Adapting to the EHEA: A case study

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1. Introduction

Launched in 1999 by the Ministers of Education and university leaders of 29 countries, the so-called Bologna Process aims to create a European Higher Education Area (EHEA) by 2010; it has further developed into a major reform encompassing 46 countries. Taking part in the Bologna Process is a voluntary decision made by each country and its higher education community to endorse the principles underlined in the European Higher Education Area.

One major objective of the Bologna Process is to facilitate and encourage mobility of students and workers in the EHEA. As current educational models differ considerably between countries, this requires the establishment of a set of common guidelines so that study programs delivered across Europe can be easily compared. To this end, a common credit system has been designed. The ECTS (an important tool used for credit transfer and student work measure) plays now an important part in curriculum design and in validating a range of learning achievements. In this system, credits reflect the total workload required to achieve the objectives of a programme, which are specified in terms of the learning outcomes and competences that should be acquired.

Using a common credit system makes study programmes easier to compare, and therefore facilitates mobility and academic recognition. However, there are other important implications to the use of ECTS. In particular, the ECTS system requires a new educational model which must guide the programmes and the methodologies used for teaching. These should be focused on learning outcomes and student-centred learning (SCL), and not exclusively on the number of teaching hours.

In some countries, the set of common guidelines can be easily accommodated into their current educational models. In others, more extensive changes are needed. In the particular case of Spain, the implementation of the ECTS requires a change of mentality, and a transformation of the underlying educational model. On the one hand, the structure and duration of the degrees will be significantly altered and this requires that the process be carefully managed. The reform will mean the end of a long standing Spanish tradition of centralised definition of degrees, both in their names and in a large part of their contents. Universities will have a very large autonomy to define their programmes and the name of their degrees, and will have to account for the results by means of an evaluation and accreditation process not present before. On the other hand, undergraduate education is currently centred on teaching, with credits measured in terms of the number of hours delivered. However, the new educational model places a special emphasis on learning and student effort; and on the use of the most adequate educational strategies to achieve the objectives, competences and transferrable skills that the module pursues.

Besides, the new educational model implies other important changes in teaching and learning methodologies, with a significant reduction of student contact (in favour of other self-learning strategies). From this perspective, a transition period is required so that both lecturers and students familiarize with it. Students need to improve their interpersonal skills, communication abilities, work organization, time restrictions, etc. and lecturers must prepare new more appropriate working materials (for lecture hours, lab hours and home study) with these objectives in mind. The preparation of such materials is a challenging task for lecturers because they have to face not only technical aspects of the subject but also the development of a teaching plan (adapted to the new methodologies) to achieve an optimum learning process.

The objective of this chapter is twofold. In the one hand, it attempts to provide a set of general guidelines and good practices which can be useful to other national and international universities currently involved in a process of change of the underlying educational model. This section explains how the School of Engineering started the process of adapting to the EHEA. In the other, it shares the results of a number of experiences and suggests a series of teaching methods to increase student involvement in the learning process. In the first part we describe the action plan in detail, with a special emphasis on educational issues. In particular, we describe the actions performed to facilitate the process of change, and how these have been monitored and controlled. The second part of the chapter focuses on the description of some techniques which have been adopted in different modules to improve the existing teaching and learning process.

2. PART I: Activities at the School of Engineering to promote the EHEA integration.

The University of Valencia is one of the oldest and largest universities in Spain. Located in the city of Valencia, it was founded in 1499, and currently has around 50,000 students from which 2,000 belong to the School of Engineering. As part of a plan for a continuous adaptation to society changes, the University is committed to provide a smooth transition to the new educational paradigm. To this end, at an institutional level, the University of Valencia has encouraged Faculties to start a series of Educational Innovation Programs, and a number of activities have been organized to share the experiences and provide the teachers with new materials, helping them to adapt or incorporate new teaching models. At a Faculty level, since 2005, the School of Engineering has developed its own action plan, composed of a set of activities which can be classified into five major categories:

2.1 Analysis

The first activity before proposing specific actions was to perform a series of studies in order to check the current knowledge of the teaching staff in different areas such as the EHEA, teaching competences to students, level of innovation in courses and teachers´ attitude to use new teaching techniques. All this information was obtained by a quiz done in early 2006 completed by 85 percent of the teaching staff. Some of the most interesting results are shown in Table 1. (complete results can be accessed at http://www.uv.es/eees).

