The Integration of Information and Communication Technologies in the University: Models, Problems and Challenges (La Integració de les TICs a la Universitat: Models, Problemes i Reptes)

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Unpublished Ph.D., 2008

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English Summary

Chapter 0

INTRODUCTION

1. Justification of the research

The impact of ICT in the universities is especially significant because some of its potentials coincide with priority functions of these institutions, like the localisation, production, storage, critique review and transmission of information and the organisation of educational programs. Through ICT we have received new formats for knowledge production and dissemination and new learning environments. The use of ICT is enlarging and modifying every university response related to teaching, research and administration in a quantitative and a qualitative way. It can also affect our way of thinking, acting and learning.

It is therefore advisable to analyse the possibilities ICT would generate in universities, in teaching, research and management: What are the opportunities they offer? How can they be effectively integrated? What training needs do they generate? What are the necessary human, economical and functional resources? What are the economic, staff and social limit? What organisational problems arise?

So far not many studies have analysed if strategic planning actually helps universities in their way towards change and what these changes really are regarding the use of ICT in teaching and learning. Up to now it has been difficult to identify if the actions universities undergo in order to integrate ICT are based on a strategic goal or if they are simply an immediate reactive response to punctual situations that ask for action because it seems to be demanded by society.

It is therefore necessary to investigate from a qualitative perspective on how the universities are carrying out this process in order to describe the most important factors and to throw light upon these processes so that we can identify them correctly and improve them. It is clear that every time a certain process is highlighted, other aspects stay in the shade. It is not the

objective of this study to solve the problem to its exact detail, but it has the aim of determining what corners remain the darkest so that they can be explored from different perspectives by other researchers. In this sense, the present research itself is based on a previous study (Sangrà, 2003) that developed a model for analysis on the revision of the strategic documents about ICT integration belonging to 16 universities in the whole world. Now this analysis model is applied in the 5 case studies that belong to this present study.

Everything that can add some understanding to the afore-mentioned processes will help us to build and to follow them in a better way with the final aim of increasing the quality of our university system.

2. Structure of the work

The full thesis (Catalan version) goes through the theoretical and conceptual framework, which is based in the concept of Information & Knoledge Society and the mission the universities should play in such a new context. Shifts that are being provoked are analysed from a double perspective, the one from the national and international organisms that are supposed to be loudspeakers of the society, and the contributions from experts that have studied this phenomena (Hanna, Bates, Bricall).

Strategic planning is used as a tool to better organise the response to this demand and it is analysed from the perspective of how the universities can used it for. The assumption of pedagogical models when using ICT is faced, and current contributions of some authors on new approaches for teching and learning through or with support of ICT are mentioned as well.

Later on the design of the research is presented, jointly with the main aim and its general and specific goals. Qualitative methods and tools are presented and justified, and process of data collection and analysis is told. The results, in the shape of five university case studies, are shown and discussed.

Finally, from the cross-sectional analysis of the case studies, conclusions and further recommendations are given. Bibliography can be found after this English Summary, and closes the full version of the thesis.

This English Summary highlights some major aspects of theoretical and conceptual framework, tells which are the main aim and the general and specific goals, and summarise the main elements of the research design and development.

A synthesis of the study cases can also be found, with the expression of the SWOT analysis of each university.

Finally, the conclusions and recommendations are included in their full version, translated into English, just before the bibliography that has been used during the elaboration of this research.

Chapter 1

THEORETICAL AND CONCEPTUAL FRAMEWORK

1. The university in the context of the Knowledge Society

For more than a decade any publication related to social sciences is alerting to the changes that are happening in our society. It is even said that a new society is emerging.

This new society would be the so-called Third Wave (Toffler 1981) succeeding the two former ones, namely the agricultural society around 10000 bC. and the industrial society that started developing around 1700 aD. Both brought about important changes in the way people lived.

These changes led to modifications in the social structure and organisation of everyday life. Giving up a nomadic lifestyle based on hunting and fishing for sedentary agricultural structures implied a substantial change in the development of mankind. In the same way the organisation of labour was enormously affected by the arrival of machines that brought about division of labour and a new culture not only in industry, but also in the way people organised their lives taking advantage of the industrial progress: transportation saw considerable changes and distances have definitely shrunk.

Indeed, today we also stand at the beginning of a number of changes that are shifting the social, economical, political and cultural conditions of our society. We are looking at changes that according to Castells (1997) allow us to say that we live in a new society because it has transformed its way of development.

Some manifestations of these changes are the following:

- Economical globalization.
- An ever more competitive labour market.

- The advent of a media culture.
- Education and training as the foundations that help to face the change.
- The democratization of the access to information and knowledge.
- The delocalization of knowledge and the approaching of distances.
- The growth of accumulated knowledge.
- New operators in the training market.

Every time change happens, or is close to happening we are invaded with insecurity due to the uncertainty it generates. But often change also brings about new opportunities - opportunities for progress, for a general improvement in society and particularly in the everyday life of the citizens.

The convergence of the latest scientific discoveries in telecommunications and technology in general, have begun to allow for important changes in information production, storage and access and have initiated what people already know as the third revolution, the post-industrial revolution or the Information and Knowledge Society (IKS).

2. The mission of the University in the 21st Century

The transformation process that has been produced by the changes discussed above has had an enormous influence on several dimensions of society itself. As a result, political institutions, that in theory represent the will of the people, now demand that universities should play an active role in the construction and the consolidation of the Information and Knowledge Society.

Nobody doubts that universities are centres that create and disseminate knowledge, but it is also true that over the past few centuries their progress has been limited regarding their own modernisation. Now they are being forced to undergo a process of restructuring that will enable them to face the new challenges and offer a new service with new perspectives (Gairín & Martín, 2004).

This is a reality reflected in many political guidelines that can be identified in declarations, communiqués, recommendations and rules produced by governments and public administrations.

The European Commission documents and guidelines, as well as in the preambles of the "Ley Orgánica de Universidades" (LOU) produced by the Spanish Government and the subsequent modifications, and in Catalonia the "LLei d'Universitats de Catalunya" (LLUC) point out that the growth of the Information and Knowledge Society fundamentally depends on the creation of new knowledge, the transmission of this knowledge through education and training, its dissemination using ICT and, finally, its use in new processes in the industrial and the service sector. Furthermore they understand that the university or academia is closely linked to this mission based on three pillars that represent its fundamental fields of action: research and exploitation of the research results through technology transfer; education and training; and finally, the contribution to regional and local development.

On the other hand it is also important to take into consideration the reports written by different expert commissions. Here we can highlight the Dearing Report (NCIHE, 1997), the "Universidad 2000", better known as "Bricall Report", or the report edited in Catalonia by the Commission of Reflection on the Future of the Catalan University (Comissió de Reflexió sobre el Futur de l'Àmbit Universitari Català, 2001).

These papers concur in the observation that the current society needs to radically change its education system, stressing the fact that this transformation is especially necessary within the university system.

However, these documents also indicate that the role and function of the universities has not changed as much as we might have imagined. What has really changed is the context in which they have tried to reach their goals: the so-called Information and Knowledge Society, the reality Castells (1997) calls the Information Era and Hanna (2000) baptises as the Digital Age.

Hanna (2002), Bates (2001), Neave (2001) and Bricall (2000) offer very lucid analyses about some of the factors that corroborate the universities need of transformation in order to improve their services. These authors agree on the following factors:

- The growing demand of educational services for an increasingly diverse type of student.
- The increasing costs of higher education in universities.
- Limited public funding.
- The emerging view of learning as an investment for the future.
- The need for new organisational models.
- The increasing role of the Information and Communication Technologies (ICT).

Regarding these points, the authors give many opinions about how ICT can contribute to the transformation process needed by the universities.

Bricall (2000: 237-249) considers that these contributions can be classified in three blocks. The first block contains the contributions that are made towards the higher education context in general. As determining factors he points out the elimination of space and time constraints in education, the adoption of a more student centred model, the improved possibilities of commercialisation and globalisation of educational programs and the emergence of a new management and organisational model in higher education. Furthermore, he points out that society recognises that the universities incorporate the influence and the new ways of administration of the ICT in every single area of specialization. According to Bricall it is also seen positively that the universities contribute to the competence building and the development of skills in the use of ICT in study, research and everyday life.

The second block refers to the advantages for research, focusing on the possibilities that are opened regarding a wider interdisciplinary and international involvement of researchers thanks to the elimination of time and space constraints.

Finally the third block discusses the benefits that the use of ICT can have on learning itself, based on an improved interaction between students and teachers and on a more intense communication that generates better possibilities of feedback among the students

themselves. The author sees possibilities for an improved quality of learning thanks to the use of sophisticated technological mechanisms like simulations and virtual laboratories and thanks to the better access to educational resources.

Probably the most important aspect is to explain these potential benefits to a wider audience, so change will never be possible if the implied people do not see the benefit, as Fullan (2002: 286) stated.

3. The incorporation of ICT in university: a strategic commitment

We consider the university as a system. Systems (Bertalanffy, 1976) consist of interacting elements and as these are at the same time open systems, these elements also interact with the environment which conditions their own evolution and the adaptation to new situations. When a new element enters the system or one of the elements turns out to play a different role to the one it had played so far, the entire system is affected and according to the principle of homeostasis it will start seeking for a new equilibrium between its new elements in order to incorporate the novelty and to continue developing its inherent purpose.

This is exactly what happens with ICT in university. A new element, or maybe not so new but with a different role, is introduced in the system. The system's organisation will therefore be affected.

Different universities develop different integration strategies for ICT within their educational programs. Farrell (1999, 2001), Werry (2001) and Wolf & Johnstone (1999) have discussed these processes that basically categorize completely virtual institutions, or Hanna (1998) who based the categories on the alliances between institutions.

The Bricall Report says that "the decision about investment on ICT does not so much depend on its technological characteristics, but on the strategic considerations taken by the university leadership with the aim of improving the services universities offer to their clients" (Bricall, 2000: 240).

Bates (2000: 35-40) offers some reasons that can push universities to consider ICT integration as positive. These reasons can be divided into four areas:

- Increasing people's access to education and training.
- Improve the university's economical expectations.
- Respond to the technological imperative.
- Improve the quality of education.

Over the past few years universities have started to develop a more strategic approach in their leadership, based on the awareness that they need to undergo a transformation process if they really want to maintain an important role in the current society. Therefore they have to change just the way society itself has changed, and to do so it will be necessary to make adequate decisions based on a thorough analysis of the context in which they operate.

The definition of strategy that is offered by Mintzberg amongst other authors (Mintzberg, Quinn & Voyer, 1997: 7) says that "strategy is the pattern or plan that integrates the main aims and policies of an organisation and at the same time it establishes the coherent sequence in which action has to be carried out."

The concept of strategic planning comes from the business context when changes in companies happen quicker, more frequently and in a more radical manner without having a clear connection with former experiences. Strategic planning is a technique that has been later incorporated in strategic leadership processes within companies and institutions.

The majority of authors agree with the opinion that strategic planning is an attempt to gain advantage over others, to obtain better results, to be better, to conquer a market etc. in a determined period of time.

In order to carry out strategic planning it is important to initiate a process that some authors call "strategic thinking" (Boar, 2001) or "strategic formulation" (Andrews, 1971). Gimbert (1998) interprets the latter and offers a concept that we consider more applicable in our particular context. We are going to use Gimbert's idea as the basis for our own inquiry.

According to Gimbert, the strategic planning process comprises of 6 steps: the mission, the vision, the external analysis, the internal analysis, the formulation of goals and the strategic decision making.

