

Information and communication technologies (ict) in higher education: a matter to think over

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One of the key successes in university education reform process is the link between ICT and methodological strategies for teaching and learning. Nowadays, nobody doubts the integration of ICT in the learning process. In university context, for instance, ICTs are very relevant because it is expected that they encourage a culture of self- and lifelong-learning. Moreover, ICTs are crucial for achieving not only these goals, but also for enabling freedom of expression and communication. There is no best way to learn a foreign language. This is because learners vary both in how they learn and what they need and want to learn. It follows therefore that ICT do not perform magical results in teaching. However looking at the current ways of language teaching, and at the future teaching strategies, there are a number of key roles that ICTs have the potential to fulfil in teaching and learning. My paper was built on a theoretical base which was developed specifically to account for the mediating impact of ICT on teaching and learning. After briefly defining and introducing the different types that ICT encompasses, along with some of their benefits; my paper will then focus on the impact of ICT on education. ICT can be used in education in two different ways: as a subject (learning to use ICT) and as a tool (using ICT to learn). The use of ICT is seen as supporting a shift from teacher-centric to learner-centric education, an important learning in research and higher education. However, the marriage between higher education and ICT cannot be celebrated on an infertile ground. This brings me to the next point, i.e. the different barriers that prevent effective ICT use and integration. My paper will also offer background research findings about the current state of ICT in Sétif. Results obtained will show teachers' accessibility to ICT equipment, knowledge, use, integration, training needs, attitudes towards ICT and obstacles. I will end up with providing some recommendations and solutions for teachers and policies.

من أهم الطرق الناجعة لانجاح عملية إصلاح التعليم الجامعي هي الدمج بين تكنولوجيا المعلومات والاتصالات والاستراتيجيات المنهجية للتعليم والتعلم. في أيامنا هذه لا أحد يشك في إيجابيات دمج التكنولوجيا في عملية التعلم. في الجامعة تكنولوجيا المعلومات والاتصالات ذات أهمية بالغة لأنه من المؤكد أنها تشجع ثقافة التحصيل الذاتي والتعلم مدى الحياة. التكنولوجيا ذات أهمية كبيرة ليس فقط لتحقيقها هذه الأهداف، وإنما أيضا من أجل تمكين حرية التعبير والتواصل. ليس هناك أفضل طريقة على الإطلاق لتعلم لغة أجنبية وذلك لأن طرق التحصيل تختلف من إنسان لآخر. بالإضافة إلى ذلك فإن تكنولوجيا المعلومات والاتصالات لا تؤدي إلى نتائج سحرية في التدريس. يتناول هذا المقال قسما نظريا يوضح تأثيرات تكنولوجيا المعلومات والاتصالات في وسط التعليم والتعلم ويعرض أنواعا مختلفة لها. بالإضافة إلى بعض فوائدها. يمكن استخدام تكنولوجيا المعلومات والاتصالات في التعليم بطريقتين مختلفتين: كموضوع (التعلم لاستخدام التكنولوجيا)، وكأداة (باستخدام التكنولوجيا لاكتساب المعرفة). إن التزاوج بين التعليم العالي وتكنولوجيا المعلومات والاتصالات لا يحول دون أرضية خصبة بعيدة كل البعد عن مختلف الحواجز التي تعرقل الاستخدام الفعال لها في الآخرة. أخيرا وليس آخرا يتطرق المقال إلى دراسة الحالة الراهنة لتكنولوجيا المعلومات والاتصالات في جامعة سطيف. النتائج التي تم الحصول عليها سوف تظهر استعمال أو عدم استعمال الأساتذة لمعدات تكنولوجيا المعلومات والاتصالات وكذا العقبات التي يمكن أن تواجههم. وسوف ينتهي المقال بتقديم بعض التوصيات والحلول للمعلمين والسلطات العليا.

Introduction

The Algerian framework of university degree is currently under reform with the traditional system, modelled on the French structure, to be gradually replaced by what is so called the LMD system (Licence, Master, Doctorat). This system is being undertaken as a pilot project at many Algerian universities, which are working in consultation with many European universities.

One of the LMD chief purposes is to place the student at the centre of the educational process, i.e. it is a student centred system. Being credit based, the LMD requires drastic changes in the way courses are designed, taught and assessed. It also requires that the young generation of graduates will be equipped with new skills, knowledge, good attitude and lifelong learning opportunities for life in the digital age.

