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## The value of ICT and the students' heterogeneity

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### 1. Introduction

In last years, the university education system based on the Master Class is finding serious problems in motivating students and obtaining from them the academic results that we would like. There are several factors may be influencing this, but the true is that we are still based to train students of the twenty-first century with a model that was resulted in thousands of years (Avanzini, 1990).

Although some time now practical classes, laboratories, field practices or seminars have proliferated as a complement to traditional lectures, maybe it is time to take a step forward that involves a substantial change in the idea of giving a class providing a physical presence of the teacher and pupils in the classroom. Without giving up any of these two figures, we propose to adapt to the present world that our students are living using the tools that are attractive to them: multimedia resources, computer and Internet.

Admitting that the figure of the teacher, in his role as transmitter of knowledge, is irreplaceable, we can not ignore the importance of the student as the recipient of them. And maybe they are who have changed most in the last years. Not take into account these changes, we can derail our educational system.

If we balance the contributions of the classical lecture as a method of teaching in universities, faced with significant difficulties that hinder a maximum advantage of this method, we concluded that innovation in this field taking advantage of new technologies is essential. Situate the student in front of the tools that are best known, regular and attractive, and give them an personal education.

The proposal presented here revolves around the idea of providing the educational content that they usually receive in class but through his computer. The chosen format is based on the use of multimedia resources. It is, therefore, create a video (picture and sound) capturing all activity that is being developed on the computer. This includes any application that is running as well as images that can be captured through a camera. The specific software that

allows us to do this is called Camtasia (Virginia Tech, 2006). After recording, it also permits to edit and produce the recorded file to obtain the ideal result.

## 2. Innovation

The Royal Academy of Spanish Language defines innovation as "change or alter something, introducing novelties". That is, innovation is change, and today, they are inevitable. In Education the emergence of tools that can help improve the teaching-learning dichotomy is taking place very rapidly (Markopoulos et al., 2007).

Carver A. Mead, professor at the California Institute of Technology, said in 2007 that the education we deliver is what we know, we teach the way we know how to think and yet when our students enter the world and build the future, this knowledge changes very fast. In today's world, most of the knowledge we have will be obsolete in 10 years. Still not tell that to our students. In fact, very often, we ask them to learn everything we know and probably will be futile and will only be a fraction of what they need to know, everything has become new.

It's a slight exaggeration but it has a depth of reason. We must consider modify, change, certain aspects of Education. Herbert Simon, Nobel Laureate in Economics 1978, said "The meaning of "know" has moved from being able to remember and repeat information to being able to find it and use it".

According to the study "Information and communication technologies in Education" of the Spanish Ministry of Education, Social Policy and Sports, statistics show that 71% of Spanish teachers in primary and secondary Education do not ever use the computer to support the explanations in their classes, and that 82.2% do not usually use ICT for presentations of topics or for working with simulations, although the 94.6% stated that access to computers in the centre, and to recognize, the vast majority, that ICT have great educational potential.

At University, the percentages of non-use of computers in teaching are lower, although still far from a majority.

## 3. Different students, different resources

### 3.1 Basis of the Master Class

As already indicated, the idea of placing the teacher with his students both physically and simultaneously in the classroom underlies the concept of the Master Class we have all in mind behind (Dillon & Gabbard, 1998). The advantages are obvious and known by all:

- Contact between the two agents which allows a better knowledge and understanding among them.
- Double-way for teacher-student communication. Not only teacher communicates but also students can participate, contribute, ask their doubts, and so on.
- Monitoring by the teacher the student's progress or difficulties.

Even assuming that the above is true, and we can say that theoretically is true, we can not overlook that in practice there are significant difficulties that hinder an optimization of this method:

- Groups of students numerous (although not as much as years ago). This significantly hampers the communication, at least by custom, between teacher and student.
- Students take part very little. The teacher does not receive an active response from them and at the end the double-way communication is turn into a one-way without return.
- And, above all, groups of students too heterogeneous to be effective a system as homogeneous and uniform as the Master Class is.

This last point is perhaps the most troublesome (Stemposz et al., 2007). To teach a Master Class to a large group of students, hoping to bring all of them certain information in a given time is, at least, a little flexible system. Try to find an alternative, to innovate.