Fig. 1.[1] Adaptation of Andrews' process of strategic formulation. Source: Gimbert (1998: 29)

In order to help us with this process, some authors introduce "strategic axis" that are defined as internal or external factors that can influence decisively on the accomplishment of the stated mission.

Earlier in this document we have established that universities want to find this advantage in their transformation. In this sense, whenever they consider it convenient, universities should start a process of strategic reflection that allows them to identify the strong and weak points that could be brought about by the incorporation of ICT. This reflection should also help in

[1] *Despite in this summary a number of tables and figures is not shown as in the complet text is, we have mantained their original numbers.*

determining which strategic decisions would be necessary to be taken in order to help the integration generating maximum benefits for the institution. All this can be called the development of a strategic plan for the integration of ICT in the university.

Indeed, the development of an ICT implementation strategy seeks to generate knowledge about how to use technology in order to create information and adequate systems with the aim of developing competitive advantages within an organisation (Porter, 2000). The university has to determine in each case which is the competitive advantage it is looking for.

In order to know if universities are integrating ICT from a defined and planned strategic viewpoint we conducted an investigative research activity (Sangrà, 2003). A number of universities were chosen covering a range of countries or regions dependent upon their stage of technological development which could be considered examples of contexts in which the integration of ICT had already been implemented for some years: Australia, Canada, USA, Europe, and Spain as well. The strategic documents of these universities were then analysed.

The identification of the types of strategies and actions that these institutions had undertaken or had wanted to carry out was done based on the analysis model developed by Sangrà (2003). The study produced the following conclusions:

- ICT represent a transversal axis of institutional change.
- Strategic planning is increasing but it still has a low impact on academic activities.
- There are fields of priority strategic action: access and infrastructure, administration processes, communication, research and teaching & learning.
- The chosen strategies are not the same in every university.

As a consequence there is a clear lack of balance in the ICT integration process that does not lead to integral solutions. Instead, we can find punctual responses to particular problems.

4. Pedagogical models and ICT integration in teaching and learning

ICT have been applied in very different pedagogical models. Therefore, and without arguing that technology is not neutral, it is also true that its use does not automatically change a model that is based on a particular understanding of learning.

The universities have found themselves obliged to respond to the challenge of ICT integration in their teaching systems. As opposed to the argument presented by Adell (1997) that technology itself is a product of the social and economical conditions of every time and country, it is still true that ICT is progressively becoming an element that brings about important decisions about change in our universities even though this challenge of ICT integration does not reach every University to the same intensity or even at the same time.

There are three focus points that are especially interesting whilst analysing the use of ICT with teaching purposes. The first one sees technology as a support for traditional teaching, as a tool that helps reaching the educational goals (Cabero, 2001). This viewpoint defines technology as an isolated entity that can be used independently and does not interfere with the teaching methods that are applied in the same context.

The second one relates the evolution of the use of ICT with the evolution of distance education, a method that historically has been considered inferior to face to face teaching and learning. The emergence of the social use of the so-called technologies of information and communication (Castells, 1997) and the conceptualisation of education as a lifelong process (Delors, 1998), have revolutionized the social perception of distance education. It is true that distance education always used technologies that had already been generally accepted and therefore never formed part of the concept of state of the art technology (Barberà, 2001: 20), but exactly that had always been its grandeur: using technology in order to give access to education to the largest possible number of people. According to Adell & Sales (1999), the really innovative role of ICT in distance education is the reduction of transactional distances between teachers and students and the opening of channels of interaction between the students themselves.

The third focus point is what some identify with the name of e-learning. Although e-learning has a wide meaning regarding the use of ICT in every educational context it is true that some of its usual applications could be considered an evolution of distance education that has always used the technologies that were closest to the people. Representatives of engineering departments often consider e-learning as their own applying a vision that sees e-learning as a tool without history that has just been invented.

ICT, distance education and e-learning therefore form a complex triad in which every element supports the other, especially since virtual teaching and learning environments have arrived.

Bates (2003: 127) considers that we can talk about a continuum of learning models based on technology. His belief is there are four big models: At opposite extremes there is the absence of e-learning (traditional face to face education), whilst on the other there is *total* e-learning (online distance education). In the middle there are two more models: the model of technology support in traditional classrooms and the mixed model in which the face to face component is reduced by increasing the online part of the program. Each one of these models has to be managed with its own particular principles and cannot be considered representative of e-learning, except the model of *total* e-learning.

People believe that the main characteristic of teaching and learning systems mediated through virtual environments is technology. In reality, technology is, or should be, a tool that serves education, although in many cases it conditions education in a very clear way. In these cases, however, we would be looking at the perversion of the system, not at a general axiom.

The main contributions of these systems are the ones that have made them attractive to their users, considering that they have opened new possibilities of learning and eliminated barriers that always seemed to be insurmountable. In detail, we are referring to flexibility, personalisation, interaction and cooperation. These contributions are done in a field, an environment or a context that is technology mediated. In such a field there are mediating agents on which depends the achievement of the educational benefits discussed above. There are four of these mediators that have to be specially mentioned: the technology, the contents, the teaching staff and the students.

Brown (2002) establishes the concept of *learning ecology* in order to explain that we are heading a new paradigm. Obviously we are still not able to accept or to reject this proposal, especially if we use the definition for paradigm offered by Thomas Kuhn (1962), which is probably the most widely accepted. But it is still convenient to keep it in mind in order to understand if it has enough potential to describe a conceptual change of the teaching and learning processes.

Brown defines ecology as an open system which is complex and adaptive and has dynamic and interdependent elements (Brown, 2002: 12). The diversity of these elements makes the whole system (ecology) strong and adaptive to change and new environments. In this sense, Brown considers that we can talk about a learning ecology around the World Wide Web that is formed by a very large number of "authors" belonging simultaneously to different interest groups and that have an expertise and knowledge that they express both in a tacit and in a written way. This way, he says, it should be easy to find a space, a little community that coincides with our own particular interests.

These communities are the starting point - communities that can be small or big, that are born in physical and local contexts and that then, thanks to a pollinating effect, quickly transmit the ideas that they create, making it possible that everybody finds his own interest fields in this network and that everybody becomes simultaneously teacher and student. The system becomes so strong that in the end nobody but the community itself is the expert (Brown, 2002: 10).

It is clear that if we want this to happen, the single elements of this kind of ecology have to have certain characteristics. Brown says that the fundamental kernel that allows the creation of such a system is the learners themselves as they design with their actions the learning environment of the future.

The result is the proposal for learning "in situ" with and from others, a type of learning that is action centred and that becomes more social than cognitive, rather concrete than abstract, and entwined with judgement and exploration (Brown, 2002: 6). In this way, the Web or the

Internet does not only become a social and information resource but also a means for learning where meaning is socially constructed and shared.

Hence, we have to observe how such proposals evolve in order to be able to see if there is really sufficient support coming from the scientific community to call this phenomenon a new paradigm. It is true that it initially shakes the assumptions we have been working with so far and it offers an option of breaking with the mimetic application of ICT in education where the same learning schemes that are used in processes without technology mediation are reproduced over and over again.

In fact, the pedagogical methods that are applied are still the classical ones so that we are actually running the risk of using virtual environments and ICT in order to perpetuate the teacher centred model (Coomey & Stephenson, 2001; Laurillard, 2002; Bates & Poole, 2003; Sangrà 2003). This is exactly what Garrison & Anderson (2003: 8) expressed in a more drastic way: "That we have not made much progress is due to the fact that the [discussed] regressive activities have been defining the status quo and have reinforced the defensive strategy of higher education."

5. Strategic axis for the configuration of an advanced educational use of ICT

The building of the European Higher Education Area (EHEA) and the methodological changes that are linked to its spirit configure one of the most important challenges that the European University System is currently facing. ICT could be a powerful ally, especially as the new approach places a high percentage of study time outside the actual classroom activity. The student has to do this work under the teacher's supervision but in an autonomous and independent way.

The big concern in the European context is the strategic use of ICT in higher education as a tool that helps to improve the quality of education and thus the possibilities of competing with the United States and Asian countries. The problem according to the HECTIC report (Coimbra Group, 2002: 35) is that the majority of university leaders are still not prepared for strategic thinking; the level of the institutions internal freedom is still not high enough because

they are just not allowed to move in the direction Europe clearly needs them to move. And externally no mechanism has been created that would facilitate this process.

The challenge of developing processes of strategic thinking that would allow us to take advantage of the potential benefits of ICT in transforming the universities and enable them to better respond to the requirements of the EHEA is on display.

Chapter 2

METHODOLOGICAL FRAMEWORK

1. Aim and goals

The aim of this research work is to identify the processes that are linked to ICT integration in order to contribute to a needs analysis seeking a better exploitation of ICT tools for the benefit of the students' learning and the improvement of management and research in higher education.

Putting this in a more concrete way, we have formulated one general and four specific goals. The conjunction and achievement of these objectives should allow us to cover the overall objectives of our study.

1.1. General goal

To describe the ICT integration processes in the universities analysing the mechanisms, variables, dimensions and relations in order to understand the factors that determine their implementation and to develop proposals for an improvement.

1.2. Specific goals

a. To describe the ICT integration processes in higher education, understanding the concept of process as strategies and actions.

b. To identify the factors and mechanisms that play a role in the processes carried out by universities in order to integrate ICT.

c. To determine, based on the opinion of the agents that are implied in the decision making process, what kind of possibilities and limitations are generated by ICT integration in the university.

d. To analyse the problems and difficulties that come along with ICT integration from an institutional, organisational, cultural and professional point of view.

2. Research questions

The stated research problem aims at dealing with the level to which universities use strategic planning in order to incorporate ICT. To know if its use helps to improve the institutional outcomes is also expected.

The research questions that should help us to achieve the mentioned objectives and goals are:

a. What are the main reasons given by universities for ICT integration? Do they coincide with what Bates and Hanna have expressed in their studies?

b. What are the strategies and actions that are part of the ICT integration processes in the universities?

c. Does the distribution and set of strategies and actions allow us to state the existence of ICT integration models in the university?

d. Which are the most common problems encountered by universities in the attempt to start and develop the mentioned processes?

e. Has ICT integration facilitated the development of methodological changes from a teaching and learning point of view?

f. Do the universities use strategic planning in order to plan, implement and manage ICT integration processes? To what extent do they achieve this?

3. Research design

This research assumes the postulates of the interpretative paradigm pretending to achieve a holistic vision of the phenomena and the situations that are to be analysed in order to lead to their explanation and understanding. It also assumes the postulates of the critical paradigm regarding the usefulness of the research due to the fact that it favours change.

We have opted for a methodological development based on qualitative strategies through document analysis, interviews with people responsible for ICT integration policies and focus groups with teachers that were implicated in these processes, and we carried out these actions within the universities that had been subject to the case studies (Patton, 1987).

This procedure allowed us to learn about the philosophy and the institutional positions that have pushed the studied universities to start initiatives of ICT integration in their centres: What objectives are they focusing on? What plans and programs are to be implemented? What resources have been at reach? What actions have been planned regarding dissemination and follow up? What kinds of evaluation mechanisms have been considered?

Moreover, based on the conducted interviews we wanted to find out in which way the institutions valued the results they obtained and the achieved impact, keeping in mind that according to Patton (1987: 11) “the narrated comments on open questions offer a mechanism for new elaborations, explanations, meanings and ideas.”