What is the amount of information existing about the EHEA?				
None	A few	Enough	Too much	NA (not answered)
0%	55%	39%	1%	4%

What is your knowledge about the EHEA?			
None	I know only some aspects	An intensive knowledge	NA
8%	80%	9%	3%

Do you think that teachers are ready to start the transition process to the new paradigm?		
Yes	No	NA
45%	49%	7%

In your opinion, what actions are needed for a successful adaptation?					
Training	Information	Time	Material Resources	Nothing	Others
66%	45%	67%	76%	0%	8%

How much do you think that the EHEA will change your daily teaching work?					
Nothing	A Little bit	Moderately	Significantly	A lot	NA
0%	4%	17%	54%	22%	3%

Table 1. Some of the results obtained from a quiz fulfilled by the teaching staff at the UV-School of Engineering.

As it can be appreciated, most of the teachers were not very familiar with the EHEA adaptation process. However, they were worried about its impact in their teaching activity and demanded information and actions aiming at providing them with better capabilities to design an appropriate teaching plan.

2.2 Informational process

Once the main needs were detected, it was clear that an action plan should be started in order to provide more information about the EHEA and all its details about the formal aspects of the educational change, but not only that; a strong focus should be given in the teaching techniques to improve the so-called transversal competences: collaborative work, project based learning, learning through writing, etc; and moreover, several techniques to address a better organization of the courses allowing different types of evaluation and proposing several self-learning activities to assure that the autonomous work hours are really busy and fruitful for the student.

During this process, a periodicity in the activities must be followed, i.e. it is important to measure the regularity of them, not being too wide neither too narrow in time to avoid the staff to forget or get tired. In any case, several actions were done:

1. Invite some relevant persons at the University level in order to clearly explain how the institution is facing the changes, the demanded tasks to the faculties, and the support offered. In this case, some conferences from the European Convergence vice Rector and the Rectors' delegate for the EHEA were done.

2. Receive information about the process carried out in other national and European universities. It was very important for us to know how other institutions were adapting to the EHEA, how they apply different techniques, how they promote the participation of the staff, how they arrange the tuition, etc.
3. Inform about the level of work done by other faculties inside the University of Valencia. This was a surprising activity because we could find that some close faculties and teachers were making an important effort to adapt the EHEA. Several lecturers from different faculties described their experiences and the activities they employed in daily classes. It was a very interesting serving to encourage other colleagues to start with some innovative activities in class.

2.3 Training

In parallel with informational activities, other training seminars, workshops and conferences were also proposed. The main aim of these activities was focused in guiding the teachers when addressing important changes in his tuition, moving from a traditional teaching model (passive students) to a more dynamic approach. These activities were carried out by relevant persons in the field of teaching for engineers, describing the common problems addressed when moving to a new teaching system, the organization of such systems, the cautions that must be taken, and so on. In general, the aim was to guide the teacher and allow him to be "fearless" in taking the challenge of modifying the structure of courses.

2.4 Pilot Projects

After the second year of promoting all the aforementioned activities, the full coordination of the first year of Bachelor Engineering in Telecommunications was attempted. The EHEA system was not yet active at that time, however, it was of common thought that some steps toward that direction could be done in order to explore possibilities. Specifically, the main aim was to explore the possibility of establishing a better coordination among teachers of the same group so that the same rules were adopted for all courses and check if some competences could be worked-out among different courses.

Of course, it should never be adopted a strategy where many new concepts are included, this can be opposed to the desired effect and some students, or even teachers could feel deceived. Thus, in a three year horizon, new coordination concepts were introduced every year. First, simple activities were hold, such as a teacher coordination meeting every month and a schedule plan for proposing tasks to the students in order for them to follow a regular work load along the academic year. Second, internal activities in the courses were introduced by most of the teachers (some tutorial sessions were held, more problem oriented classes done and project-based learning was used in some courses). Third, an attempt to incorporate some important competences was also made. In this case, oral expression, written abilities and autonomous problem solving were chosen.

