

Adapting the teaching model to the new generation with the use of the ICT

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Abstract—In the last century the pedagogical and psycho-educational changes, advances and studies were the major figures in the educational programmes and in the way of teaching. In the century XXI, although these items continue with a great prominence, new tools have emerging which are very useful for teachers by means of Information and Communication Technologies (ICT). Moreover, in Europe an small revolution in the educational system is happening: the Bologna process. From our research group we are developing and using different tools to obtain and to facilitate this change of attitude: we have created some new and interactive material, similar to videos, we use the Moodle platform, we have created test for an auto-evaluation by students, etc. These new tools are implemented on the one hand in our subjects of the Engineering School of Bilbao and on the other hand in the subjects of the Spanish Group 9 of Universities by means of its Virtual Campus.

Keywords—Computer applications, E-learning, ICT, Knowledge improvement, Teaching model.

I. INTRODUCTION

SOME teachers think that academic results of students and their way to teach into the classrooms are not interconnected. Other teachers think that if their way to teach has been successful in the past (15 or 20 years ago), they have not the necessity to change this way, and if the results of students are worse it is because and only because the level of students in their previous studies has decreased.

We think that it is not completely right. And we think that the opinion of the majority of the teaching community is like our [1], [2], [3], [4]. That is, in some countries, doubt to some

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changes in the educational programmes, the level of studies in the Secondary School has decreased (if we compare it with the programme that was 15 years ago). But other ways of teaching have emerged (or they are emerging) not only to complete the old way of teaching but also to fill the gap that these changes in the educational programmes have been able to create [5], [6], [7].

There are many efforts from teachers of university (sometimes with the inestimable help of students) to improve and to adapt their classes in the convergence to the Bologna process. Many of them are involved in the field of the e-learning [8], [9], [10].

In the academic year 2005-06 some teachers of the Department of Applied Mathematics put a new model of Education into practice [11], [12].

The results of this new model were spectacular because the percentage of students that pass the exam was increased from a typical 35% (in the previous 10 years the average was 35%) to an interval between 60% and 70%.

Last academic year, 2006-07, the results with the new model have been similar (a little bit higher), and equal with the typical model.

The model is based on three ways: the use of new technologies both in the classroom and out of the classroom and on the adaptation of the classes to the Bologna declaration.

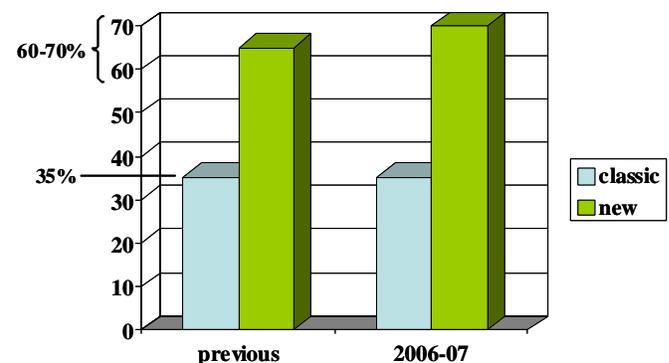


Fig. 1. Percentage of students who passed the exam with the classic methodology and with the new one.

II. BOLOGNA DECLARATION

The Sorbonne declaration of 25th of May 1998 stressed the Universities' central role in developing European cultural dimensions. It emphasised the creation of the European area of higher education as a key way to promote citizens' mobility and employability and the Continent's overall development.

In the Bologna declaration of 19th of June 1999, which underpinned the previous declaration, it says that the achievement of greater compatibility and comparability of the systems of higher education nevertheless requires continual momentum in order to be fully accomplished.