The interpretation of this information allows us to draw a panorama -possibly not complete but indicative– of the processes that lead ICT integration in higher education and the related key factors.

a) Qualitative methodology based on case studies

In developing the research, our actions were based on a multiple case studies method. We chose this qualitative method because of what it contributes in the sense of "understanding the meaning of an experience" (Pérez Serrano, 1994a: 81) – in this case a number of experiences. This method has also to allow us to understand what the analysed universities do, and to develop some general theoretical statements about the regularities in the structure and the process that they could socially follow looking at other institutions as Becker (1969: 233), quoted in Pérez Serrano (1994a: 83), pointed out.

As we pretend to gather new knowledge, or to deepen the already existing one, about how universities act in front of the challenge of ICT integration, our case study has got an instrumental function (Stake, 1999: 17). We do not want to achieve the total understanding of the functioning of every single analysed institution, but only the part that explains why some strategies have been developed and others have not, and to what result they have presumably led.

We chose four Spanish and one Italian university for the case studies. The criterion for selection was to be able to work with a number of institutions that had undertaken ICT integration at different moments, with different starting points, although their dimension would be similar. Moreover one of the chosen institutions had taken up ICT in an intensive way turning into a virtual university. Accessibility to documents and information also has been a criterion applied to the initially chosen universities in order to carry out the final selection. The Italian university enabled the research to have a European dimension.

b) Instruments for data collection

In order to collect the data this the research intended to analyse, we used three techniques: the analysis of documents, an individual interview of competent key informants of every university holding places of responsibility in the policy of ICT integration and the *focus group* formed by teachers.

The institutional analysis of documents aimed at identifying and describing the different strategies, actions and mechanisms that universities carry out with the aim of integrating ICT in their organisation. We have analysed those documents that deal with the objectives and strategies that are related to ICT integration as a strategic factor of institutional change. The annual reports and other documents of institutional definition have also been subject to analysis.

The function of the interview has been to expand the collected information, to put into contrast and to analyse the difficulties and problems that could be caused by ICT integration in the analysed universities. Interviews were conducted with individuals who were responsible for ICT integration in their institutions. We took into consideration the interview structures and the question typology formulated by Patton (1980), Spradley (1979) and Schatman & Strauss (1973), all of them quoted in Goetz & LeCompte (1988: 137-138). Moreover, we used open items due to the increased flexibility and the possibilities of getting more detailed information (Cohen & Manion, 1990: 385).

The pattern of the interviews was validated after having tried it in an initial research study which allowed us to eliminate or modify those questions that turned out to be of little use or confusing.

Finally, the focus group of teachers has had the function of checking if the identified or declared strategies were being applied and if there was a sense of reaching some kind of qualitative result. It is therefore a function of control of the quality of the collected data (Patton, 1987). This tool has helped to cover triangulation alongside with the interviews and the observation (Morgan, 1988).

c) Application of the instruments for data collection

The content analysis of the documentation has been carried out through codification (Hernández Sanpieri, Fernández Collado & Baptista, 1998) in which each of the cases was seen as the universe, the different documents were the units of analysis and the categories had formerly been established in a an earlier study (Sangrà, 2003) with a wider universe –

universities around the world that have strategic documents about ICT integration. These documents were either accessible from the institutions' Websites or were published and easy to be found. This permitted the creation of a new model analysis which we called GRACE (Management, Research, Access, Communication, Teaching-Learning: Gestió, Recerca, Accés, Communicació, Ensenyament-Aprenentatge, in Catalan).

The interviews were mainly conducted in a personal way and they have been registered. In some cases responses were sent via e-mail (Anderson & Kanuka, 2002) due to special difficulties in organising the meeting for a personal conversation.

The *focus groups* were activated in all the universities except one due to the fact that a short time previously the same technique had been applied in another research action with similar objectives. In this case, and assuming the methodological weakness of the procedure, we decided to use the data and conclusions of that other study with very similar goals. In the case of the others, the number of participants oscillated between 4 and 8. For each *focus group* we needed around two hours.

The period in which this research has been conducted belongs to the academic year 2004-05. Data collection was finished by the end of 2006.

d) Codification of the collected data

The information coming from the documental analysis, the interview responses and the focus group was codified with the aim of treating it adequately. The codification of the documental analysis was done by following the categories established in the analysis model that we have discussed above.

The codification of the content of the responses to the interview and the ones coming from the focus groups was done with reference to the structure of strategic formulation (Gimbert, 1989) and adopting it to the following categories:

- Definition of the ICT integration model in the university.

- Strategic vision: threats, opportunities, weak and strong points.
- Really developed strategic decisions and actions.
- Challenges and opportunities for improvement.
- Difficulties and problems.

In order to classify the resulting information we carried out an internal analysis of each category with the aim of structuring the informant's discourse about each category, underlining the key concepts and exposing the information in a synthetic manner. We also carried out a transversal analysis with the aim of offering a synthesis of the informant's perceptions and concepts that constitute the core of his perspective. In order to carry it out, a new reading of the interview content became necessary in order not to lose the overall perspective.

Finally the information was collated to every case study, so that its reading could lead to a comprehensive understanding of the studied universities attitudes regarding ICT integration, the applied strategies, the encountered difficulties and the expected results.

e) The writing of the cases

In order to guarantee the internal validity, the editing process of the cases has been subdued to the revision and validation by some of the persons that took part in each of them. We also used the "peer debriefing" technique (Lincoln & Guba, 1985: 219, 301) that consists in the revision of the texts by a different researcher that is not involved in the actual study in order to achieve a sufficient level of external validity.

Each case concludes with a synthesis that consists in a SWOT analysis. The SWOT analysis (strengths, weaknesses, opportunities, threats) is a technique that helps to draw a diagnosis of the situation of an organisation in a particular moment because it concentrates on the analysis of the internal and external reality of this organisation. The internal analysis allows us to outline the organisation's own strengths and weaknesses, while the external analysis identifies the possible threats and opportunities that can be found in the organisation's

environment. It therefore offers a fixed photograph of a dynamic reality that can change with time.

f) Limitations of this study

As mentioned earlier with Stake (1999: 46), the work with qualitative case studies produces open descriptions and multiple realities. In this context it is the proper experience and its development which helps us to interpret the meaning of the results. Therefore it can be conditioned up to a certain extent.

This research does not pretend to be a comprehensive study covering all the universities and allowing for a total generalisation of the findings, even accepting that “people can learn many general things from particular cases” (Stake, 1999: 78). The study has the aim of identifying processes, independently of the frequency in which they appear in different universities that help interpreting how ICT integration in the universities is planned and how one could act in favour of an improvement of this planning and implementation. Hence it is more about identifying trends than about valuing magnitudes.

For this reason we have not been seeking the representativeness of the sample of the universities used to elaborate the case studies. The selection responds to criteria that have already been established earlier on. The institutions had to have adopted ICT integration in different situations and with different intensities. At the same time it was a condition to be able to access the documentation we wanted to analyse. The study is not a comparison between universities and it does not seek this goal.

On the other hand it is important to keep in mind that the analysis was conducted in a determined and limited moment in time what means that its results become a “photograph” of the identified processes. The usefulness of such instant views would have to be evaluated in subsequent studies of which this present one could be a starting point.

Chapter 3

RESULTS

In this summary we can only show the general conclusions of each case study. To see them in more detail it would be necessary to read the entire research.

1. The case of the Universidade da Coruña (UDC)

a) Strategies for ICT integration at the UDC

The UDC never had a strategic plan for ICT integration during the time in which this study was conducted. No document with a similar title could be found, and, what is even more important: there was not a single document that seemed to have the aim of offering such a plan. The only thing that goes beyond punctual identifications of needs like the acquisition of cable connection, or the installation of computers for the students, is the so-called "Proxecto ITEM" that listed the necessary actions for ICT integration in the university's teaching and learning activities. The Proxetco ITEM is the document that has been mentioned most by all the informants of the UDC.

The triangulation applied into the study has permitted the identification of a clear lack of communication of the institution's strategic view and even a confusion regarding what each of the started initiatives represented in the whole of the university.

In some cases the staff perceived the Proxecto ITEM as the strategic plan of the university itself: "Up to now there was one [plan] coordinated by the CUFIE... but there has also been a change in policy and I do not know very well if the intention is to go on in the same direction or to change." (UDC4)

Before this Proxecto the majority of actions had the aim of providing a technological infrastructure to the whole of the university. A second phase was determined by the creation

of the Vice Rectorate for Technological Innovation that developed the training and the virtual platform. This phase seems to have been with the intention of incorporating the teachers based on initiatives that give support and help them in order to raise interest in participating in the starting process.

This lack of vision and strategic planning has not stopped the development of a number of actions that aimed at ICT integration in the UDC. But the transmitting mechanisms were basically direct orders coming from only one person which reflects a policy based on personalities: “The direct contact with the politically responsible person at least until there was a change in the institutional government board. This person basically determined the needs that had to be covered and we were in charge of the development needed to implement those functions. It was politics based on one single person. We ourselves did not have a lot of freedom because the general and also the concrete lines to follow were given from above.” (UDC4)

This point highlights a very important problem: the lack of clear and motivating leadership that establishes a point of arrival for the journey and that encourages everybody to work towards that direction.

The lack of evaluation mechanisms is another characteristic of the studied case. Even when there was planning there was no evaluation involved. This is to say that in reality there was no clear understanding of what was intended to be achieved and how this achievement was going to be measured. “Even having these things working [the projects] we still have not defined how to control them [the evaluation].” (UDC2)

In this sense the positive perception regarding the small benefits brought about through the Proxecto ITEM becomes negatively affected: “The Proxecto ITEM did change some things, it changes the mentality of many people and many people were told: “here you have a computer to learn what a platform is”, and after that there was a lack of definition and everybody developed the ITEM project the way he liked.” (UDC5)

At the beginning of 2005, however, the current government board started the process of elaborating the Strategic Plan of the Universidade da Coruña, approving the so-called "Documento 0 do Plano Estratéxico" that contained a working method to be followed.

b) The fundamental roles of the CUFIE and the Facultade Virtual

The creation of the CUFIE and the Facultade Virtual turned out to be the fundamental elements in the ICT integration process at UDC.
On one hand, the Facultade Virtual personalised the proposal of ICT integration that was directed towards the teaching staff, either using technology as repository for digitalised resources or as a teaching-learning environment for partially or totally virtualised courses.

On the other hand, the CUFIE has had a catalysing function for the INNOVATE plan and the ITEM project, as well as a support for the teachers in their training needs regarding the pedagogical use of ICT and the technological capacity to be able to work with the existing tools. The CUFIE has been the visible unit in all processes that have been promoted by the university itself.

c) The UDC's pedagogical model with ICT

The informants of this university, as well as the analysed documents have been very clear in one thing: the UDC is an on-campus university and ICT are not used any further than to build a blended model. There are many doubts about what pedagogical model should be adopted so that is becomes difficult to determine if the UDC has really got a teaching model based on the use of ICT.

Some are looking for a use of ICT in their face to face classes, incorporating technology as a support and nothing else. Others consider that the platform should work as a repository for notes and complementary material that the students can use as a free extra on top of the face to face classes that are compulsory. Finally the most courageous ones are prepared to think of ICT as a way of substituting some of their face to face classes with work that has to be

done in and within the virtual network. Very few consider the possibility of offering fully virtual courses, mainly because according to what they say there is not enough institutional backing.

It is a fact that this situation has caused a debate about the meaning of ICT for the teaching model that each teacher wants to develop. In this debate many unanswered questions have emerged.