The experience obtained in this project evidenced a number of pitfalls concerning the new organization. Regarding the coordination among teachers, it is common to have different points of view. In this sense, the presence of a coordinator proposing and verifying the

course plan becomes necessary. Besides, the teacher's work load significantly increases the teachers who participate require full involvement; otherwise, the students will not feel that the system works as a single block and this fact might decrease the success rate.
On the contrary, many advantages are obtained. Students can follow a teaching system able to develop their skills, learning theoretical contents but also improving different aspects concerning the integral education of an engineer in ethical aspects, decision-making, group work, project development and self- organization. Moreover, these activities have led to an increment in the online materials available to students, helping them with the homework.

2.5 Additional activities

In order to complete the activities at the School of Engineering, other side aspects apart from teaching are proposed. As an example, a continuous collaboration with companies exists so that students can spend some periods at the companies and some courses and conferences from important company professionals are proposed to students. Of course, traditional exchange programs are promoted; they are very popular among students, allowing them to experience different teaching methods used in other universities and broaden their social view.

Finally, with the objective to increase teacher's involvement, some other activities were funded by the School. For instance, the attendance to some conferences outside the University, the financial support required to start some innovative action in class, or small expenses which might help teachers start new and interesting learning systems.

3. PART II: Teaching Techniques Adopted

This part describes some of the teaching techniques which have been taken into practice in an attempt to improve the teaching and learning process. These have been incorporated into existing modules, some as pilot experiences. First, we present a method to encourage an even participation of group members, when cooperative strategies are used. Then, we describe the benefits of using competitive strategies, explaining how the introduction of an assessed competition into one of the modules has helped motivate students. Next, we present a technique to increase student support by introducing the role of a "support student". Last, we describe how coursework based learning has been used in two more modules.

3.1 Encouraging an Even Participation of Group Members

Team work gives the student an opportunity to engage in discussion, take responsibility for their own learning, and thus become critical thinkers (Totten et al., 1991). When working in small groups, students can share their strengths at the same time as they develop other weaker skills, and they tend to learn more and retain contents longer than when these are presented in other instructional formats (Davis, 1993). Apart from a greater enjoyment and motivation (Beckman, 1990; Slavin, 1983), students also develop a number of transferrable skills and values. They learn to deal with conflict, acquire problem solving abilities and improve their interpersonal, social and communications skills.

A major problem when using group based teaching strategies is maintaining an even collaboration of the team members. When most of the work in performed outside the classroom, some students may try to hide behind the rest of the members and avoid part (or all) of their responsibilities. Several strategies have been proposed to handle this problem (Davis, 1993). Some examples are keeping the groups small, allowing teams to dismiss members when they do not contribute adequately, or performing anonymous assessments at the end of each task, in which each student has to state the contribution of each member (Walboord, 1986).

In this section we describe two techniques which use cooperative learning to encourage student interaction and improve their learning experience.

A First Attempt

A first attempt in this direction was made during the academic year 2007/08, in a third year compulsory module called "Programming languages", studied as part of the Computing degree.

The method was supported by Aula Virtual, an LMS (Learning Management System) that the University makes available to students and faculty members. During the lecturer sessions (or using the LMS), activities related to the subject taught are proposed. Examples of these activities are developing a software application or giving a presentation on a related topic. Only one group of students may voluntarily take responsibility for each activity, and each activity is assigned a deadline and a value which determines the maximum score that the group may attain. At the end of the semester, students are ranked by the course points achieved and mark guarantees are given to the first few ranked students. If a student who has achieved a mark guarantee obtains a lower mark in the semester examination, the former replaces the latter. To encourage team work, the activity may be performed in groups of up to five members, and the individual scores achieved are independent of the number of students who performed the activity. With this strategy, active learners who prefer learning by doing can find an additional motivation, at the same time as other more reflective learners are not jeopardized.

To achieve an even contribution of all members and avoid shirkers, the presence of passive students is strongly penalized and has an effect on the entire group. After the activity deadline students have to publish their solution in a forum created for this purpose in the LMS, and present their work during a lecture session. All group members should be present at this event and they have to offer a question time in which the lecturer and/or other students in the classroom may address questions about the activity to any particular member of the group. If that student does not answer it correctly, the entire group loses the entire score. Because of the competitive component in the scheme, other students are encouraged to study the solution provided by the group and ask related questions to those students that they believe are the weakest in the group.