Twenty-nine European governments engage in co-ordinating their policies to reach in the short term, and in any case within the first decade of the third millennium, some objectives, which they consider to be of primary relevance in order to establish the European area of higher education and to promote the European system of higher education worldwide. Among these objectives, we can mention the next three:

- Establishment of a system of credits - such as in the ECTS system - as a proper means of promoting the most widespread student mobility. Credits could also be acquired in non-higher education contexts, including lifelong learning, provided they are recognised by the Universities concerned.
- Promotion of mobility by overcoming obstacles to the effective exercise of free movement with particular attention to:
 - for students, access to study and training opportunities and to related services
 - for teachers, researchers and administrative staff, recognition and valorisation of periods spent in a European context researching, teaching and training, without prejudicing their statutory rights
- Promotion of the necessary European dimensions in higher education, particularly with regards to curricular development, inter-institutional co-operation, mobility schemes and integrated programmes of study, training and research.

The new system of credits will belong very important, since only the 75% of the hours will be presentials, that is to say, students will take the 25% of hours of a subject out of classrooms. In order to implement this point, internet will play a very significant role. That is why we are developing some tools that are described below, as a development of some videos or the implementation of web-services in our subjects like help for students. With these tools, students will be able to follow the subject out of classrooms.

III. NEW METHODS FOR IMPROVING ACADEMIC RESULTS

A. *In the classroom*

That is, in the first way we use the computer in the classroom to explain the theory of some themes of the subject and even to explain some problems or exercises that have special characteristics (they are 'typical' problems, or they are too extensive to make in the blackboard, or they are 'real' problems and we can support them with some real videos or photographs).

B. *Out of the classroom*

We also use the technology out of the classroom (second way): one of these activities has involved the preparation of videos relative to matters pertaining to the program of the subject, which have been hung in Internet. The objective that is persecuted with this new material is double. On the one hand it is tried to lighten the number of presential hours of lessons (masterly classes). With this aim, the teacher develops a subject in an exhaustive way, as if exposition was done in the classroom, but with the advantage of being able to make use of all the technology that a computer offers, and he puts it, in form of video, to be used by the student.

On the other hand, the student does his work meeting his capacities and necessities. He decides how many, when and where he will receive information of the video. In this way, the personal work of the student and his capacity of self-management are powered, forcing him to develop a sense of responsibility that the presential class annuls in many occasions.

Moreover, the way of communication is attractive for the student: Internet. To make use of a tool that in many cases it is associated to the leisure in order to acquire knowledge aids to turn the learning process more attractive.

The material has been developed using sometimes Power Point and others OneNote from Microsoft Office to create the presentations. Moreover, we have been able to make use of all the software available to expose with the greatest possible clarity concepts that, in a presential class, would be more complicated to explain.

Once these presentations prepared, we have recorded the video (slides of Power Point or OneNote and audio of the teacher) by means of the software Camtasia [13]. This tool allows to capture in video format all the activity that is being developed in the screen of the computer.

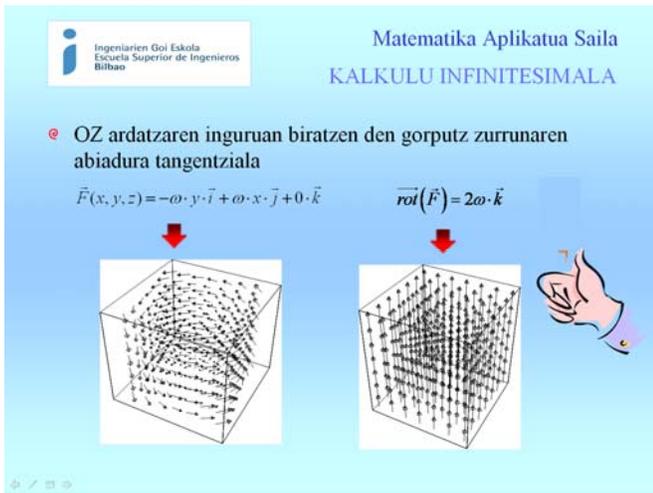


Fig. 2. The interactive material.

The opportunity to attend a class in which the teacher explains to him, the times that the student needs, ideas and concepts of the subject that he is attending is offered to the student. Besides, the lesson is exposed with examples and techniques that are not feasible in a masterly class with the traditional style.

It is obvious that this kind of teaching-learning requires of certain complicity between the teacher and the student, even more than a Masterly Class in which both are physically present.