The lack of a pedagogical model and the need of its definition become especially visible when one thinks that ICT have to be able to improve the existing teaching methodology: “Using a projector does not change the model. You simply make it livelier.” (UDC3)... “In the past we knew that our model was the master class, but now what is it going to consist on? It is necessary to know what teaching models have to be applied, what is face to face, what project tutoring means... and on top of that we now have to face all the uncertainties related to the ECTS... what could the model of today be?” (UDC6)

A certain perplexity was detected among the teachers that were prepared to use ICT. “We have got the materials, we have got the platform. Now how we are going to do our class? Because sometimes we say: ‘It is blended’[2]. What does that really mean?” (UDC6)

One can imagine that it is necessary to define and identify the models that are placed between wholly face to face teaching and complete virtuality. The blended models are not very well defined and teachers find it difficult to integrate the technology they have because there are no models with which they are able to identify themselves.

One of the emerging trends is recognising the need of a methodological change, which means that we can start finding a certain awareness about the fact that ICT bring upon a change in the ways of teaching and learning: “We have to start thinking that teaching is not just thinking in contents, but in how these contents have to arrive with the student. It is necessary to identify which things have to be learned in presence of the teacher, the ones

[2] In the original, *semipresencial*.

that can be learnt by the student himself and which ones can be learned later, at a different moment and in a different place." (UDC3)

This methodological change appears reinforced, but it has to come alongside the perception of benefit that can be reached with ICT integration. And that perception is still not there, possibly as a result of the lack of evaluating attitude within the initiatives that have been developed: to know what ICT can be used for, what methodological changes they support and, above all, if students learn better and more and if teachers feel professionally more satisfied using them (UDC3).

Finally we were able to point out the key role the organisational aspects. One of the fundamental elements that would have to be addressed is the change of the organisation model, a structural change that enables institutions to carry out administrative processes in an adequate way. ICT have to help achieve a good management of these administrative processes because they are important in the task of facilitating teaching itself.

In this sense we can see what implications ICT have at different levels. At the institutional level the university has to ensure the existence of resources, not only material but also economical and human resources. During the analysis of the present case we could not find any evidence that the administrative system had also assumed this part of ICT integration. In the summary table of strategies and developed actions we could hardly identify any element in that line.

On the other hand, ICT integration on a faculty level has clear organisational implications: When to use the existing technological resources, how to organise timetables, where to place them physically or how to access them virtually... On top of this, teaching staff has to be aware about how the workload shifts with the application of ICT elements: at the beginning, the design phase, they require much time. Later some of that time can be recovered, but it is necessary to make those people implicated aware of the fact.

This organisation will condition the planning and the economical resources, so that it is useful to evaluate the growing and renovation processes according to the existing needs.

But these needs are related to the ICT integration model that has been defined. Any change has to be linked to a particular model.

d) Synthesis

Finalising this case we would like to show a SWOT analysis of the UDC's strategic situation.

Strength	***Weaknesses***
- Young, technical and small university - Intention of achieving progress and improvement through ICT - Existing ICT integration program in teaching (ITEM) - Commitment to modernisation and internationalisation - Good international relations - Good level of face to face teaching - New technological infrastructure	- Traditional rigid organisational structure - Belief in the exclusive validity of traditional teaching methods - Lack of a known and shared strategic plan - Reluctance towards change within some groups - Economical limitations - Lack of coordination - Weak leadership with a lack of determination and vision - Low level of knowledge and training in the use of ICT amongst the teachers - Lack of recognition of the online tasks carried out by teachers
Threats	***Opportunities***
- Speed of the technological change - Competition with other universities - To remain "outside" the processes of technological change - To become obsolete - Lack of public economic resources	- Growth of community support - Autonomy within the Galician universities - Increased possibilities of access to technology by students - To complement traditional teaching with online teaching - Improvement of the quality of teaching through personalisation and efficiency

Table 16. SWOT analysis of the UDC

2. The case of the Universitat Oberta de Catalunya (UOC)

a) Strategies for ICT integration at the UOC

The UOC is an off campus university based on the use of a virtual teaching and learning environment, the Virtual Campus. Here we are talking about a model of online distance education, completely virtual and asynchronous, that uses ICT intensively from the beginning. The UOC uses the Internet as an access technology in order to offer all the services that are necessary to an academic community, facilitating personal and group relations among the students, the teachers and the administration.

The multimedia materials have been the core element and the basic resource for learning. These materials have been explicitly developed by the university itself with the collaboration of recognized national and international experts. Initially the main data carrier was paper due to the difficulties of distributing materials on digital carriers over the Web that had a much reduced bandwidth. The evolution of the Web and the distribution channels has made it possible to keep transforming the materials towards the digital format.

As an organisation, the UOC is a virtual institution that uses its own intranet as a tool for communication and organised information sharing. “The UOC is different for having committed itself to virtuality becoming a reference model of a virtual university.” (UOC8)

From the moment it was created, the roadmap used by the UOC was the Memorandum it presented during the act of recognition as a university. This recognition was given to the institution on October 4th, 1994. During the first years it developed the initiatives and objectives that were expressed in that Memorandum.

After 2001 the UOC started a process of strategic reflection that concluded with the making of the UOC’s Strategic Planning (PEUOC.edu) in 2002-2005. In this plan the institution carried

out an analysis of the internal and external situation and the proposal of a number of strategic axis and actions that have to be developed in order to achieve the vision.

b) Pedagogy, technology and organisation – the fundamental triangle

The actions that supported the mentioned strategic axis have been mainly completed, although it might not have covered the whole vision or there might still be space to introduce some different details. However, it is necessary to mention that after having conducted the triangulation one could see that the teachers' perception was a bit different to the one identified in the documents or shown by the government board regarding the achievement or the development of the goals.

Even so the analysis of this case has permitted us to conclude that there were a number of elements that can be considered fundamental in the strategy that had been followed, and that contributed in a determined way to the achievement of the university's vision and mission.

The elements that have played a decisive role in the consolidation of the UOC's model were, on one side, the leadership abilities of the institution's main responsible person, the Rector. He was able to transmit and keep up the belief in a vision and in a way of doing things in spite of the doubts brought about by factors like the novelty and the lack of references. On the other hand we have to mention the UOC's particular organisational structure that provided a level of agility and flexibility that is difficult to achieve in such a kind of institutions.

The other elements to be mentioned are to be found in the triangle formed by technology, pedagogy and organisation that so not necessarily appear in this order.

In reference to this, we have to point out the role of the Unit for Educational Design (Unitat de Dissenys Formatius; UDF) on one hand and the areas of Educational Methodology and Innovation (Metodologia i Innovació Educativa; MIE) and Information Systems (Sistemes d'Informació; SI) on the other.

Based on the reviewed material[3], the UDF's role in creating guidelines, protocols and support tools for instructional design and producing digital resources can be considered a very important contribution due to the fact that it helped in establishing the models for pedagogical treatment of contents in virtual teaching and learning environments. These models will probably be of immense importance in the process of adaptation to the EHEA: *"The possibility of having a team of experts in this context that do permanent research and try out new ways was unique because it brought about many positive results with interesting aspects of innovation."* (UOC3) The only negative element was unfortunately the little use that was made of this unit in some moments, as well as its later elimination.

The willingness for mutual understanding and collaboration between the afore-mentioned areas allowed an achievement of a synergy that was of great benefit to the UOC's pedagogical model.

The use of technology as a tool for learning, and the methodology that helped to achieve a maximum of learning formed a good team, which subsequently led to the consolidation of the model UOC, supported by the remaining element, the organisation.

The organisational factor is a very characteristic element within the UOC's strategy. Although these organisational aspects can sometimes create disagreement and problems, they have undoubtedly been a key factor that has allowed the institution develop it's model of the use of ICT successfully*: "The UOC has got a model of organisation and functioning in which technology is the backbone on which the other activities are based. These are administration, services, teaching, research and dissemination. This implies that the whole technological application is subdued to a process of coordination affecting the methodology and the general functioning. As a consequence, the generalization of experiences of success can be very quick, effective and efficient."* (UOC1)

[3] UOC (2001) *Antologia de materials didàctics.*
UOC (2001) *Assistent de Recursos Metodològics (ARM)*
UOC (2003) *Guies per a l'elaboració de materials didàctics multimèdia.*

The UOC defines itself as a virtual organisation, but inside the institution we can still find perceptions, also detected elsewhere, that in spite of the increasing integration of ICT in universities, the parameters in which technology is applied might not be the most adequate because they are still based on conventional organisation and teaching models: *"How can you manage documents in an adequate way? How can we share and work together in groups? How can we overcome our face to face decision taking? The answer to these questions is not linked to increased investments in tools, but lies in using the tools we already have got in an efficient way."* (UOC1)

c) Learning in the UOC: A distinctive in-house teaching and learning model

The UOC has developed a model for the use of ICT in education and training that permits breaking the barriers of space and time between teachers and students. And to do so, the institution chose the e-learning model that is known as asynchronous online distance education.

This model addresses the characteristics and needs of the profile of those students the university wants to offer its services to. It is based on four fundamental pillars: flexibility, personalisation, interaction and cooperation.

The experience accumulated by the UOC over the years of online teaching and learning is very clear. This experience led to a strategic competitive advantage over other institutions. At the same time it seems to be clear that if the UOC does not keep up a permanent process of pedagogical and technological innovation, the same situation could turn into a disadvantage.

d) Synthesis

As a conclusion of the case study, we now present a balance of the strategic situation of the UOC, expressed in a SWOT analysis.

Strengths	Weaknesses
- An "ad hoc" organisational structure that implies teaching and management in the same way. - An own consolidated pedagogical model based on asynchronicity, teaching materials and continuous assessment. - A clear ICT strategy - A strong leadership with a key vision - A particular type of students - Pioneers and innovators in the field of educational design - The first virtual university - A newly created university	- Dependent on technology for innovation - A teaching model based on a reduced number of teachers with fixed contracts - A technological infrastructure that is hard to renew - Little initial implication of the teachers in the strategic project - A certain "cyberoptimism" - Too frequent organisational changes that generate instability - Lack of training and culture of the teachers regarding distance education and e-learning - Teacher attitudes influenced by face to face scenarios
Threats	**Opportunities**
- The new virtual universities - Difficulties in achieving recognition for a non traditional organisational structure - Opposition of all Catalan universities to its creation - Speed of technological changes - Virtuality of face to face universities - More powerful and user friendly virtual campuses - Decreasing public funding	- To become a reference for e-learning as a pioneering university - To overcome space and time barriers in quality higher education - Contribute modernity to the concept of distance education - Students' capacity building in TIC - Advantages in the process of entering the EHEA - Increasing networked activity in all the sectors

Table 25. SWOT analysis of the UOC

3. The case of the Universitat d'Alacant

a) Strategies for ICT integration at the UA

The UA did not have a strategic plan for ICT integration during the time in which this study was conducted. The institution used a roadmap based on the inspiration and vision of its Vice Rector who was the person that assumed some leadership. But this very situation made that the roadmap was not extendedly shared and supported. Concentrating leadership only on the upper level, communication hardly reaches the lower parts of the pyramid, so that there are groups that do not feel involved.

ICT integration is initially seen as a tool that could bring about cultural change within the university, but in fact the developed strategies finally became a model of support to the existing reality that is accepted as something that only has to be improved. Only when talking about the EHEA challenge, ICT are again seen as an instrument for methodological change.