In some occasions, friendship and respect for others force a student who lacks interest in the subject do her share of the work to avoid that others get penalized. For this reason, once a group of students has taken responsibility for an activity, no member may drop from the

team. However, there is not commitment from any of the students to stay in the same group for future activities. This causes that shirkers be rejected and that students with a common learning preferences group together in other activities.
As side effects, this scheme motivates activists to attend the lecturers so that they can pick up the activities they like most. At the same time, the solutions provided by the groups are revised and provided as learning materials for the entire class.
Some interesting responses are detailed below:

a) The groups were dynamic, in the sense that their members were constantly changing. In many cases, the group started with the maximum number of members allowed, but its size reduced to three or four members in the next activity.
b) There were a few activities that were performed by a single person. In many cases, this was due to competition (an attempt to obtain a higher score than other members who have commonly worked together). However, there were two students who preferred to perform all tasks in an individual basis. In this case, we convinced these two students to form a group, in an attempt to motivate the development of their team work skills.
c) After the first four classes, only 15 of the 25 students attending the lectures had participated in some activity. After ten lectures, only 7 students continued in the scheme. Some students were highly discouraged when they realized that other students were far ahead in the ranking, and this caused that some other students decreased their performance levels once they had achieved a score which ensured them a passing grade.
d) Some students who achieved a good mark guarantee did not attend the semester exam. They preferred to dedicate more time to prepare other modules rather than to study for a module which they had already passed.

Although some of these are positive aspects, the student behaviour described below in c) and d) made us re-consider the strategy and propose a more robust method to achieve the same objective.

Refined Strategy
During the academic year 2008/09 we used a different strategy to palliate the effect of uneven participation of group members. While still penalizing the presence of passive students on the entire group, the competitive component is eliminated.

In this occasion, students have to attend four examinations during the course, and the final grade is obtained as the average of the scores achieved at each examination. However, each of these scores is influenced by the geometric average of those obtained by each member of the team. In particular, the individual score for each examination is averaged with the geometric average of the marks obtained by all team members.

Each examination has an associated course work load that students must perform outside the classroom. This work has to be performed in teams, and it is closely related to the contents of each examination. Although students are given freedom to group themselves as desired, they are advised about the risks of having too many members. Although the amount of work is independent from the size of the team, the geometric average strongly penalizes low marks, and these are more likely as the number of members increases.

With this scheme, the final grade is composed of an individual and a team component. The objective we pursue is to encourage students to help each other, hence promoting collaborative learning.

The results of using this methodology are summarized below:

a) Although groups were dynamic, there were not as many changes in the group members as in the previous case. With a few exceptions, the groups formed at the beginning of the semester were maintained throughout the entire course.
b) Although initially there were some large groups (up to 6 members), these soon divided into two. The students realized that the probability that one person fails to do their share increases with the number of members.
c) In general, the marks obtained by all team members were homogeneous. Although there were a few cases in which one member failed to meet his/her objectives, it was not common that other student in the same group performed extraordinary well.
d) In many cases, some questions in the examination were variations of some which appeared in the course works. This caused that, although some teams decided to divide the work between their members, they usually organised post-discussion sessions to explain the results to each other. In fact, most groups organised study session on the previous days to an examination, with an obvious benefit to the learning process.
e) Some weak student s became forced to make an effort so that the marks of other team members did not get affected negatively. Besides, the felt supported by the rest of the team members who also were interested in pulling their grades up.
f) Student participation was noticeably increased. While in previous years, attendance was about 50% (measure on registered students), this year rates close to 80% were achieved.
g) No significant negative effects were observed. A questionnaire processed at the end of the course revealed that most students enjoyed the experience, preferred this collaborative way of learning and considered that they learn better than by using traditional teaching methods.

Although both techniques aimed at encouraging an even participation of group members, only the second one really obliges all students to participate. While the competitive component of the first strategy finally discouraged some students, the second approach established a common goal for the team and enabled student collaboration, resulting in a significant educational benefit.

A side effect to both approaches is that it forces teams to adopt a stronger position against shirkers. In many cases, members of a team do an extra amount of work to compensate for the presence of a shirker. However, with the strategies presented in this section, the grade of the rest of the members is significantly affected. This causes that shirkers be rejected by other team members.

3.2 Use of Competitive Strategies

Competitive learning has been criticized because they may have destructive outcomes, such as promoting selfishness or increasing anxiety levels. Besides, using competition as an extrinsic reward may turn the genuine intrinsic interest in increasing competence into an interest for demonstrating they are better at a specific task (Butler, 1989). In this section we show how making an appropriate use of this type of techniques can also help the learning process, increasing student motivation and making them aware of their knowledge with respect to other students in the same group.