Taking the University of Sétif (which is planning to adopt the LMD system) as an example, I venture to say that most Algerian universities have a long way to go if they are desirous of upgrading their current facilities so as to assure the best utilization of new modes of research, teaching and learning through ICT. It was only in 2003 that the English department in Sétif was hooked to the internet to be deprived from this privilege five years later. Moreover, at this age and time, many teachers are still not yet computer literate. Not able to even use the internet for basic functions of sending and receiving e-mails, to name few. Even among those who claim to be computer literate, including myself, our knowledge of the various ICT applications is limited. This limitation is due to the absence of formal training in general ICTs application.

In a world of digital interests, there is a need for an urgent change in the mode of teaching and research; a change that will accord Algerian academics self-confidence in the use of ICTs. However, I must admit that some teachers are already well versed in ICT applications in their teaching and research somewhere else. But still the number is so small that it cannot make the positive impact normally envisaged.

There are a host of ICT applications for research, learning and teaching in my field of specialization. But I cannot avail myself of these opportunities

because of the lack of education in this area. Just like me, many teachers are not abreast with the dynamics of the rapid changes in research and teaching because of ICT. This has become the case because some of us have not had the chance to educate ourselves in the application of these technologies. And if ICTs in reality have the abilities of upgrading our teaching and research, then any delay vis-à-vis its usage is detrimental to the learners we handle and Algeria's overall development.

In this paper I will present the real context in which the problematic of using ICT is a contemporary necessity for our future. In section one, I will dive deeply in literature and provide some of the different types of ICT and their potentials. The integration of ICT will certainly make a deep impact on perspectives about teaching, learning and education in general. These aspects are dealt with in section two.

Section three will highlight some of the barriers and limitations that are present everywhere and that stand against the reform 'ICT'.

In section four I will deal with many pertinent problem issues and questions forming the origins of my research problem. Next, I will outline the context of my case study; this includes the description and justification of the data collection method, together with an account of the procedures for analysing data. Finally, I will discuss conclusions on the findings of the subject research aspects, and make some suggestions for teachers and policies.

1. What are ICT?

There is no universally accepted definition of ICT. The concepts, methods and applications involved in ICT are constantly evolving on an automatically basis. A good way to think about ICT is to consider all uses of digital technology that already exists to help individuals.

The 'C' in ICT refers to the communication of data by electronic means, usually over some distance. This is often achieved via networks of sending and receiving equipment. The 'I', on the other hand, refers to the data that has been processed in such a way as to be meaningful to the person who receives it.

When computer and communication technologies are combined, the result is information technology, or 'InfoTech'. It is a general term that describes any technology that helps to produce, manipulate, store, communicate, and/or disseminate information. Presumably, when speaking about information technologies as a whole, it is noted that the use of computers and information are associated.

The information technology is sometimes said to be coined by Jim Domsic of Michigan in November, 1981. Domsic, who worked as a computer manager for an automotive industry, is supposed to have created the term to modernize the outdated phrase 'data processing' (<http://www.itaa.org/es/docs/Information%20Technology%20Definitions.pdf/p.30>). (Accessed May 31st, 2009.).

ICT in teaching and learning encompasses many different types of software applications. The applications tend to fall into two distinct types:

1. 1. Generic Software Applications

Generic software applications are multi purpose programmes that are not designed specifically for language teaching and learning. These include: word processor such as Microsoft word; presentation software such as Power Point; e-mail packages and Web browsers.

1. 2. Call Software Applications

Call software applications are programs designed specifically to promote language learning. They usually include a substantial degree of interactivity (Brown, 1988:06). The comings are some examples:

1. 2. 1. Technology Enhanced Language Learning

This can help produce telling results in language performance through interactivity (human-computer interaction). It is based on the stimulus/response/feedback paradigm- involving the use of a range of stimuli (text, images, audio or video), learner's responses using a range of input devices (keyboard, mouse, touch screen or speech) and various types of

feedback (text, images, audio or video).

1. 2. 2. Interactive Whiteboards (IWBs)

An interactive whiteboard is a surface onto which a computer screen can be displayed via a projector. It is touch sensitive and lets us use a pen on it (or in some cases a finger to act like a mouse, controlling the computer from the board itself). Changes made to the information projected onto the whiteboards are transferred to the computer and can be saved and retrieved in future lessons.