This is one of the reasons that the process has been driven in three fundamental phases. The first one deals with the provision of the necessary infrastructure that allows and facilitates the access to technology. The second one concentrates on the reorganisation of management and administration processes where ICT can contribute a lot and the whole of the institution does not perceive any risk of change. It is in the third phase where elements are introduced that aim at the improvement of teaching and learning processes by renovating the pedagogical methods. The introduction of these elements is accompanied by and based on mechanisms of teacher support and training.

It is also important to mention that the UA has not established any mechanisms for the evaluation of the applied strategy. The non-existence of a proper plan leads to the situation that the different units themselves are responsible for the evaluation of the achievement of their objectives. However, such a procedure does not allow for a general institutional view of the situation.

b) The role of the Service for Educational Innovation (SIE)

It is very interesting to observe the role played by the SIE (*Servei d'Innovació Educativa*) in this process. Not for what it has done, but for what it has not done. The SIE worked as the joint partner on which the creation of different units and services was put into practice. These units and services made the development of the strategies possible.

This role of a mediator and a coordinator at the same time that was adopted without seeking any protagonist position but favouring the application of the strategy above all other has led to very good results in the UA.

Its collaboration with the ICE and the library, which are services with a lot of individual identity within the universities, led to a situation where the actions of each of the units summed up instead of neutralising each other.

In this sense, the creation of the Punt DIT is one more positive achievement. Although not everybody feels completely comfortable with the type of support given to the teachers, it is undeniable that this support exists in abundance.

The set of mechanisms that form the process initiated by the Commission of Educational Innovation by promoting the use of the virtual campus, receiving at the same time the support given by the Punt DIT for the implementation of any needed solution, and that is accompanied by calls for Innovation projects and exchange meetings, has allowed creating an atmosphere that supports innovation at the UA.

c) The teaching model with ICT at the UA

The UA's pedagogical model is a face to face model. The statutes of the university even do not permit fully virtual teaching and learning. On the other hand it is accepted that ICT can be an ideal complement for face to face classes.

In this sense, the use of the virtual campus as a corporative tool has made it possible for many teachers to enter a world of ICT application with pedagogical goals. It is also true that they might

have probably had a limited vision because the virtual campus is developed through the so-called “teaching tools” that are technological solutions that cannot be integrated into any theoretical educational framework.

It is also accepted that one of the objectives of ICT integration is the renovation of the teaching methods, but the triangulation applied to the study has shown that there are two big blocks for UA-teachers. In the first place there are the ones that had integrated ICT into their teaching without modifying their usual practice. In the second place there are those who considered using them for a change in their teaching.

But the latter have had many doubts about how to do it, about the needs of pedagogical training, about the interaction with the students etc. This has to be seen as an interesting contrast to the relaxed attitude of the ones that think that nothing needs to be changed.

d) Synthesis

As a conclusion of the case study, we are able to present a balance of the strategic situation of the UA, expressed in a SWOT analysis.

Strengths	Weaknesses
– A young university – Increasing internationalisation – Relatively big and new campus – Capacity of changing the organisational structure – Promoted and consolidated virtual campus – Existing support commissions – Clear leadership – Increasing automatic management – Strong and adequate technological infrastructure – Virtual library “Cervantes” – Punt DIT for teacher support	– Traditional, not very agile structure with legal aspects that slow down modernisation – Dependent on the electoral programs of the vice-rectors – Difficulties in effectively modifying pedagogical models – Initial rejection towards distance education – The teacher support model is not accepted by everybody – Insufficient didactical training regarding the use of ICT – Lack of recognition of online teaching – Lack of definition in the pedagogical models with ICT support – Limited funding
Threats	**Opportunities**
– Small university surrounded by big universities (València, Múrcia) – Missing the train of ICT in society – Decreasing public funding	– Increase commitment with the social environment – To be part of a large Scientific Park – To modernise management processes – Improve quality – Commitment to open knowledge – The EHEA

Table 31. SWOT analysis of the UA

4. The European case: The Università degli Studi di Milano (UNIMI), Italy

a) Strategies for ICT integration at the UNIMI

The UNIMI considers that the best contribution that can be done by ICT is their use as a tool for the improvement of management processes.

However, there has been no strategic planning for ICT integration. There are not even previously established objectives. Progress and reactions have been made according to needs linked to specific situations and to the possibilities of response. This is the procedure followed by the Commission for Computer Strategies (Commissione di Strategie Informatiche) that had been specifically created for this purpose.

On the other hand one can see that the predominant strategic vision regarding ICT at this institution is fractured and divided in three different viewpoints. The first is the one we considered official: according to the official vision, ICT are tools that can help improving the administrative processes of the university. The second one believes that the university should play a role of pedagogical reference regarding the use of ICT for educational purposes. Finally the third vision considers that ICT have to help addressing the changing types of students and the challenges brought about with the EHEA.

As it happens in the majority of institutions, and in this case it is especially important due to the size of the UNIMI, there are groups that reject the integration of ICT and of any element that could cause change, although in this case the governing board seems to be determined in not giving up: *"We are still in the phase where the ones that are generally convinced of the system are still a minority. We still have to go on working. At this moment the vice-rector believes in the sector and he supports it. Some personalities in the single faculties support it. One can say that we have a centre that pulls in this direction and a periphery that slows down."* (UNIMI2)

b) The fundamental role of the CTU

Although the main actions have been dedicated to aspects related to management issues both in administration and teaching, it is necessary to point out the role played by the CTU in the process.

The CTU was born as a centre with the aim of analysing the possibilities of ICT for teaching and learning. Nowadays it is a service unit and as an exclusive competence, it carries out support actions for teachers around the pedagogical use of ICT.

This is especially remarkable in a university that does not have a Faculty of Education. The CTU assumes the functions of expertise in the field of pedagogical application of ICT and it does so in a context that does not really support its work. In this sense it has mainly developed the function of a support centre for the redesign of the courses belonging to those teachers that wish to integrate ICT as part of their teaching using ARIEL, the virtual environment developed by the CTU itself for its use within the Università Statale.

Accomplishing this function, thanks to the CTU, many teachers have discovered that ICT integration could lead to an innovation of teaching methods: *"One important lesson that I have learned is that when you apply well integrated technologies you can reach an added value that lies in that ICT make you reflect on the way you organise your work, your internal organisation. This is the advantage. The teacher is used to create lessons at the last minute: with distance lessons he has to decide beforehand."* (UNIMI2)

c) The model of teaching with ICT at UNIMI

The conclusion has to be that there is no pedagogical model related to the use of ICT at the UNIMI. On one hand this is due to the lack of interest by the university's governing body that has a very restrictive view of what could be achieved with ICT. So the Governing Board considers that the traditional face to face model could hardly be improved through e-learning which does not include the physical contact, seen as indispensable in an educational environment.

The arrival of the *Università Telematiche* has not helped a lot regarding this because it has created a mainstream of opposition considering that these universities do not do research and therefore cannot offer quality education. At this point it is important to say that we have been able to observe the praxis of what is considered e-learning in Italy and can therefore understand the criticism that has been raised: the use of technologies that imitate face to face teaching and an almost complete lack of pedagogical foundations.

What happens is that each teacher does what he or she considers most useful. The most advanced teachers ask the CTU for help and develop some interesting innovations, but there is no common direction, apart from other issues, for the differences between faculties and subjects: *"It has to be pointed out that the situation is very different from faculty to faculty and also regarding the courses. It is not possible to adapt all courses to the same model. I am thinking of philosophy."* (UNIMI3)

Summarising and quoting one teacher, it would be interesting for the UNIMI to build a model that allows teachers to integrate their praxis into the one carried out by the all of their colleagues. The CTU has got the capacity and the expertise to develop it, but the university has not yet asked for it.

d) Synthesis

As a conclusion of the case study, we now present a balance of the strategic situation of the UNIMI, expressed in a SWOT analysis.

Strengths	Weaknesses
- A consolidated university (80 years) - A reference institution in Italy - Recognised practice labs - Existence of ad hoc commissions for ICT - Strong development of infrastructure - Well equipped and computer enhanced library	- Organisational and teaching structures are extremely traditional and rigid - Lack of strategic planning, fractured vision - Lack of leadership, narrow vision - Reluctance to virtual education - ICT do not have a place in the pedagogical model - Excessive dependence from technical services - Lack of consensus about pedagogical aspects - No evaluation of the initiatives - Lack of recognition of ICT enhanced teaching and learning - Resistance against change - Financial limitations
Threats	**Opportunities**
- Arrival of new training providers of tertiary level - Competition from other European and American universities with online programs - Creation of the "Università Telematiche" - To become a technologically obsolete university - A negative perception of the university among the students - Resistance of the Italian teaching community against change - Decreasing public funding	- Improvement of management processes - To understand the use of ICT within the university's mission - The EHEA as an opportunity to move further - A wider course offer in order to capture new students - To help the community to know improves the university - Publicise the strategy - Take advantage of distance education's contribution to the EHEA - To establish a new organisational and pedagogical model

Table 37. SWOT analysis of the UNIMI

5. The case of the Universitat Rovira i Virgili (URV)

a) Strategies for ICT integration at the URV

The URV has extended the ideas of its general strategic planning towards the integration of ICT in the university because ICT are considered an indispensable instrument to achieve the vision that stems from this strategic planning.

The institution thinks of ICT as a tool that helps giving support to already existing face to face teaching, and improves it by introducing virtual teaching and learning in the cases where it is recommendable and possible. ICT that help students and teachers to make the concept of Knowledge Society real by giving support in tasks like the search for information and the sharing and dissemination of findings.

At the same time ICT is also one of the instruments the URV uses to get closer to the territory, so that the people get the feeling of the existence of a university in their proximity. In summary, the URV tries to facilitate the access to ICT in order to achieve larger numbers of university members.

This is the reason for a special effort made in access and infrastructure in a first phase. A second phase was used to make management processes more up to date and to develop a third phase centred in ICT used as a tools for change towards methodological innovation in teaching-learning processes. These phases, however, have not been independent and separated one from another.

The simultaneous evolution of different phases of the integration process seems to have been a key factor in its implementation: *"To produce a good general plan for the whole institution and to act simultaneously on infrastructures but also on the content that has to travel through the network. Cable and hardware only do not add much value to the institution."* (URV1)

One has to underline the importance of introducing innovation with ICT starting from management (i.e., the register's office) as an element of transformation and an entrance for

innovation into the centres. According to these centres, the introduction of ICT has happened in many different ways. The fact that this happened, although the centres are placed in the same geographical area and were under the same government with its orientations and indications, shows that the culture and the leadership developed at each one of the centres is of immense importance and can generate a diversity of reactions.

Finally it was observed that the evaluation of the impact of the URV's ICT integration policy is defined: *"Evaluation is carried out according to the improvement of the system and of the organisation regarding the achieved results."* (URV1). However, it was so far not possible to have access to the data that would have given some contrast, thanks to their quality of tangible evidences.

b) The fundamental roles of the SRE and the URV@prop project

The Service for Educational Resources (Servei de Recursos Educatius, SRE) has played a fundamental role in the whole process of strategy development for ICT integration at the URV. It is true that the role of the department of Computer Services (Servei d'Informàtica; SI) should not be underestimated, but the technical and pedagogical support activities offered by the SRE to the teachers allowed the articulation of the innovation proposals in an adequate way among those teachers that quickly got involved in the process.

The SRE was responsible for the coordination and the organisation of the virtual campus which has proved to be decisive as a space where teachers have been able to gradually develop their experience with ICT as a support to teaching and learning. It was also the SRE that asked for a change of mentality regarding academic management.

