

I CAN READ TECHNICAL WORDS, BUT HOW SHOULD I PRONOUNCE THEM?

María-Ángeles Cifredo-Chacón¹, Mercedes Rodríguez-García²

¹ *mangeles.cifredo@uca.es - University of Cádiz (SPAIN)*

² *mercedes.rodriguez@uca.es -University of Cádiz (SPAIN)*

Abstract

It is a known issue that English is the official language in the field of the engineering. However, is reasonable that each country teaches Engineering degree in their mother tongue. Tricky and novel topics comprise these studies and understanding the lectures is already hard enough. Therefore, we aim that English must be a skill to reinforce in engineering degrees but by means of tools other than bilingual lectures. We propose some techniques in order to promote the writing, reading and listening skills. This paper is focused on Computer Engineering degree, and the experiment was carried out in a course called "Computer design techniques". In this module students are taught to design digital circuits related to Computer Architecture targeting to FPGA by means hardware description language. Many technical documentation is required to design and program. Reading is the easiest skill to work since all the technical documentation is provided in English: bibliography, reference manuals, datasheet and so on. Writing skill is reinforced advising the students to comment the software programs writing in English. Commenting a code is a mandatory requirement in the course and making the extra effort to write them in English, was awarded with a better mark. Finally, our main proposal, how to work the listening skill without teach in English. We have created some video-lectures where the same lecturer explains the same lessons taught along the term. The most innovative feature for these video-lectures is that they have subtitles in English. Subtitles offers the student a best understanding and achieve they relate the read technical words in the documentation with their pronunciation. The students are recommended to watch the video-tutorial in order to hear the pronunciation of the new technical words learnt along the lesson. Also, video-lectures are useful when some student miss a class or need additional explanations to understand some topic. The professor cannot dedicate much time explaining the same contents once and once again during a face to face class. But at home, the students may watch the lecture as times as they want and even, the video may be played slowly. In this way, the listening skill is worked also at the same time they learn the contents and how to pronounce the new technical words. A survey was filled up by the student at the end of the term. Questions such as what were their opinion about the video-lectures, either about contents and the subtitles, or about the effort to write comments in English, were included. Most of them liked the video-tutorial and said the subtitles were helpful to understand the topics. Some students recognised that they only have watched the video-lectures to learn how pronounce the new technical words.

Keywords: Bilingual teaching, teaching innovation, technical words, listening skill.

1 INTRODUCTION

The adaptation of Spanish universities to the European Higher Education, through the Bologna process, has transformed and improved university teaching in regard not only to the structural reform of curricula, but also a concern towards the idiom competence. Graduates in Engineering must be educated to the current labour market demands and universities must ensure that students obtain both the specific technical and idiom competences which enable them to meet such needs. Besides, the integration of different universities on behalf of internationalization in actions such as Excellence Campus, Research Network, Erasmus Mobility for students, staff or lecturers, gives sense the integration and promotion of English in the Higher Education.

There is no doubt that the following step forward for the universities is a progressive adaptation of their syllabus, students, lecturers and infrastructure. As for the students, Bologna process establishes a mandatory B1 level in a second language to obtain a university degree. In respect of lecturers, and taking into account that they are specialists of their own field, not of language teaching, a long process of training is needed. There are some lecturers with international projection who could be suitable to

this model, but undoubtedly, there are more lecturers whose level of English, although apt for scientific research, does not reach the necessary expertise for teaching in English.

In that respect, the School of Engineering of the University of Cádiz has been working for several years in a Plurilingual Education Programme [1] in order to develop the most appropriate methodologies for each subject and provide lecturers with the required abilities and activities for employment in teaching [2]. Many approaches to face these challenges exist. The most popular over the last years has been the called Content Language Integrated Learning (CLIL). CLIL is focused on determine the most appropriate methodology for each subject and provides training to lecturers to achieve it. The pilot bilingual program in University of Cádiz is based on CLIL and a few subjects from different degrees have evolved to adapt to a bilingual scenario.

A huge assortment of activities has been trained, developed and deployed in our University based on the proposal from different sources [3]. Questionnaires, problems formulation, bibliography, videos on-line, presentations and others similar activities in English were proposed to be provided as material to teach.

However, a review of experiences carried out in engineering degrees reveals inefficient outcomes when students lack a good level of the basic abilities of the English language, reading, writing, listening and speaking [4][5]. Similar conclusions are drawn when the lecturers make a deficient use of the English language, both writing mistakes, i.e. errors in slides, problems or questionnaire and a wrong speaking if teach in English. In the same way, students refer “they felt all teachers should serve as models and be responsible for the correct use of the language” [2]. Even the selected on-line videos could be wrong, either on contents or language.