The technique described in this section is currently used in a programming module that introduces the C and C++ programming languages to first year students. In this module, a competitive learning strategy has been incorporated into the teaching plan with a twofold purpose: a) as a form of extrinsic reward to motivate students and b) to complement the support for the cooperative and individualistic learning styles.

In particular, two of the traditional lab sessions have been replaced by competitive assessments. At the start of the tests, students are given a specification of a simple computer game they have to implement, together with an executable file of the game already implemented. The specification contains some basic requirements and some possible extensions, each with an associated score which indicates the score that students achieve by implementing it correctly. Students have to produce a source code that implements the features in the specification. The duration of the assessment session is planned so that it lasts the same as a single laboratory and thus no submission is allowed after that time.

All solutions submitted are ranked by score. The first implementation in the ranking is assigned the maximum mark, and the last which achieves at least the basic requirements the minimum passing mark. Other results in between are scaled linearly between these two marks according to their ranking positions. To avoid that students lose motivation, sessions are carefully designed so that a basic solution is easily achievable. The marks obtained in the competitions have an important impact on the mark for the laboratory sessions.
In this case, there are several benefits associated with the use of the technique:

a) The competitions constitute a milestone for the learning process. The two competitions are scheduled away from the exam period so that students have the time to review the contents, and little hints are provided so that they can train for the event.
b) It develops a sense of a team. Although students are already working in pairs during the laboratory sessions, there are no time limits or other constraints that make coordination necessary. In the competition, students need to develop a strategy and really work together with a common aim.
c) All students acquire a global perspective of their own learning in comparison to the rest of the class. Their position in the ranking is a good indication of their progress and allows them to judge their knowledge in relation to that of the rest of the class.
d) The competitive environment imposed by the set-up avoids any type of plagiarism.

As part of a subjective analysis, students are asked on an individual basis about the competition. Most students enjoy the experience and remark on the positive effects of working in pairs under a competitive environment. As an interesting issue (and more objective evaluation) it is also worthwhile to remark that an observable correlation exists between the marks obtained in the practical sessions and those obtained in the competition.

3.3 Increasing Student Support

One major problem in many university modules is offering an adequate support for the set of activities that a student must perform to fulfil its objectives. In the particular case of the programming module described above, special difficulties are found to provide support to certain academic activities. On the one hand, a series of exercises are proposed during the lecture sessions. These are usually more complex than programming examples provided in class and allow supervising student progress. On the other hand, supervised laboratory sessions are provided other than those scheduled for the module. These are specially addressed to students having difficulties with the subject.

The first of these activities implies grading exercises, and providing adequate feedback to make students aware of their level of knowledge. The second, an effort so that the lecturer is available for an additional time. To provide continuous feedback to both lectures and students, the figure of the so called “Support Student” has been introduced. These are students in the last courses of the Computer Engineering degree who assist lecturers in the teaching. To this end, it has been agreed with the Computing Department that support students can earn credits for such an activity.

Support students mark exercises and hand them back to the student in a week time, reporting the main difficulties and student mistakes to the lectures. Besides, they replace the lecturer in the additional laboratory sessions mentioned above. In particular, 60 minute weekly sessions supervised by support students complement the usual 90 minute sessions at key stages of the course (such as dates close to the examination period).

In this context, support students have allowed us to increase student support significantly. Furthermore, they facilitate monitoring the group and detecting potential problems in advance.

3.4 Coursework Based Learning

Deliverables can be a useful complement to promote learning outside class sessions. However, they require that the lecturer (or its assistants) provide appropriate feedback to the students. This is a time consuming activity for lecturers and the feedback which is usually offered is generally scarce.

Meanwhile, class sessions are usually boring for students, and they tend to adopt a passive attitude. In order to solve this problem, some teachers promote a previous reading of contents. Nevertheless, this reading activity is not as effective if it is does not focus on key aspects of the contents.