The work that the student makes in front of his computer, listening the explanations of the teacher while attractive examples help him to understand what it is exposed, has to be valued in their measured. And, although the teacher has been able to reduce certain presental hours of lessons, it is also true that a good work done by the student will bring, without doubt, the necessity to resolve his doubts, either in class, or in a tutorship.

C. Adapting the teaching model

The third way means to adapt the university model to the new ECTS (European Credit Transfer System) model come from the Bologna declaration. And in this way we have developed some tasks and partial examinations for students that have helped them to pass the subject [14], [15]. Some of these tasks have been done by students by means of the Moodle platform.

Here the second and third ways are united in this issue. Nevertheless, to use Moodle in a subject requires many changes. It is necessary to return to design the subject and to consider this work platform like an aid, like a new methodology and not like a new technology [16], [17].

From our point of view, Moodle is a tool in the university teaching that allows teacher to coordinate the learning using the Information and Communication Technologies (ICT) and represents a great help in the new model of the ECTS, since with this platform students get involved in the learning process.

IV. GROUP 9 OF SPANISH UNIVERSITIES

The Group 9 of Universities of Spain is an association with no profit motive in mind, made up of the public universities of Balearic Islands, Zaragoza, La Rioja, Navarra, Basque Country, Cantabria, Oviedo, Extremadura and La Mancha Castile. This group was set up in 1997. The common social aim of the universities of the G9 is to promote the collaboration among the institutions that are members of the Group both as far as teaching and research activities are concerned and with regard to management and services activities.

Among other projects, the Group 9 makes a common offer of subjects of free configuration (optional subjects from which students must to make their choice). These subjects are given by means of telematics technologies (internet, e-mail, chat, etc.).

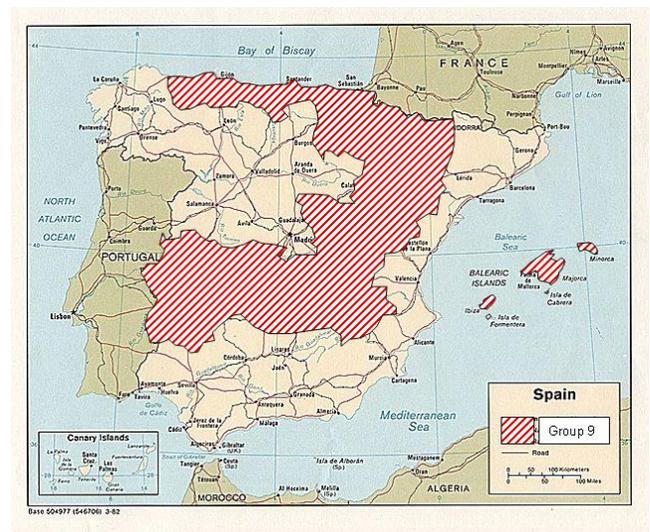


Fig. 3. Geographical area of the G9 of Spain.

Each university offers a set of subjects that can be taken by the students of the other universities. So the students of these nine universities can choose among a great number of very different subjects.

These subjects are telematics, therefore students do not have to travel to the university that offers the subject. Teaching materials, partial evaluation tests included, are supplied by internet [18].

It is only necessary to travel in order to do the final test of the subject, but always to his/her own university, that is to say, the university that offers the subject sends the exam the university of the student (and there the student does the exam, so the displacement is the shortest one).

In each subject, the registration quota is 10 student per university, and the selection process is made by the university that offers the subject.

V. CONCLUSION

A new educational system is emerging where ICT have great prominence.

The new system entails a change of attitude of the students: they must stop being mere receiver of knowledge to assume an active and independent attitude in relation to the planned activities that they must make.

In this paper we have presented new material and methods in order to improve the results of students.

These kind of material has a very good acceptance by students in the both cases of being useful to study the subjects and of being friendly and enjoyable.

One of the most relevant item is that results of students has been increased to the double (that is, a 100%) compared with the average of the previous 10 years.

At least, we must mention the advantage of these materials, which is that any teacher, even without great domain in computers and with null knowledge in programming, can develop similar materials for his subject.

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