It is desirable to specify the reasons that have led us in the previous paragraphs to talk about heterogeneous groups of students. Thus, we could realize that we are referring primarily to two aspects:

- Students with a different knowledge base. Especially when we have first-year university students, it is crucial that they come from different centres, not only in terms of knowledge but also the methodology used.
- Students with different rates of learning. It is convenient at this point to underline that we are working with people, not with screws. Just as our mood affects our exposure is better or worse, our receivers are also influenced by their personal characteristics.

This last aspect is in turn linked to two ideas:

- The student's innate ability to learn.
- The student's attitude to the personal work that learning requires. It is almost a constant complaint among teachers the attitude of apathy that many of our students show. The work that a student should do, either personally or in group, is in marked decline. There is not a sense of personal effort.

If for each student these issues can be decidedly different, why impose a single system for all of them? Is at least the chance of supplementing it with alternatives that are best suited to each student? We think so.

### **3.2 A private teacher**

In order to develop this idea, start from some conditions that we consider not negotiable:

- The teacher is an irreplaceable figure in the academic and personal education of students.
- The student is, of course, irreplaceable. And his characteristics, on the whole range of students, are what they are and we should, as far as we can, adapt to them.
- The contents of the established programs in each subject and curricula must be taught.

This idea should be made absolutely clear to not mislead. We are talking about changes in our educational system which promote better learning, allow teachers to extend their knowledge to the student in the best way for both (teacher and pupil). We are talking about encouraging the student on his path to learning. But under no circumstances we want to say that these contents are not needed or that have to be amended, and much less reduce them (not at least without a thorough study that definitely advises it).

Beside of these departure conditions we should also make clear what the main problem we are trying to resolve is: the audience (students) of the teacher is heterogeneous.

In view of the approach, the solution is to particularize those classes. That is, we give students the opportunity to receive a Master Class taught by his teacher, at the pace that the student wants and as often as he needs. Moreover, if this proposal is also based on the use of techniques attractive for students and allows the use of resources that enrich the presentation by the teacher, apart from giving in a blackboard, we might meet our target in a double sense. It means, the system tries to adapt to the needs and wants of students, while stimulating their desire to learn and especially to develop their personal work.

### **3.3 Attracting students**

Our students are natives regarding the use of ICT while we, their teachers, are immigrants in the area. That is, for them to use computers, internet, etc., is so intrinsic to their lives like for us the books. In this sense, applying these tools to the study has to be something to keep in mind with absolute normality (Bilbao et al., b, 2006). We must assume therefore that, although it can be a little strange, for them a lesson through a computer can be as natural, or more, than that given in a classroom, through a blackboard (Bilbao et al., 2007). Why not take advantage?

The proposal here presented revolves around the idea of providing to the student the teaching content that he would normally learn in his class through his computer. The format chosen is based on the use of multimedia: video and audio. A video and audio recording by his teacher, with contents that are in accordance with the syllabus of the subject, distributed in the most appropriate manner, using all the tools (software) to his scope and made available to the student when he deems appropriate.

### **3.4 Involvement of students**

Obviously this approach, in addition to be attractive to the student, since he will be use tools which he controls and often associates with leisure, such as the computer or Internet, involves a commitment on his part because this use implies his willingness to do a personal effort without a control such as the attending a Master Class.

To begin, there is no schedule or pace set by the teacher. It is the student who manages the learning. This, which may be risk, is also part of its appeal. And before a student who wants to learn it can be a motivator, although so far he has not managed to get the best of his classes.

In fact, rather than the student, we must attract and engage the teacher in this new framework of teaching. Our challenge is to convince the potential use of ICT within education.

#### **4. A way of innovating: generation of multimedia resources**

When it talks about generating multimedia resources people become a more or less clear idea of what we mean: video and audio. But the truth is that in this field you can find a wide variety of styles and models.

When we say 'audio', we refer primarily to the recording of the voice of the teacher. His explanations are the basis of these recordings. It is true that, depending on the subject, the audio may contain many other aspects besides the voice of the teacher. You only need to imagine one class on any item of the music. The chances of enriching our recording are as wide as our imagination allows.

Regarding the video, there are several ways:

1. A video containing the image of the teacher. This image can be the teacher in front of the camera in the style of a news announcer, or pick a more dynamic image to be recorded, for example, during one of his traditional classes in the classroom.