In order to maintain the pace of the class, combining explanation and student participation, we have developed a methodology that combines previous readings with deliverables, so that it becomes a guided activity. The deliverables include a series of questions that the student must solve before attending class. Then, the class session is fully dedicated to solving the deliverable. By using this methodology, the lecturer can combine explanations of contents with the student's participation, and provide him/her with an adequate feedback. At the same time as the lecturer explains the correct solutions to the exercises, student questions are answered and their results are discussed.

After each class session, the teacher collects the deliverables (which may be individual or in teams), checking that they have been completed. The number of deliverables handed is reported to each student by using the university's learning management system. The empty cell effect is an important incentive to encourage students to submit their deliverables on time. As the deliverables are solved and commented during the class, the revision task reduces to testing that the deliverable has been completed, becoming less time consuming for the lecturer.

The use of deliverables based on a previous reading has also been adopted for laboratory sessions. In this context, laboratory classes are evaluated according to two major criteria: The first one is associated with a deliverable about the contents of the lab session, which must be handed in at the start of the laboratory session. The second one is related to the work developed by students during the lab session and the outcomes achieved.

This methodology is currently used in two modules of the Computer Science degree. These modules are called "Introduction to Computer" (IC), a first year compulsory module, and "Microprocessor Based Systems" (MBS), a third year elective module.

In these cases, the strategy also makes use of basic knowledge examinations, mainly based on questions that are contained in deliverables or closely related to them. To pass these exams, a student must answer most questions correctly, permitting a single mistake.

Another group activity aims to develop writing skills. To this end, each work group must write a report describing the activities which they have performed during the week. This group report is revised by the lecturer, who provides adequate feedback on its contents and the correctness of their writing.

The first effect of this methodology has been a significant increase in student attendance to lecture sessions (from 20% to 80%). No such an effect has been noticed on laboratory sessions, as it is usual that all students attend. At the same time, a noticeable increase in the number of student passing the module has been achieved (from 25% to 60% in the IC module, and from 25% to 80% in MBS module).

3.5 Remote laboratories

It is very important to provide students with tools they can use to support their learning outside teaching hours. For courses where the usage of hardware or special equipment is essential for a proper learning of the subject, it is common that laboratory hours are not enough to fully practice all the topics which should be covered. This argument is also valid for the equipment. Because of high prices only a reduced number of units are available, causing restrictions on student access.

The proposal for these cases was to develop a remote laboratory web system where the students can access the hardware located at the University premises, being able to use the system as if they were physically in the laboratory (controlling the system via activation of web controls and receiving information via web pages or a camera placed close to the equipment). At the School of Engineering, such a web system has been developed. Figure 1 shows its main structure. The main parts of the system are the web server including the user management and the web controls for the equipment interface; and the hardware communication system with the target equipment for downloading control program and activating/reading digital and analogue signals from the equipment.

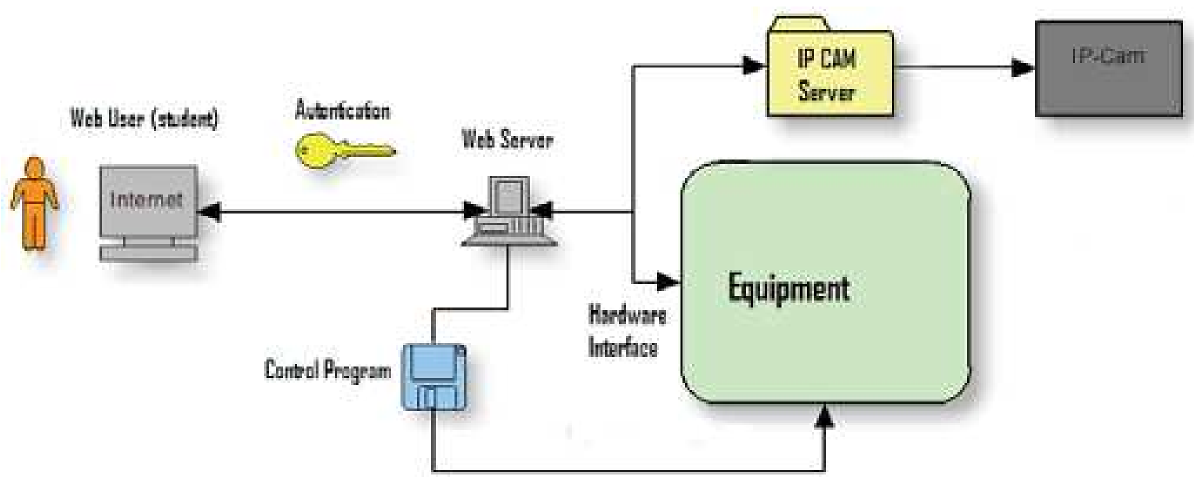

Fig. 1. General diagram of the proposed remote laboratories access system.