The permanent relation that existed right from the beginning between the ICE, the SRE and the virtual campus has provided the URV strategy with a strong leadership that avoided the usual fights between different organisational responsibilities.

The other crucial element in the process was the URV@prop. This project had the aim of placing the rails in advance so that the train could run on them when it became necessary.

The development and the implementation of the whole infrastructure, the user training, the access from far locations and the creation of a technical network in the territory have undoubtedly been factors for success.

c) The model of teaching with ICT at the URV

The URV was one of the first universities that adopted the concept of student centredness in the teaching and learning process. Many of the actions that have been revised in this study prove that the institution walks firmly in the direction of putting the students into the centre of teaching and learning.

On the other hand, the URV is considered an institution that was born as a face to face university but that is able to certain degrees of distance education development without abandoning the core face to face context it is placed in. In such cases the support contributed by ICT is immeasurable.

The applied model integrates ICT gradually as a support to the traditional classroom activity. While teachers start feeling more confident and motivated, the institution embraces proposals of a more innovative kind. In this sense, and considering that one reason for ICT integration is its use as a tool for pedagogical innovation, we have to admit that the URV has still not reached a desirable speed. As mentioned in the Pla Estratègic de Docència (PLED), ICT use has to allow for the implementation of new teaching methods that should evolve "from face to face and teacher centred models towards more flexible and individual ones with a clear stress on student centredness." (p. 8)

At the time of the preparation of the present study it was still possible to find serious resistance by teachers and difficulties in some of the university's faculties in the attempt of applying the desired model. Even so it is true that there are other centres that have a certain advantage, probably due to their own culture, as for example the School of Chemical Engineering or the Faculty of Educational Sciences and Psychology.

After all it can be said that there is not one single model that works for the whole university. What we can find is the government's willingness of promoting different ways of realisation of

ICT supported teaching and learning. The stability of the government board in the last years made it possible to implement the strategies that are considered fundamental with a certain consistency.

d) Synthesis

As a conclusion of the case study, we now present a balance of the strategic situation of the URV, expressed in a SWOT analysis.

Strengths	***Weaknesses***
- Small young and easily "moved" university - Well developed local roots - Able to reorganise the structure - A clear strategic direction - Adequate technological infrastructure - Values efficiency and change - Internationally well positioned research groups - Government's leadership	- Traditional structure - Need of getting closer to the territory - Difficulties in offering digital access to the university - Flexible environments - Big differences between faculties and centres - Some old and badly equipped buildings - Low teacher assistance to training sessions - Lack of recognition of online teaching and the invested time
Threats	***Opportunities***
- Problems in establishing alliances - Stay outside the digitalisation process - Speed of the technological changes	- Development of a different and better pedagogical model - The EHEA as a global challenge - Adapt the course provision to the teachers' needs - Achieve levels of pedagogical excellence and research recognition - To become an efficient organisation prepared to lead the change and the modernisation of management - Capacity building for teachers - Strategic alliances - Virtual teaching and learning in order to complement and improve face to face models - Methodological innovation

Table 43. SWOT analysis of the URV

Chapter 4

CONCLUSIONS

In the following we are going to present the conclusions of the whole study after the transversal analysis of the results gathered in each case.

a) The passport to the Information and Knowledge Society

The wish of integrating and being useful in a society that suffers an ever stronger impact from technological development and the advantages and disadvantages such development brings about is the main driving force leading to integrate ICT in which all studied universities coincide.

Although different terms are used to express this reality - as for example technological innovation, Information and Knowledge Society, ICT influence in society, image of being technologically advanced, digitalisation process – all of them agree upon the point that the technological imperative as defined by Bates (2000: 18) continues to be one of the main, if not the most important reason when it comes to considering the strategic scope of ICT integration in the university.

But there is also a certain amount of agreement of proximity regarding three more motives. In the first place, we can mention the use of ICT as an instrument for improvement and modernisation of institutional management. It is obvious that this aspect is related to the first one due to the fact that it is the feeling of modernity that is presented as a key element to be kept in consideration and that becomes central and strategic in a communicative policy of projection, this is embodied by all universities concerned.

Quality improvement in teaching and learning is another motive that gets widely mentioned. To achieve this goal through ICT is possible, but it remains surprising that this statement is not supported empirically but rather used as another element in that communicative policy we discussed above.

The intention of promoting pedagogical innovations is also mentioned, where ICT have had to act as a tool for such an innovation. Objectives like the development of complements for face to face education, to overcome the barriers of space and time or to modernise the methods for distance education stand as manifestations of this intention.

It is also necessary to point out that some of the universities recognised that ICT integration should become the big excuse to achieve certain organisational and cultural changes within the institutions themselves. Such objectives are not always openly expressed and can lead to confusion in the moment where institution members try to achieve goals that are not the ones that figure in the institution's "secret plan". Not to share objectives can lead to a lack of implication with negative results regarding the desired outcomes.

b) Strategic planning: a pattern for action

ICT integration in universities results in being a process. This process is characterised by a number of dynamic parameters that change periodically and constantly and are subject to the action of different external factors. One of these is technology.

Being a dynamic process means that it there is no culmination. The universities find themselves immerged in a constant process of change due to the technological integration that seeks to make them more efficient and more effective in all senses. It is a permanent change that affects the whole of the organisation.

The strategic planning of the universities is perceived as very limited. Normally it responds to internal difficulties and balances – and here it is necessary to undergo an analysis of strengths and weaknesses – but it does not respond to an analysis of what is happening outside. The majority of universities consider that they are in a fairly good situation in comparison to other universities, but this only happens because they have not carried out a detailed analysis, possibly because certain teams of governing boards are not interested in producing a clear picture of what is lacking in their own university and in which areas they are beaten by the others. This limits the possibilities of the implementation of strategies of success in ICT integration, leading to actions that are more reactive than proactive.

Mintzberg (Mintzberg, Quinn & Voyer, 1997: 16) points out that strategy can be defined as a plan or a pattern; however both approaches are not exclusive.

As a plan, strategy is conscious and, above all it allows us to determine the results we want to achieve. But it is also necessary to define the behaviour we want to cause, that is to say, what is the common element in a flow of actions. This way of understanding strategy is the one we consider a pattern: the consistency in behaviour, both intentional and incidental (Mintzberg, 1997: 16).

The pattern becomes strategy when it is possible to identify a permanent and reiterative way of acting in front of similar situations. We justify a behavioural pattern that had not been previously planned and we label it as strategy. It is a pattern that integrates the goals and main policies of an organisation, which defines the coherent sequence of actions to be carried out.

It has been difficult to find specific strategic plans for ICT integration in the studied universities. It was necessary to search and read diverse and often dispersed documentation in order to be able to identify the strategies a university has implemented to incorporate ICT.

If they can be found, these strategies are often hardly defined and the actions correspond to a bundle of initiatives that are very often part of smaller or larger projects but not necessarily related to a global strategy of the institution that seeks the best ICT integration in the organisation.

It is true that Mintzberg (1997) himself says that we can talk about strategy even in the cases where there is no strategy, at least publicly. The problem is that in such a case the deriving actions run the risk of being incongruent.

On the other hand it is useful to bear in mind that many of the developed strategies belong to the group of emergent strategies. This means that they were not foreseen, they were not part

of the initial plan but are now seen as necessary to be included. The following figure, adopted from Mintzberg (1997: 17) offers a more graphic view of the issue:

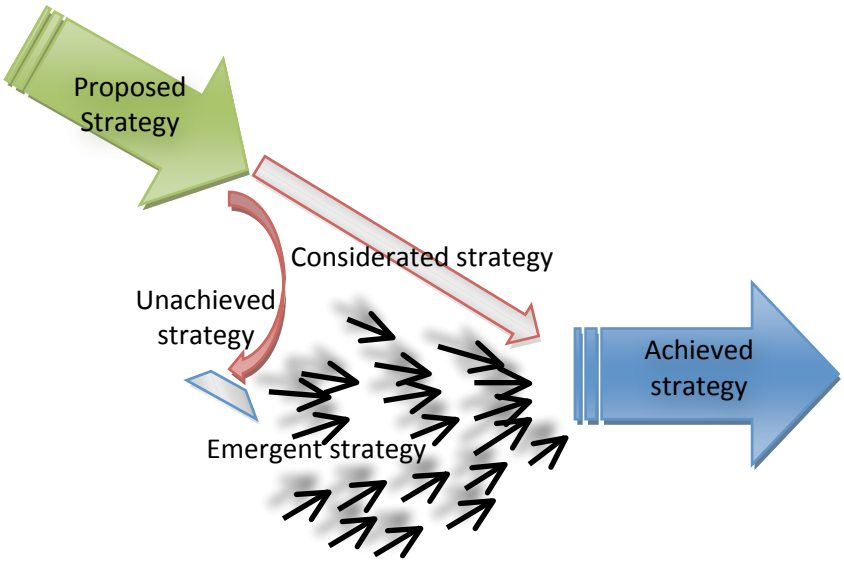


Fig. 10. Incorporation of an emergent strategy

One point that became very clear was the poor evaluation culture that exists regarding ICT integration. We could hardly find any instrument to evaluate the impact of either policies, or strategies and not even actions that were carried out. The ones that could be found were still very poorly developed. A generous interpretation of this situation could indicate that the universities still have not reached a high enough phase of development to apply evaluation activities on the obtained results, but it is also true that these instruments cannot be found in the corresponding plans of action.

In general all the analysed universities consider that ICT can contribute to the improvement of teaching and learning in an interesting way because they are seen as resources with a great potential of support to the teachers' activities, at the same time as motivating facilitating elements that help students to learn better and easier.

c) A wide typology of strategies and actions

The university's organisation appears as a basic element for ICT integration. In this sense, the analysed universities can be grouped in two different models.

The analysed face to face universities tend to give permission to organisational evolutions that can be different in each faculty. The culture and the tradition of each of them mark different trends in the implementation of some strategies and actions.

The particular case of the virtual university shows a unified model that develops the organisation in a transversal way based on criteria of business management. The case of virtual universities that can stand as an example of intensive ICT integration, ask for a very particular model of organisation in order to take the maximum advantage of learning in a network as they become "network organisations" themselves.

The fact that the digitalisation of a university leads to a dynamic of constant change that has to be managed appropriately is a point that is visible in all of the cases. Management of change has to be done by involving the affected parties with a clear, well disseminated and shared vision.

Another key element that has become clear in all of the analysed cases is leadership. The findings prove the need for a strong leadership in higher education institutions in order to be able to face ICT integration with possibilities of success. Leadership is important so as to avoid ICT integration becoming conditioned to the last detail, especially by the varied intentions of the teaching staff, but by students and the administrative staff, too even though all of them are key elements in the implementation of any project.

We have found cases where leadership was insufficient or inexistent, other cases where it was decisive and others where it was excessive. In all of them it was fundamental for the development of ICT integration in the universities.

The size of the institution seems to become an important element too, when it comes to establish a particular organisational strategy. The smaller universities agree with the opinion that their size (between 20.000 and 35.000 students) makes them more capable to manage the changes that are brought about by ICT integration.

It is also necessary to point out that the analysed universities tend to concentrate the tasks that have to help integrating ICT in units, services or centres that are occasionally created for this purpose. The UDC entrusted the unit responsible for teacher training, the CUFIE (Centro Universitario de Formación e Innovación Educativa), with the management of the integration process. The URV used the SRE, although its work is complemented with functions that are assigned to other units. The UOC has concentrated the main part of its strategic actions under the coordination of the MIE (Àrea de Metodologia i Innovació Educativa), although other units are also involved, like the "Àrea de Sistemes d'Informació". The UNIMI used the CTU for integration and the UA did the same with the SIE.