Regarding to the videos recommended, other drawbacks has been detected by us. The students have learnt the lectures in their mother tongue, and the videos offer technical and detailed explanations with a specific vocabulary, but in English. Students do not recognise the sound of these new words doing more complicated to understand the content or learning the English language.

In this paper, we aim to promote the integration of the English learning with the contents but away from the long process of training and tight requirements of CLIL. Our humble method, we are not specialist in education methodologies such as CLIL, includes a few activities to work the reading, writing and listening abilities, without lecturing in English. The method is suitable for a group of students heterogeneous regarding to the level of the language. As for lecturers, the method allows introduce activities to promote the English independently the level certified. Even, those that need can count on the help of an English teacher to guarantee the correctness in every activity. The method achieves to teach a complex and specialized course, belonging to the Computer Science Degree, in a manner that all the content is explained in the mother tongue, but fostering students to practise English, in particular, English for the Computer Science Engineer.

2 METHODOLOGY

The methodology is divided into two stages: (1) gathering, creation and organization of teaching material related to each basic language ability: reading, writing and listening. (2) Deployment and implementation. Therefore, is presented in two subsections with detailed explanations.

2.1 Preparing the teaching material

The teaching material related to reading skill includes the slides used in the theoretical sessions, laboratory guidelines, datasheets, reference manuals and bibliography. Manuals and datasheets did not require modification as are offered in English by the vendor of the technology handled at the laboratory. However, the slides used in the lectures and the laboratory guidelines had to be translated from Spanish to English. The bibliography referenced was the same as previous academic years, mostly written in English.

In order to motivate the students to write the code comments in English, a guideline was provided. The guideline consisted of a suggested vocabulary and some classical sentences as templates. Some recommendations about what is considered a comment were included as well.

The main goal of our proposal is reinforce the listening skill, in particular, to enhance or learn the pronunciation of the technical words related to the course. As was mentioned previously, usually the English level among the students is heterogeneous. On the other hand, the professors involved in the

module might not speak as fluently as desired to lecture in English. To overcome these drawbacks several video-lectures were created.

The video-lectures show the same explanations taught during a classroom or laboratory session, but the lecturer speaks in English. The same slides and laboratory guidelines are used. The main advantage respect to teach in English is that, before recording the video-lectures, the professor may prepare the audio script with the help of an English teacher, making sure the speech is correct. In addition, the video can be recorded as many times as needed until a good pronunciation is guaranteed.

For the students, the video-lectures give the opportunity to watch them once and over again to hear repeated the misunderstood concepts, either because they did not understand them during the classroom sessions or they could not attend to that day. Furthermore, the video-lectures can be slowed down in order to be understood by the students with a lower English level.

An additional feature in the proposed video-lectures is to include English subtitles, similar as the used in [6]. English subtitles help to the students to understand the contents better, especially when they are not good at English language. On the other hand, subtitles allow highlighting the most important technical words for the subject, writing them in other colours or in capital letter. As suggested, the subtitles be reviewed by an English teacher in order to guarantee there are no misspellings.

Nowadays there are many computer applications to record this type of multimedia elements, such as Microsoft Office or Openoffice among others. We chose Power Point from Microsoft, used the slides already created and recorded the lecturer speech. Power Point generated the MP4 video file as well. Later, the MP4 video files were processed by means of YouTube to add the subtitles in an automatic way. When the subtitles text files were generated, a correction process was required and took advantage to highlight the keywords. As a result, a final version of the video-lectures including subtitles was created in YouTube website. The final step was adding all the students enrolled to the private YouTube channel. The link was provided in virtual campus.

2.2 Implementing the new features in the one-term module

The three abilities were implemented and evaluated or watched, each one in a different manner.

The teaching material is provided to the students by means of the virtual campus. Slides, including bibliography references, laboratory guidelines, datasheets and reference manuals are all uploaded at the beginning of the term. The theoretical sessions and the explanations for the laboratories sessions were taught by the lecturer by means of the slides and the guidelines in English, but speaking in her mother tongue. Along the laboratories sessions, the students needed reading the datasheet and the reference manual about the target technology to be able of use it.

After each laboratory session a task is required, the student must issue, through the virtual campus, the design carried out. This work must include the explanation of how the design was solved and the commented code to achieve it. Bearing in mind that commenting the developed code is mandatory but no writing it in English, a rewarding in the mark was agreed. The exercises required would be assessed with the maximal mark, ten points, if the comments were written in English and eight points if no.