In the first case, the image of the teacher can occupy only certain area of the computer screen and accompanied by other types of images to complement their explanations, such as a text or a slide prepared with PowerPoint. In the second case, however, the recording of the teacher in the classroom can also be aimed to record their explanations written on the blackboard.

2. Another possibility is to not include the image of the teacher and based the video on a succession of images from the recorded activity held in the computer.

In this case the idea of the video is to maximize the capabilities offered by different software applications available to us, enriching our exposure in a way that would be unworkable on a blackboard. In this regard, it is possible to record a presentation with, for example, Power Point, to which is added the audio with teacher's explanation, or include a development made with a symbolic mathematics package or any other tool (software) that helps the student to a better understanding of the content to be displayed (Arribas et al., 2006).

3. A video that mixes the two previous models, including a brief initial introduction with the image of the teacher and then continuing with the recording made on the computer.

In any of these models, basis is on capturing images and generating a video with them (Bilbao et al., a, 2006).

This is just one example, implemented, of how innovation is possible. With the multimedia resources education comes from teacher is supplemented and enhanced, allowing its use at any time of day. In addition, it serves as a review of the lesson because it is the voice of the teacher in the application which should explain the topic or lesson in question.



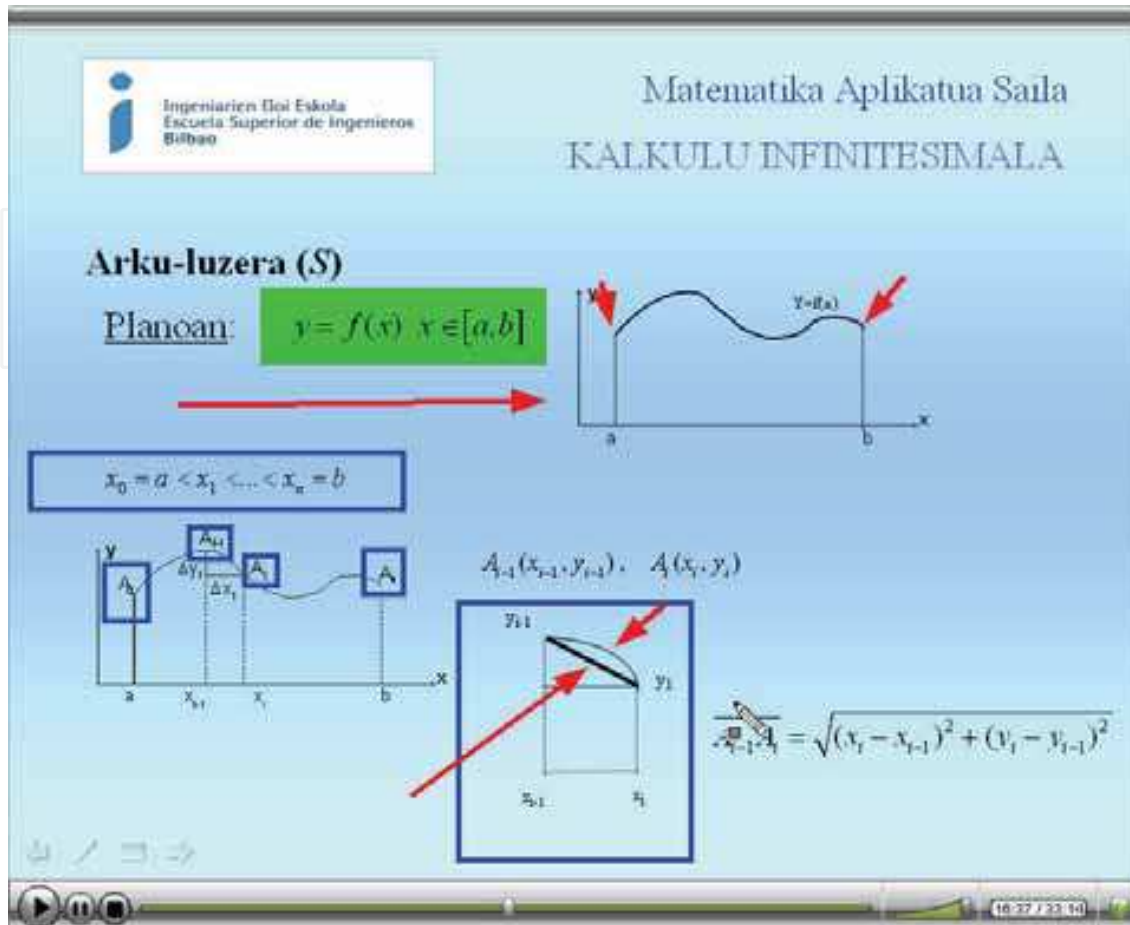


Fig. 1. The interactive material.