Another common strategy is the promotion of specific projects (Proxecto ITEM at the UDC, URV@prop at the URV, PEUOC at the UOC) that try to have a better and stronger impact in the universities' organisation. However, we have no evidence that allows us to confirm that this assumption in correct.

The following table offers a synthesis of the types of strategies and actions that are sorted according to the analysis categories and that can be used as indicators for a subsequent evaluation.

Categories		Strategy indicators		Actions indicators
Access and infrastructure	Support	- Guarantee the necessary infrastructure to carry out the subsequent actions - Facilitate the students' access to virtual subjects through the necessary provision of technology - Assure the profitable use of the tools through specific training - Guarantee security in the communication channels: high density firewalls etc. - Create commissions that supervise the updating of the strategies - Develop financing and co-financing mechanisms for the acquisition of technological tools	Creation	- Implementation of the necessary communication technologies in order to make data arrive to the whole of a particular context of action - Creation of a virtual teaching and learning and management (Facultade Virtual, Campus Virtual, Arial - Virtualisation of the libraries, their access and their use - Constitution of commissions with the mission of implementing the institutional strategies - Installation of computer equipped classrooms in different points of the university environment - Starting of projects that point towards the work with open source codes that are more accessible and sustainable
	Promotion	- Carry out promotion campaigns for the acquisition of advanced communication systems (UNIPORTA, UNI-WIFI, etc.) - Start promotion plans for technological innovation (Innovate - Develop virtual environments for students, teachers and management personnel to interact - Increase budget for infrastructure in order to make it more attractive and promote its use - Designate economical resources to facilitate distance work and study - Disseminate the maintenance of the university's scientific equipment so that the community can consider it technologically advanced	Enlargement	- Increase of the possibilities of access to the server - More vigorous communication systems (for example video conference) - Increase of the number of servers and the possibilities of access (capacity for massive simultaneous use) - Enlargement and updating of the corporative communication networks - Increase of the number of classrooms equipped with up to date PCs - Provision of laptops for teachers - Transformation of operative units in order to adequate them to the current needs and requirements - Incorporation in national projects (Campus One, Universitat Digital, Intercampus ...)
	Awareness	- Assume the postulations of free and open source software - Facilitate the participation in the creation and improvement process of the virtual campus - Make the computer culture grow - Reduce the distance between the university and the academic community as well as the territory	Improvement	- Renovation of the administration's technological equipment - Network migrations in order to increase its power - Establishment of t he new regulations for ICT security - Updating of the equipment for teachers and departments - Updating and improvement of the designations for classroom equipment

Management processes	**Support**	- Promote management based on processes - Develop ad hoc management applications - Organize administrative support for pedagogical innovation - Improve the use of ICT for process control - Reproduce different external experiences - Reduce distances between all the university services and the user	**Creation**	- Creation of specific applications for academic management (virtual secretariat, Acadèmia Àgora, GT, W4),for human resources and economy (Sumer, Hominis, EUROS) and for statistics (DAU, Reportística, GIR) - Creation of an intelligent ID-card
	Promotion	- Involve the whole organisation in the project - Promote the re-engineering and the decentralization of the administrative and management processes - Facilitate information search, storage and retrieval of documents and data	**Enlargement**	- Development of a plan for the entire digitalisation of the key processes of management - Amplification of the existing management modules - Centralization of the acquisition process of databases digital journals - Coordination of the library systems in the different faculties - Creation of a collective catalogue of the university's libraries - Development of tools for personalized curriculum management - Implementation of electronic resource management of electronic resources - Implementation of evaluation protocols for online services
	Awareness	- Widespread the idea that ICT make work easier - Create a positive climate towards the introduction of ICT in the university - Lead the organisation towards results - Disseminate the philosophy of virtuality - Pay special attention to complaint management - Promote the collaboration between technical units and the management staff	**Improvement**	- Implementation of a new management model for technological projects - Optimization of the reuse of programs - Creation of automatic circuits for student support - Improvement of the functionalities of the institution's website - Adaptation of the tools for library management to the norms and standards of e-learning - Improvement of he e-mail services (addresses per student, lists, antispam)
Communication	**Support**	- Set and plan the provision of virtual channels and digital journals - Provide the social agents with the everything the university can offer	**Creation**	- Creation of specific vice-rectories (innovation, technology, technology and EHEA...) - Creation of ad hoc commissions (DIT, Comité Web, etc.) - Opening of emblematic projects (URVnet, Diari Digital, etc.) - Incorporation of webs for information (Taboleiro virtual, EEES, vice rectories, Ariel, etc) - Creation of virtual channels linked to the faculties

	Promotion	- Make the university's internet activity visible and orientate it - Use e-mail as the main internal communication tool - Establish a permanent dialogue between units and services that are involved in ICT integration - Promote a digital editorial office - Support knowledge sharing	Enlargement	- Renewal of institutional websites - Enlargement of the scope of the university's sites as a basic mechanism for communication
	Awareness	- Identify ICT use as a sign of modernity - Make the university better known internally - Promote the philosophy of virtuality - Avoid the use of paper based communication - Visit other universities and take part in congresses	Improvement	- Web page updating - Sign treaties with technological institutions and their external projections
Research	Support	- Create tools that support research - Make the university itself into a subject of research - Establish a global virtual network of researchers - Promote the new requirements for the application of library management in line with the CBUC	Creation	- Creation of research institutes (IN3) - Creation of specific programs (Networks of Research on Teaching and Learning in University) - Creation of management systems for research (SIR – Sistema Informatico per la Ricerca)
	Promotion	- Concentrate institutional research on defined fields - Reinforce the research lines of e-learning, network society and knowledge management - Attending conferences	Enlargement	- Increase of the digital libraries' reach and scope - Inclusion of all open publications in the library catalogue (DOAJ) - Implementation of new tools for research management
	Awareness	-	Improveme	- Sign the contracts for joining the Anella Científica

Teaching and Learning	**Support**	- Guarantee the necessary technological and pedagogical support for teachers (tools, training, etc,) - Promote action for a correct recognition and compensation of digital material production and online teaching - Design strategic frameworks for the elements of the pedagogical model based for ICT integration - Promote the use of ICT in the competence orientated design of study plans - Detect teachers needs regarding the use of ICT and structure training around these needs - Training for design, monitoring and evaluation of the teaching and learning activities on the virtual campus - Create tools for teachers support - Incorporate more blended or virtual activities - Make sure to have a small network of trained teachers that can help teaching the rest - Support the production of digital resources - Support the design and development of training for the introduction of ICT in face to face teaching and learning	**Creation**	- Creation of specific units and services for teacher support in the task of ICT integration in teaching and learning processes (CUFIE, SIE-Punt DIT, AMIE-UDF, CTU, SRE) - Development of projects within these units in order to promote the use of ICT in teaching and learning (ITEM, Matricola, Facoltà di Lettere, DUET, Aula Virtual) - Creation of virtual and face to face support platforms in order to wrap up the projects (Campus Virtual, Aulas.Net, Ariel, Campus Extens) - Call for innovation project with ICT use - Celebration of exchange conferences about innovation through ICT - Virtualitsation of subjects - Creation of companies linked to the university and to the development of its digitalization (Ediuoc, Eurecamèdia)
	Promotion	- Enlarge the online course offer - Adapt online degrees to the EHEA - Promote and increase the use of ICT in teaching and learning - Promote methodological innovation using ICT as a lever for change - Promote the virtual campus as a common space from where all teaching materials can be accessed with multimedia support - Provide innovation projects, centres and departments with material and economical resources - Collaborate with external partners	**Enlargement**	- Creation of a methodological map for the use of ICT - Creation of networks for methodological innovation with ICT and organise exchange conferences - Production of multimedia teaching materials - Life broadcasting of academic events. Creation of online files of these broadcasting. - Experimental production of “videolessons” - Incorporation of the roles of instructional designer and online tutor as basic elements for e-learning evolution

	Awareness	- Promote a positive look at ICT integration within the university's mission - Facilitate the participation in the process of creation and improvement of the virtual campus - Communicate and disseminate the positive evaluations of ICT participation in teaching and learning and its improvement - Advise the teachers about the use of virtual learning environments - Use virtual platforms as institutional elements - Motivate the production of digital contents - Gradually develop ICT integration projects avoiding to cause fear and rejection - Practice methodological benchmarking	Improvement	- Development of new digital teaching materials - Student training in ICT use, both for beginners and people who have to update knowledge - Internal teacher training for the use of the virtual campus - Design and development of digital training guides for teachers - Creation of working groups for methodological innovation - Application of a methodological command chart - Organisation of exchange conferences - Renewal of 40% of the equipment in digital classrooms

Table 44. Synthesis chart of strategies and actions.

d) The integration models, steps of the process

The applied GRACE model of analysis model suggests the theoretical existence of three models: the technological model, the organisational model and the pedagogical model. However, it has been possible to prove that these models are not pure and how the universities got through different phases in the process of ICT integration.

These phases or steps seem to match with the needs that the universities' governing boards feel to have, and they are applied, sometimes overlapping, but generally seeking a certain response to these needs:

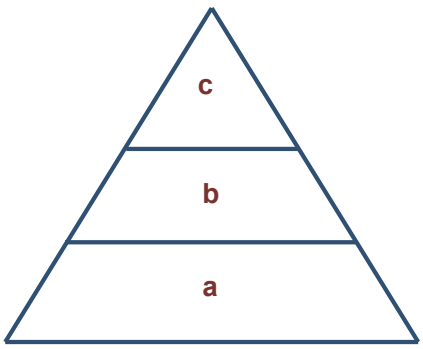
a) *The "technological" need*: This refers to the establishment and assurance of the necessary infrastructures to carry out the integration process.

b) *The need for "management improvement"*: This refers to the application of technological solutions in order to improve the university's administration processes.

c) *The need for "widening and improvement of teaching and learning"*: This responds to the intention of causing positive change in the teaching and learning process through ICT

integration. At a late stage in this step the implied parties normally realise that the integration will work if the staff has developed enough knowledge and capacity.

According to this concept of need we can try a graphic representation based on Maslow (1957) with a pyramid where the different phases overlap while their function is being accomplished.



Phase of the need for "widening and improvement of teaching and learning"

Phase of the need for "management improvement"

Phase of "technological" need

Fig. 11. Phase pyramid of ICT integration in the university

One can reach this conclusion by looking at the order in which the analysed universities have developed the different steps in their models, although this real sequence of actions does not coincide with the sequence that they report to have followed. Despite the consideration that optimizing the management processes was the last priority, in reality in the majority of cases studied, this step was placed in second place.

This can be reflected in a process that starts with strategies and action that belong to the category of Access and Infrastructures, then continues with the actions that are related to Management Processes and finally splits in order to continue with actions belonging to other categories like Teaching and Learning, Communication or Research.

