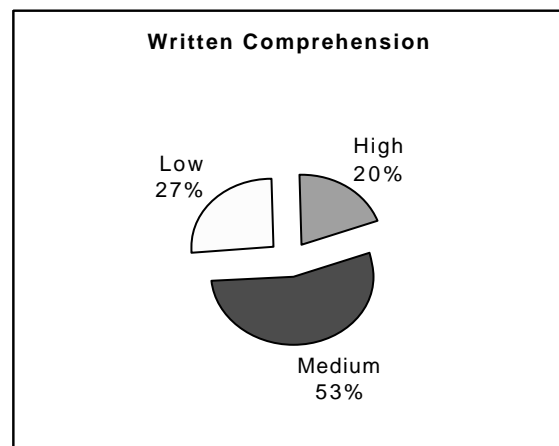
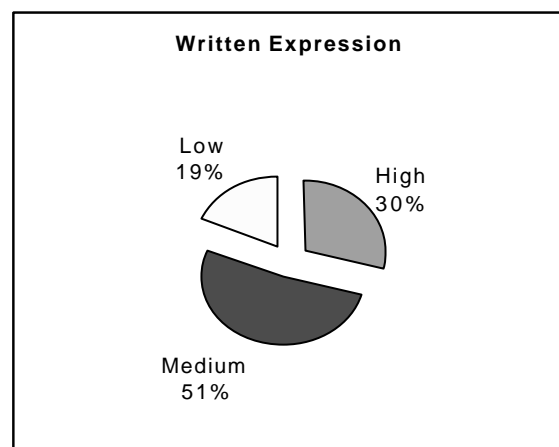
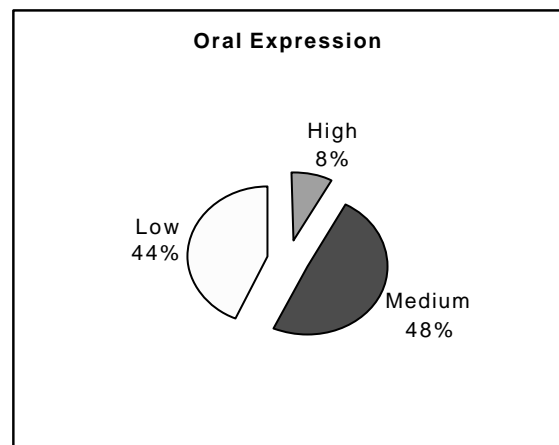


Figure 1- English ability level.

It can be seen that, in general, first and second year students believe themselves to possess an intermediate level of written English and a low-intermediate level of spoken English. Despite this, many are interested in studying some of the offered subjects (see Figure 2). However, this data is not very reliable given that the survey was a mere consultation and not binding.

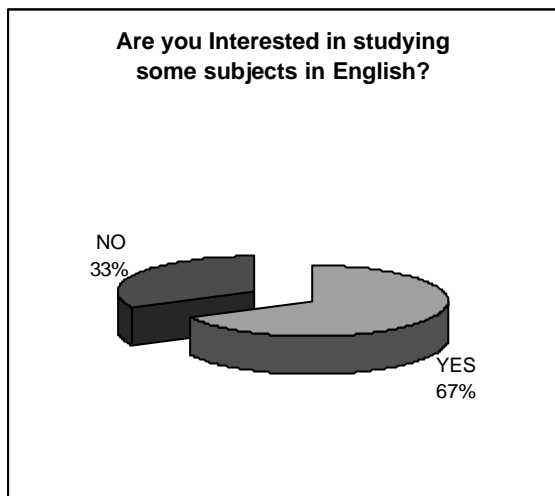


Figure 2 - Interest shown by the students in studying in English.

The questionnaire also asked students which language they preferred for the complementary documentation and slides. Figure 3 shows that the majority of students prefer complementary documentation in Spanish.