The execution of such videos is relatively easy. Any teacher can make their own videos, and relevant to their subject. Because we must not forget that these videos can be tailored to each subject, using each time the tools best suited for this.

Moreover, these videos can be interactive with the student who is using it, so in order to go straight ahead the student should participate in the video.

## 5. Conclusion

Just started the twenty-first century university community is facing a series of challenges to respond. Among them, perhaps the most important one is to meet the expectations that students have in their education when they decide to begin university studies. Actually we should talk about mutual expectations that are generated between teacher and pupil.

Professor hopes to be able to transmit knowledge to their students and they respond by showing an active desire to learn, effort and positive attitude to work, both personal and collective, which their education requires. A good professor does not limit his role to exhibitions, theoretical or practical, of his subject. Alongside this work, he tries to stimulate

students to make them feel really attracted to what is being taught and involved in their education.

The expectations of university students are, if it is possible, even more ambitious. He expects to receive an academic education that allows him to manage, if not resolve, their personal and professional future. But together with this, he sets his targets on issues much closer in time. He expects to understand what teacher is explaining and feel attracted by it. And no mistake, he does not expect to have to make a great effort to achieve it.

That Master Class, like exhibition model, is a valid tool for teaching is something that no one doubts. The question is whether this is the right tool or it is the only one that can be applied. The truth is that this model will provide lots of information to a wider group of students. But on the contrary, perhaps this fact, students that attend the lecture, is its biggest enemy.

While the teacher directs his exposure to a group of students that have in common their interest in the subject they are learning, an issue that allows some nuances, it is nevertheless true that the characteristics of students who make up this group can be substantially different. In general, the learning ability of each student, the aptitude shown to work, both personal and collective that this learning requires, and his personal attitude are characteristics that determine the proper functioning of the group.

Admitting that we can and should require students certain minimum, the fact remains that it is in our hands trying to find alternatives that provide solutions to problems usually found in the classroom: students that do not take part, little receptive and just not used to work.

Adapting of the educational system to address this challenge (and others) is being implemented. In this way, we can adapt the system to the characteristics of diversity of the group, and to the use of a methodology consistent with current techniques and skills and habits of the students.

The basic approach is the generation of multimedia resources through the development of audiovisual materials. A material developed by the own teacher according to the syllabus that he has to impart. And the idea is to make this material available to students who will have access through a computer. In this way the student will have the opportunity to attend a presentation by his own teacher, but to fit their needs: when, where and how often.

In addition, the preparation of this material allows us to make use of tools and applications that are not within our reach if we make a presentation on a blackboard. In fact, to fully exploit the opportunities offered by ICT is consistent with the approach set out here. And, among other things, this helps us to win the attention of students and encourage their participation in the education process. You can not ignore that this system requires personal work by the student and to achieve it is a goal in itself.



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The widespread deployment and use of Information Technologies (IT) has paved the way for change in many fields of our societies. The Internet, mobile computing, social networks and many other advances in human communications have become essential to promote and boost education, technology and industry. On the education side, the new challenges related with the integration of IT technologies into all aspects of learning require revising the traditional educational paradigms that have prevailed for the last centuries. Additionally, the globalization of education and student mobility requirements are favoring a fluid interchange of tools, methodologies and evaluation strategies, which promote innovation at an accelerated pace. Curricular revisions are also taking place to achieved a more specialized education that is able to responds to the society's requirements in terms of professional training. In this process, guaranteeing quality has also become a critical issue. On the industrial and technological side, the focus on ecological developments is essential to achieve a sustainable degree of prosperity, and all efforts to promote greener societies are welcome. In this book we gather knowledge and experiences of different authors on all these topics, hoping to offer the reader a wider view of the revolution taking place within and without our educational centers. In summary, we believe that this book makes an important contribution to the fields of education and technology in these times of great change, offering a mean for experts in the different areas to share valuable experiences and points of view that we hope are enriching to the reader. Enjoy the book!

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