IWB encourages spontaneity and flexibility, allowing teachers to draw on and annotate a wide range of web-based resources (Kennewell, 2001). It also enables them to save and print what is on the board, including any notes made during the lesson, reducing duplication efforts and facilitating revision (Walker, 2002). Moreover, it allows to share and re use materials, including workloads (Glover and Miller, 2001). Finally, it is widely reported that it is easy to use compared with computers in large classes.

1. 2. 3. Computer Labs

Computer labs have an important role to play as indicated by Heather Rendall headed *Teaching in the Computer Network*. The computer lab work is very effective in offering the intensive one-to-one practice that language learners need.

1. 3. Computers and the Internet

1. 3. 1. Computers

Computers can facilitate teaching and learning at all levels, from pre-school children mastering the alphabet to doctors learning new diagnostic techniques. To fully understand the real impact that computers are currently having on language teaching it is firstly necessary to step back and consider how their role has developed.

In the past, computers assisted language learning (CALL) developed and concerned itself with the pedagogical applications of technology. Learners

used the computer to develop and practise their English. The computer, for instance, served mainly as a vehicle for delivering instructional materials to the learner. It was also used for skill practice in a non-drill format and with a greater degree of learner choice, control and interaction. This includes using the computer to stimulate discussion, writing or critical thinking. The computer has also been used as a tool (e.g. word processors, spelling and grammar checkers). Marked by the introduction of two important innovations: multimedia and the internet, the computer's role is becoming integrative (Warschauer, 2000).

All in all, computers in general can be classified into three categories as far as their function is concerned. They can be used as objects that learners learn about. They can be considered as aspects or tools in subjects (use of graphic design software to create web pages). And last but not least, they can be used as medium for instruction (Plomp, Ten Brummelhuis, and Pelgrum, 1997).

1. 3. 2. Multimedia and the Internet

English has been existing for many years and its significance continues to grow, fuelled, partially at least, by the internet. Graddol's (2000) suggests that in the year 2000 there were about a billion English learners- but a decade later, the numbers will have doubled. The same study indicates that over 80% of information stored on the internet are in English.

Technological innovations have gone hand in hand with the growth of English and are changing the way in which learners communicate, work, trade and learn. It is fair to assert that the growth of the internet has facilitated the growth of the English language.

As far as multimedia is concerned, many studies have emphasised the potentials of computerized media and multimedia environment in fostering language learning (e.g. learning vocabulary) (Nikolova, 2002). The main advantage of multimedia is that they enable reading, writing, speaking and listening to be combined in a single activity, with the learner exercising a high degree of control over the path that s/he follows through the learning materials.

The internet, on the other hand, builds on multimedia technology and in

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addition enables both asynchronous and synchronous communication between teachers and learners (Davies, 2003).

The internet provides language learners with opportunities to use the language that they are learning in meaningful ways in authentic contexts. It provides an easy and fast access to the use of current and authentic materials in the language being studied, which is motivating for the language learner. Such authentic materials include, for instance, online newspapers, web casts, pod casts, newsroom video clips or even video sharing websites such as, say, You Tube. Another learning opportunity using the internet is provided by chat rooms and virtual environments where the language learner can practise speaking and pronunciation, without the fear of making mistakes.

1. 4. Portable ICT Device

Portable ICT device is a computer able to be carried by a person with reasonable ease with regard to its size and weight. In addition to what an ordinary computer provides, the portable ICT device can be used for periods of time without connection to a mains electricity supply. Most commonly, this means that the device uses batteries as an energy source.

ICT are more than just computers and the internet. ICT tools go further to include also cell phones, global positioning systems (GPS), video games, digital cameras, MP3 players, wikis, blogs and more. All these devices can also be used in a way or another in teaching and learning.

2. Impacts of ICT on Education

2. 1. A Shift from Teaching to Learning

The use of ICT in teaching and learning can be viewed as made up of two interrelated parts- acquisition of generic ICT skills and learning the medium of ICT. This use is seen as supporting a shift from teacher-centric to learner-centric education, something seen as desirable in its own right, and certainly an important learning tool in higher education. This shift changed our expectations of what learners must learn.

Learners will have to learn and navigate through large amounts of information, to analyse and make decisions, and to master new knowledge domains. They will need to be lifelong learners, collaborating with others in accomplishing complex tasks, and effectively using different systems for representing and communicating knowledge to others (Scandholtz, Ringstaff and Dwyer, 1997).