At the beginning of the course, the students were fostered to access and following the video-lectures. The lecturers insisted on the idea to play the video-lectures every time they wanted a slow explanation about a topic or only to practice the listening skill but related to the technical content learnt along the subject. Often, many technical words lack of a translation to Spanish, in our case, or this is unused. For this reason, the professors, although teach in their mother tongue, include some of them in the lectures. This idea is also applied when the students ask professor to solve some doubt, they need say many technical words, and a good pronunciation is expected if they have watched the video-lectures. Indirectly, students are assessed in the pronunciation skill.

As a summary, it can be considered that only the writing ability is assessed with a mark and the remaining abilities are watched by the professors. The reading ability is watched during the laboratory sessions, as the students have to be capable to carry out the exercise with the target technology reading the provided material. The listening skill is more difficult to assess, in order to achieve some feedback from the students, the professors tried that the students ask them some questions which including the most important technical English words or even they were hearing the questions and conversations among them while they carried out the laboratory sessions.

3 RESULTS

The methodology presented in Section 2 is carried out in a course of third year of the Degree in Computer Science. The course, called "Computer design techniques", teaches to design digital circuits related to Computer Architecture targeting to FPGA by means hardware description languages. The method is applied along the term, four months, at the laboratory and theoretical classes. The experimental group is constituted by a set of 22 students, 12 out of 22 with a certified B1/B2 English level.

A survey conducted at the end of the class revealed that the majority of students find that reinforcing some basic English skills in the course is useful for their professional future. Furthermore, all surveyed students consider is interesting have available the video-lectures in order to hear the lesson as times as they want.

Tables 1 and 2 show, 14 out of 22 students watched the video-lectures to enhance their listening ability, 10 out of 22 saw them to hear again the misunderstood lessons and 3 out of 22 because they missed any lesson. All the students agreed in the video-lectures' English subtitles were essential to understand the lessons and, specially, to identify and be familiarised to the keywords of the course. 18 out of 22 students submitted the codes commented in English and all of them considered useful the provided guidelines. Finally, 6 out of 22 surveyed students referred difficult to understand the reference manuals and 2 of them the slides written in English.

Table 1. Survey results focused on video-lectures.

	agree	disagree
Did you watch the video-lectures only to practise your listening skill?	64%	36%
Did you watch the video-lectures to hear again a misunderstood lesson?	45%	55%
Did you watch any video-lectures to hear a missed lesson?	14%	86%
Do you think the subtitles are essentials to understand the lessons?	100%	0%
Do you think the subtitles helps to be familiarised with the course's terminology?	100%	0%

Table 2. Survey results focused on laboratory and theoretical sessions.

	agree	disagree
Did you write in English the code comments?	82%	18%
Do you consider the comments guidelines are useful?	82%	18%
Do you think to practise the basic English skills is important for your future job?	94%	6%
Did you find any difficult to handle the laboratory material as the reference manual was written in English?	17%	73%
Did you find any difficult to follow the theoretical lesson as the slides and bibliography was written in English?	9%	91%

The following is a summary of the students' impressions about the developed experience. These impressions can be understood as qualitative information that qualifies and complements the results.

- *It is better to learn the course's contents in our mother tongue.*
- *The video-lectures are a good opportunity to practice technical English, but the English subtitles were fundamental.*
- *Subtitles gave a reason to watch all the video-lectures.*
- *I am used to read English documentation, but I have no opportunities to write.*
- *I hope to find a job in Spain, I do not like English.*
- *Although the reference manuals are easy to understand the previous explanations in Spanish are always welcome.*

4 CONCLUSIONS

In this work we have presented an experience to help the students to enhance some basic skills of the English language without teaching contents in other than the mother tongue. Our main objective is to promote the bilingual programs but keeping in mind how complex the engineering topics can be. The listening skill is worked at the same time they learn the contents and how to pronounce the specific technical words.

Our method eases any lecturer, even with a B1 level and not confidence in speaking English, be able to motivate to students to practise English as a merit for their future job. On the other hand, the teaching materials prepared got students do not be frustrated although they had a low level English. Video-lectures with subtitles have been welcome to allow a better comprehension of the lessons, although taught in English. The technical terminology and its pronunciation has been easily identified and learnt thanks to the English subtitles.

As shown the surveys, this experience has had a positive influence on the students' motivation giving them conscious how important is the English language in the engineering field.

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