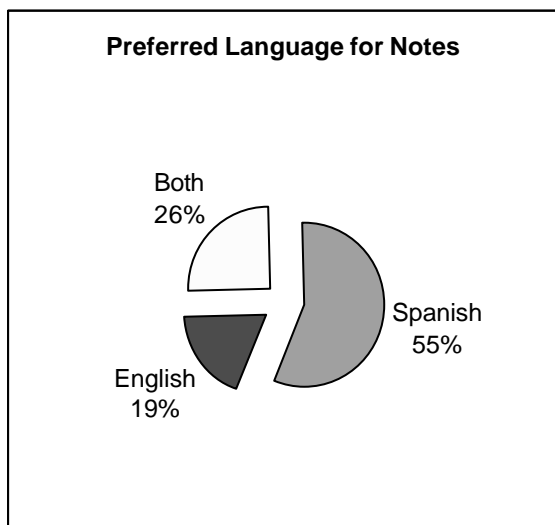


Figure 3- Documentation language preferences for notes.

However, with regard to the slides (see Figure 4), the percentages are evenly divided – with equal numbers preferring English and Spanish. Since the complementary documentation is already available in Spanish, our aim for the 2002/2003 academic year is to translate it into English and allow the students to choose. With respect to the language for the slides, each teacher will have to decide after analyzing his particular subject and asking the opinion of the students.

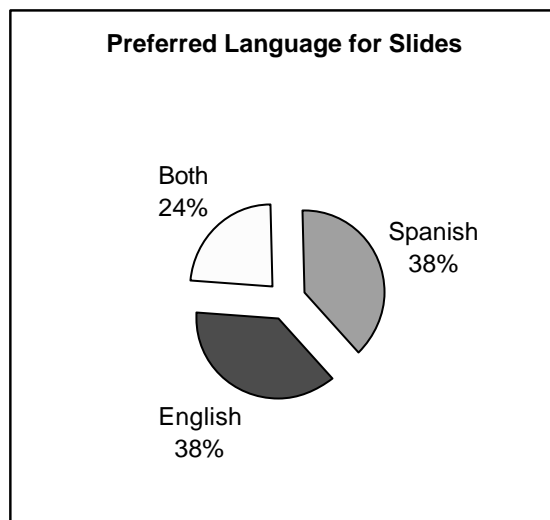


Figure 4- Documentation language preferences for slides.

Finally, students were asked about their preference for the class times. Most students prefer the English groups to be scheduled in the morning (see Figure 5). As a result, every effort will be made to give the English groups this preferential scheduling, and so encourage greater attendance in the 2002/2003 academic year.

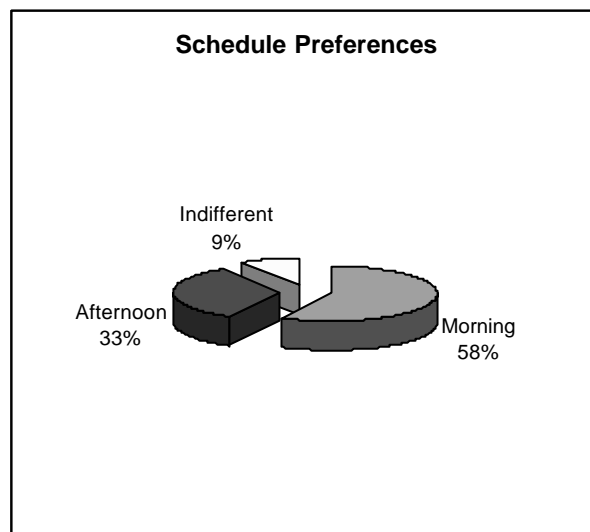


Figure 5- Schedule preferences.

CONCLUSIONS

During the 2001/2002 academic year, the electronic engineering department of the UPV started teaching two subjects of the electronic bachelor degree course in English. Few students attended because this was a new and largely unpublicised event.

Session

Next year, additional subjects in the same degree course will be taught by the electronic engineering department in English. The main goals are to correct the problems encountered during the first year; and to give the project maximum publicity among students. Some proposed improvements are: scheduling the English language classes in preferential morning slots, and translating the

complementary documentation and/or slides into English. This new experience enables students to practice technical English and facilitates their incorporation into a job market which increasingly values English proficiency. To sum up, the students enjoyed a satisfactory teaching experience that they would recommend to their colleagues.