Shifting the emphasis from teaching to learning can create a more interactive and engaging learning environment for teachers and learners. This new environment involves also a change in the roles of both teachers and learners.

The role of the teacher will change from knowledge transmitter to that of learning facilitator, knowledge guide/navigator and co-learner. The new role does not diminish the importance of the teacher it just requires new knowledge and skills.

2. 2. Impact on Learners and Learning

There is growing evidence that ICT application to the core business of education can accelerate and improve learning on a number of fronts:

2. 2. 1. Motivation

Learning is improved through games and other digital media (US Congress, 1995; Allen and Ainley, 2000; Diggs, 1997), through offering real and relevant opportunities for linking with real language learners (via the internet and video conferencing), through providing access to relevant and engaging materials (through access to language entertainment and information sources) and strengthening teachers and learners relationships to be more interactive and guiding (Shears, 1995).

Research demonstrated considerable improvements in affective areas due to ICT (Allen and Ainley, *ibid*; Calvin, 1998; Cuttance, 2001; Schacter and Fagnano, 1999). Examples include learners perseverance (Jacobson, 2001), enthusiasm (Mandinach and Cline, 1996) and good attitudes to learning (Ryser et al., 1995).

It is axiomatic that none of these benefits is guaranteed to flow automatically from the use of technology, but many may be achieved through good teaching and the modelling of effective learning.

2. 2. 2. Learning across and outside Institutions

ICT tools can be used to make learners tacit knowledge public, can help them develop metacognitive skills and become more reflective and self regulated learners (Hsiao, 1999). This can be achieved through personalised and mobile devices, and through home access to the internet.

2. 2. 3. Effective Practice and Progress

Learners can practise languages in an environment free from embarrassment where they can work at their own pace. These environments offer also instant feedback on success, diagnostic testing of abilities, encourage learners to manage their own learning, develop their basic skills (Mann, 1999; BECTA, 2000), problem -solving (Oliver and Omari, 1999), information management (Peabody, 1996), and work habits (Adnanes et al., 1998).

2. 3. Impact on Language

There is no doubt that developments in electronic instrumentation and computer science have already altered the way we look at the language. The vast data processing capacity of modern systems has made it possible to expect answers to questions that it would have been impractical to ask a generation ago.

Corpus linguistics and the arrival of lexis, for instance, as an item to be included within the syllabus began in the 1980s with Sinclair (1987) and others, and work of this type continues today. This statistical analysis of language, initially analysis of written language, and more recently spoken language has allowed us to examine the frequency of words. This has informed the profession from several perspectives. It has given us insights into the most useful vocabulary to teach and facilitate the emergence of the lexical syllabus.

All areas of English language study have also been profoundly affected by

technological developments. In phonetics, new generations of instrumentation are taking forward auditory, acoustic, and articulatory research. In phonology, lexical databases are allowing a new range of questions to be asked about the frequency and distribution of English sounds. In graphology, image scanners are enabling large quantities of text to be quickly processed. In grammar, huge corpora of spoken and written English are making it possible to carry out studies of structures in unprecedented detail and in unprecedented range of varieties.

Other well recognized areas of English language study have also been affected, such as: sociolinguistics, studies of dialect variation and stylistics (Crystal, 1999: 436).

2. 4. ICT and Teacher Professional Development (TPD)

Over a series of international programmes for the development of ICT in education, there have been research studies of the uptake of ICT in education. Studies of this kind deals with the impact of ICT on teachers' training (Cox et al., 1988), level of resources (Cox, 1993), teachers' attitudes (Woodrow, 1990), and teacher professional development (Villegas-Reiners, 2003). For detailed research papers on many of these aspects see Passey and Sumways (1997).

The conception of TPD has been challenged by the emphasis on lifelong learning. TPD is more and more considered as a long-term process that includes regular opportunities and experiences systematically planned to promote growth and development in the profession (Villegas-Reiners, *ibid*). One major influence on TPD is technology (Snyder and Acker-Hocevar, 2004).

ICT can have many positive effects on TPD in many areas. It is aimed to involve teachers in developing a personal digital portfolio, which can lead some teachers to move swiftly from a position of non-user to mentor of others (Kankaanranta, 2001). Publishing digital portfolios on the web enables a sharing of pedagogical expertise and practice. Electronic portfolio development process, above all, contributes both to teachers' professional development and learners' lifelong learning (Barrett, 2000).