The use of this approach provides many different benefits. First, any user can access hardware system at any time 365 days, 24 hours a day; this fact makes it possible to access hardware systems which are usually restricted to research or advanced courses. Second, the lecturer can easily evaluate the student (according to the teacher needs, the web server might be programmed to track the students' actions). Last, the student can use dangerous systems in a safe way (e.g. chemical instruments, radioactive measurements, etc.); if some restrictions are included in the hardware control, the student could only handle the desired controls, opposite to the physical presence where the user can control any action whether it is necessary for the task or not.

At the moment, a general platform has been built and used for some courses related to ABB® industrial robot programming, FPGA programming, microprocessor programming and power electronics. The platform uses a modular structure so that most of the modules can be re-used and only the specific hardware interface with the target equipment needs to be customized. The web page http://labserver.uv.es is the web address where the user can access the system.

The results showed that users feel very comfortable with the system, and consider its best value the possibility to work with it at any time and from any place. The statistics showed that most of the users take advantage of the maximum time offered by the system (time is limited to 30 minutes because no concurrent users can access the hardware at the same time), with an average usage time of 24 minutes per user. In case of the Industrial Robot system, a self-evaluation tool was incorporated, indicating the correctness of the proposed movement programming activity. The tracking system included in the web server showed that users feel involved with the system, downloading different programs until the right one was achieved. Although we have not found important problems with concurrent accesses to the system, a queuing system has been included to allow users to make reservations for time slots in case the system is being used.

4. Conclusion

This chapter has dealt with the experience of the School of Engineering at the University of Valencia in adapting to the EHEA. In particular, the most important actions have been described. These have focused on encouraging teaching staff to adapt their teaching methods, so that transferrable skills and competences are included as part of the objectives of the modules that they deliver. Although there were faculty members who rejected the new proposals, these were a minority. In general, once the actions were completed, the teaching staff were more involved and informed about the EHEA. This caused a higher interest in modifying teaching procedures and gave rise to other educational initiatives. After some years from the start of the action plan the School of Engineering is more involved in the EHEA; effectively applies its guidelines; and offers more educational activities to students.

The EHEA implies a new educational model (with important changes in teaching and learning methodologies), and some in-class actions are also required. In this direction, some specific experiences have been presented. In particular, a method to encourage an even participation of group members in collaborative tasks; the use competitive strategies as an extrinsic reward to motivate students; a technique to increase student support, by introducing "support students" to assist lecturers; the use of coursework based learning to promote certain transferrable skills; and the use of remote laboratories to provide full access to restricted resources.

All these techniques have been introduced in the context of the new EHEA, in an attempt to improve particular aspects of the existing teaching and learning methods. Although a significant progress has been made, improvement of teaching methodologies is still in process. Indeed this should be an on-going process which should never end. This fact has been recognised by the University of Valencia and its School of Engineering, by providing support to the teaching staff in different ways. As an example, the school is financing the attendance of lecturers to educational events and some training programs have been started (including a series of courses, workshops and conferences).

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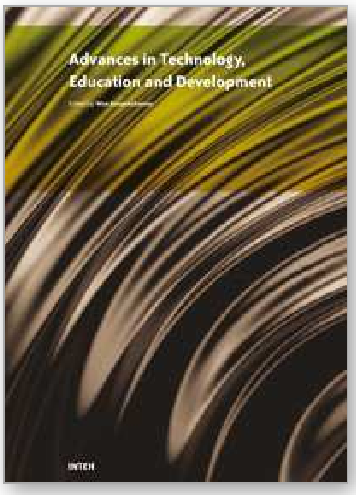

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From 3rd to 5th March 2008 the International Association of Technology, Education and Development organised its International Technology, Education and Development Conference in Valencia, Spain. Over a hundred papers were presented by participants from a great variety of countries. Summarising, this book provides a kaleidoscopic view of work that is done, all over the world in (higher) education, characterised by the key words ‘Education” and ‘Development’. I wish the reader an enlightening experience.

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