Teachers can also acquire and develop many knowledge and skills to become

effective in the class through mailing lists and discussion groups. Membership to a mailing list can reduce feelings of professional isolation (Parker and Howell, 1998). And sharing problems or successes through a discussion group can give members the confidence to reflect on practice in their own institutions.

3. Barriers to ICT Use and Limitations

3. 1. Barriers

- **Teacher level barriers.** Teachers' poor ICT competence, low motivation, lack of confidence in using technologies in teaching, and complexity are significant determinants of their levels of engagement in ICT.
- **Faculties' level barriers.** Limited access to ICT, poor quality and inadequate maintenance of hardware as well as unsuitable educational software hinders ICT integration.
- **System level barriers.** In some countries it is the educational system itself and its rigid assessment structures that impede the integration of ICT into everyday learning activities.
- **Other barriers.**
 - Many teachers think they are already overburdened with large classes and many have different subjects and levels to prepare, as well as tight daily time tables.
 - Many teachers most commonly use ICT for administrative tasks (routine tasks, record keeping, lesson plan development, information presentation and basic information searches on the internet).
 - Teaching with ICT takes more time for teachers, both as they attempt to shift pedagogical practices and strategies, and when such strategies are used regularly.

3. 2. Limitations

There is no best way to learn neither a language nor a single optimal set of teaching materials. This is because learners vary both in how they learn and what they need and want to learn. It follows therefore, that there are no ready made solutions offered by ICT to support all learners at all levels.

Any teacher, for instance, just by introducing a computer into his/her

teaching, cannot consider that automatically s/he will have the outcome that his/her learners will learn more, or better, nor can they be considered incentives to learning. Access to computers and the internet does not mean new learning methods suddenly emerge. As Schacter (1999: 331) points out: *'we should not accept the rhetoric that technology makes learning easier and more efficient because ease and efficiency are not pre-requisite conditions for deep and meaningful learning'* Moreover, it is possible to use ICT for trivial purposes, to waste learners' time with ICT or even worse, to use ICT for destructive or immoral purposes, entrench inequality and favour particular groups .

4. ICT and the Case of Ferhat ABBAS University-Sétif

4. 1. Origins of the Research Problem

Worldwide research on use of ICT for teaching and learning is going on. Many universities are spending fortunes on this sort of research. Measures, such as workshops, seminars and conferences are frequently held on the same topics. To make our educational system cope with the moving trend of reforms and to catch up the literature, I think it is high time to do some research and development, and establish a system where we make effective use of ICT.

Moreover, of all disciplines of education, social sciences and humanities departments in Sétif make least use of ICT. It is, therefore, urgent need of hour to sensitize them about this respect.

4. 2. Significance of the Study

Hypothetically, I believe that teaching the English language is not the cup of all teachers. Neither are all of them sufficient to teach. The use of ICT is one of the many solutions which can help us overcome this hurdle. For instance, the teaching of English requires high level proficiency over pronunciation, stress, intonation and phonetically correct language. Here again, and in addition to the already mentioned benefits, the use of ICT in form of CDs or DVDs of encyclopaedias, internet resources, graphical presentations, audio books, movie clips, etc. can be of tremendous help.

4. 3. Objectives

We are expecting to reach a teaching methodology, where a good combination of traditional approaches and modern techniques gives us better options for teaching. As a matter of fact, we can fulfil the reforms' thrust to ICT integration, quantity and excellence in higher education.

4. 4. Research Questions

Are our teachers equipped for the new wave of integrating ICT in their classes? Is our infrastructure suitable for extensive use of ICT? If so, to what extent? What needs to be done?

4. 5. Research Design and Methodology

- Choice of the method

Our research is mostly of fact-finding descriptive nature, it has two specific aims. First it describes a current situation, and therefore we can develop and provide appropriate recommendations. Second, it deals with teachers who are presently teaching respectively at the English department of Sétif's university.

- Data Gathering

The only data gathering tool to be used is a teachers' questionnaire. This will enable us to have access to teachers' attitudes towards issues they consider important in making the best educational ICT use. The questionnaire will also inform us about teachers' experiences with ICT in different contexts. .

- Sample

Our sample is the whole population of oral expression teachers (twelve teachers) to whom questionnaires have been administered. These teachers, of course, have also other modules in addition to Oral Expression, such as Literature and Phonetics. Although all teachers (except two) are part time teachers, they have all a considerable teaching experience (from two to twenty teaching years).

- Procedures for Analysing Data

All the obtained data will be presented in tables and statistically analysed to be interpreted. We will end up with some results.

- Results

Results (see appendices) show that there are significant differences in all technological resources between teachers' personal, professional development and teaching use. Teachers' most commonly used ICT tools are: word processor, audiovisual means and the internet. All these resources are used chiefly for personal use; however audiovisual means are used in both personal and professional development contexts.

Results show also that there are many obstacles that prevent the integration of ICT. Some resources, to name few, are not available at all (e.g. the internet in our department), or not accessible when needed (tape recorders). Although, there are some teachers who claim they lack time, skills and technical support even in the presence of ICT; it is sad to say that only three teachers undertook some training about computer use in private schools.

All in all, all teachers were firm in their belief that ICT can help them find relevant information for their teaching, can motivate their learners and facilitate the target language. This appears to conflict, however, with strong assertions about how ICT can be time consuming if not used constructively.

5. Suggestions and Recommendations

- Teachers are the key to the successful integration of ICT into education. They manage the processes of teaching and learning. Without the active, enthusiastic and skilled participation of teachers, innovations to enrich education with the advantages offered by technology are doomed to fail. The full participation of teachers in adopting technologies to enhance education requires a commitment to ongoing professional development to teachers.

- Teachers should be volunteer learners, motivated to learn more about the use of ICT to better their position and make improvements. In other words, teachers should be aware of the potential of technology to promote educational reform, and that the ability to apply technology is one of the

necessary skills for a good quality teaching.

- Teachers should be able to evaluate themselves on use of technology to support lifelong learning, professional development and personal life. **ICT in education**.www.unescobkkk.org/education/ict p.58-59.

- Teachers need to understand that their roles have to change, that the physical space of the classroom will need to be changed, and that they should accommodate different kinds of interaction: small groups, learner to learner, and learner to computer interaction (Warschauer, 2000).

- The use of ICT in language learning not only involves pedagogical changes for teachers but also involves environmental and pedagogical changes for learners. Because learners are traditionally used to face-to-face teaching in classrooms.

- Although an increasing number of learners have access to online technologies and use ICT for personal interactions, they find it challenging to use ICT in an educational context.

- ICT have the most positive effect on teaching and learning when it is targeted at specific areas, with a clear rationale for its use from a broad research base about ICT, about pedagogy and about professional development.

- ost managers in all sectors should recognize their responsibility to provide leadership in policy and planning for ICT in education.

- Administrators need to ensure that teachers have adequate time to participate in ICT integration, and do not have to sacrifice too much personal time to do so.

- The availability of tables, desks, writing materials, computer facilities with electrical outlets and burglar bars, classroom space (physical infrastructure), internet connectivity, radios, batteries, network equipments, dedicated technicians experienced and qualified in the maintenance of computer systems (technical infrastructure) are chief priorities for teachers if they are

to use ICT in their teaching.

- Teachers should be provided with print-based guides to hardware and software, instructional materials and modifications to curricula to support their professional development.

- Introduction of ICT takes time. Adequate time must be allowed for teachers to develop new skills, explore their integration into their existing teaching practices and curriculum, and undertake necessary additional lesson planning, if ICT are to be used effectively.

- Lessons learned from introducing ICT in education need to be shared. As the introduction of ICT to aid education is so often a part of a larger change or reform process. It is vital that successful uses of ICT are promoted and disseminated.

- ICT should be appropriated rather than merely used.

General Conclusion

Given the increasing pressure exerted by technological developments on language education, it is important to understand the underlying factors behind teachers' decisions regarding ICT.

Although teachers are willing to adapt change and will do so under the right conditions. ICT still remains to be a threat to many, especially those who were used to be the authority in class. Any innovation that is clear and practical, and more importantly supported by authorities has enormous potential in providing more learning resources and make high efficient learning possible. In other words, teachers can make comprehensive reform possible but professional development is the key and support is vital.

It is necessary to point out that we should take the results of this work with certain caution. As it is a pilot example and would be dangerous to inference from the results to the whole population. Given thus, and bearing in mind all the results commented before, I think that our faculties make a limited use of technological resources. This fact makes the large potentialities of ICT in teaching lost in higher education.

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