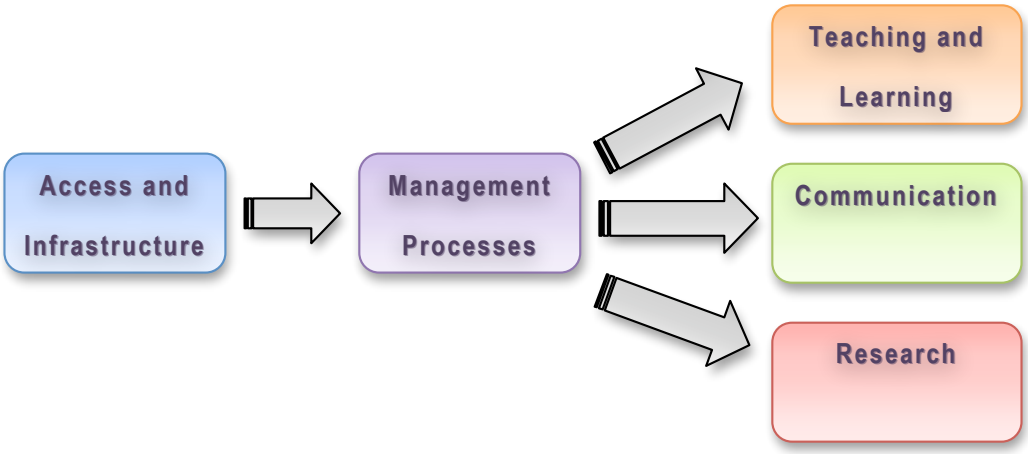


Fig. 12. Process of strategic implementation of the phases of ICT integration

e) Usual problems

The problems that come with ICT integration processes have a very individual character according to each institution and its context – just as it happens with any other changing process in general. We have nevertheless taken the ones that seem to be common in all of the studied institutions and grouped them in three big blocks.

- *Problems related to organisation*

The problems related to organisational aspects can also be classified under three subcategories: problems related to communication aspects, problems that are considered to be institutional management issues and finally those that relate to the organisation of teaching and learning.

In the first subcategory we have to stress the lack of a defined strategy to disseminate and implement the project. People do not know anything about it or what they know is only based on rumours, which leads to a situation where the perception of a strategy is very limited and the possibilities of involvement shrink considerably or even turn into potential opposition or reluctance.

The lack of a general and overall strategy or a very defensive position of the university's governing board alongside the lack of coordination between strategic actions and operative

decisions. This usually leads to a certain chaos in the organisation and results in not having a clear view of what the message is and how everybody is supposed to react.

This can occasionally be accompanied by too frequent organisational changes that increase the feeling of living a provisional moment or a phase of uncertain leadership. It is important not to confuse necessary restructuring in a moment of change with the constant modifications in structure and responsabilities. Such continuous changes can even lead to problems in keeping a constant rhythm of innovation. Also we have to see the lack of evaluation of the initiatives that are carried out. What is not evaluated is labelled as being not very important.

One problem that has been possible to identify in all cases, is the lack of time of the teachers to adapt to the changes that become necessary with ICT integration: new roles, virtualisation of materials and courses, new designs etc. that generate a workload that is much larger than usual. This point becomes even more concerning when it is combined with another of the identified problems: the lack of recognition of online or distance teaching and learning.

- *Problems related to funding*

Limited resources are a recurrent problem when it comes to talking about economical issues. Although there are universities that accept this situation as part of the rules of the game it is evident that budget restrictions do not allow for a quick and adequate development of ICT integration. This becomes especially visible in the resources earmarked to access facilities and infrastructure.

On the other hand it is also clear that any change needs a significant financial support to achieve sustainability through time. Without this financial backing there is the risk of converting many projects into pilot initiatives that cannot be extended to other departments of the institution. Such an outcome would at the same time reflect the unnecessary waste of the initial investment.

When we talk about ICT integration, economic difficulties become especially important. Technology is expensive but the most important aspect is that the speed of technological

change is very high, which makes the situation even more complicated. The institutions cannot keep up with the rhythm imposed by technological evolution, but as well it is clear that this way they would become obsolete. One example of this reality is the difficulties universities have in keeping their technological specialists when these people receive much more lucrative offers from the corporate sector.

- *Problems related to culture*

We have already said that ICT integration in university is a process of change and has to be considered as such. Therefore it is obvious that one of the conclusions of the present study is that there is a high level of resistance against change among the university staff. In the cases we are dealing with, this resistance can be explained with different variables.

Firstly, the level of knowledge among the teachers tends to be very low. This causes resistance against the unknown due to the uncertainty and insecurity it implies. Secondly, there are ideological aspects that influence. One of them is the conservative attitude of an important part of teachers in most of the universities. These teachers are against any change of their own teaching models and consider that any innovation jeopardizes the final outcome of traditional knowledge transmission. But there is also the other extreme where we can find teachers that express very little sympathy for ICT from a supposedly progressive position, because they consider them antisocial.

On the other hand, there is a third variable that causes a situation where a teacher does not receive any information about the possibility of improving his teaching results with the use of ICT because there is no evaluation process in place. This lack of an evaluation culture which was also observed in the field of organisation causes real problems.

Due to its peculiarity we also have to mention the difficulties encountered by the virtual university that has been studied. This institution has been confronted with a set of problems that were imported from outside but became a key element inside the university. We are referring to the definition of “working as a teacher” in an institution that offers virtual teaching and learning. The experience and habits of the majority of the institution’s teaching personnel

that have come from other face to face universities has occasionally caused a crisis within the educational model itself looking for face to face solutions in an organisation that promotes virtuality as a service to students who want to take advantage of precisely that characteristic. On the other hand we have also been able to identify the problem of an excessive cyber-optimism. However, the teacher identity in these contexts is an issue that requires further and more indepth research.

f) The evolution of the educational models based on the use of ICT

With educational models, in this case we refer to a role given to ICT in the process of teaching and learning, either from an institutional perspective or, alternatively, being left to the consideration of the teaching staff.

We are therefore not going to analyse or evaluate the concrete way teachers use technology in each lesson. Such an approach was used in a fairly recent study (Salinas, 2008).

In this study there are face to face institutions that decided to incorporate a virtual environment as a complementary or alternative element to conventional education. In some cases the new virtual environments were used in the same pedagogical concepts on which face to face education is based. Former paper based materials were simply used in a digitalized version accessible in the virtual campus. In other cases, such materials were produced *ad hoc*.

In other cases the virtualisation of courses was mentioned. But behind that term we can find much disparity in the meaning: the definitions reach from a simple digitalization of papers (a pdf. file) to a course that is completely managed over the virtual platform and does not rely at all on the physical attendance of the students.

This helps us to understand the vast extension of the concept of “e-learning” who’s scope ranges from support to face to face classes to online distance learning. After having analysed the studies and comparing the results with Bates’ classification (2003: 127) we decided reformulating his proposal and established the following four main models:

a) The model of minimal support

This model is based on the traditional face to face class that can occasionally be a master class. It uses certain technologies as an addition to the resources that are normally used in the classroom. Such a technological tool could for example be a PowerPoint presentation. It is certainly a poor model that contributes very little to educational innovation and that simply allows the teacher to answer positively when he is asked if he uses ICT in the classroom.

b) The complementary or alluvial model

This is a model where the teacher develops a model of minimal support which he or she considers fundamental, basic and complete, complementing it with the use of the virtual campus provided by the university. The teacher uses the campus as a sort of "repository" where he/she deposits papers, exercises, references that the students can use to widen, improve or deepen particular aspects of their learning. But it is not a problem if the student does not use this offer. The basic element he needs to pass the subject is class attendance and all that is explained or carried out in the classroom.

c) The supplementary or substitution model

This is a similar model to the last one. Both are models we could consider blended. The difference is that here the teacher proposes a use of the virtual campus that leads to a partial "substitution" of the face to face program. This means that the students work in the classroom and they do compulsory work outside the classroom, in the virtual environment. In this model the online teaching is a fundamental part of the educational model and without this virtual part the model would be incomplete. The student that does not participate in the online program cannot achieve the corresponding accreditation. Therefore we can see a noticeable difference between the two models regarding the consideration of the virtual activities' value. This, of course leads to a different teacher role, too.

d) The virtual or online model

This model we could qualify as the most extreme in which student and teacher cannot coincide in time and space but can still have a very strong and important interaction. The ones who apply this model consider it fundamental, basic, complete and non face to face. It can combine synchronous and asynchronous activities or offer total asynchronicity.

In the context of this study we are not going to evaluate which one of these models is the most adequate because this always depends on the objectives and the vision each university has stated. It is true that the teacher that applies the last model with excellence has good possibilities of taking advantage of the opportunities offered by the other models because he or she will have experienced the whole of the continuum discussed by Bates (2003: 127). On the other hand, some of the teachers that participated in the research argued that experiencing online teaching in any of the models always led to an improvement of their face to face teaching activity. The necessary previous planning turned out to be crucial for the students' performance and satisfaction.

Chapter 5

PROPOSALS AND RECOMMENDATIONS

ICT integration processes in the universities have to be incorporated in the processes of continuous organisational change that every institution has to undergo periodically. In the same way that the organisations face this reality from a strategic perspective which enables them to foresee threats and opportunities and to have a better chance of making decisions that lead to success, the universities should consider ICT integration process as another strategic process and apply appropriate and satisfactory instruments for analysis and decision of each moment.

The different strategies, processes and actions that the universities decide to put into practice have to be based on a coherent plan. This plan should include a clear vision that has to coincide time wise with the model for implementing the use of ICT that the university has decided upon. All these actions have to be integrated as far as possible, so that they offer a maximum efficiency and avoid what Fullan (2002) refers to when describing change and innovation in schools: "The main problem is not the lack of innovation in schools but the existence of too many unconnected, episodic, fragmented and unnecessarily embellished projects." (Fullan, 2002: 53)

a) The TOP triangle

It is necessary to achieve an appropriate balance between the aspects related to technology, organisation and pedagogy in order to obtain success with an e-learning initiative in the university. Although every academic institution is different and develops its activities in a particular context, the TOP-triangle formed by the previously mentioned vertexes can offer some help. It is highly recommended to design and implement a strategic plan that takes into account these aspects.

As we have seen, any change like ICT integration in a university, implies a process of strategic thinking in order to redefine the roles of the different agents, to create new functions

and departments and develop a new concept for the educational model. It also leads to the reorganisation of routines and administrative processes and to the restructuring of production and educational design processes.

The ICT integration process is easier to understand in a context of reconfiguration of an institution's organisational and pedagogical characteristics in harmony with the new opportunities and limitations that technology brings about. Therefore we see technology, organisation and pedagogy as a triangle of factors that are closely related to each other in a symbiotic way.

The analysis of the factors and mechanisms promoted in the studied cases enabled us to observe how the universities' visions and strategies – the ICT integration models – condition the configuration of the mentioned TOP triangle under which we can arrange the identified actions and activities.

The three elements are related to one another in their function of contributing to the construction of a powerful environment in which teaching and learning can be produced under clear and well defined quality parameters. Although every single institution has its own particular characteristics that have to lead us to establish a balance between the three factors based on parameters like the size, the target, the type of contents or the educational and social context, we can imagine that this balance does not vary too much between different institutions. At the same time we think that the balance has to be subject to the necessary adjustments when needs and priorities keep changing with time.

Fig. 13. The TOP triangle

b) Guidelines for strategic planning for ICT integration in the university

ICT integration has to be done in an explicit, planned and systematic way, involving the organisation as a whole and its members both individually and collectively in order to take the maximum advantage of its potential benefits. The strategic planning can become crucial in achieving a solid and significant integration process. We seriously recommend deciding on what technological solutions have to be adopted when, where and how in order to be able to apply an efficient and effective methodology. Although universities normally understand strategy as a pattern, it is also necessary to produce a plan that complements this pattern and therefore make it deliberate.

Technology, organisation and pedagogy are three elements that become the main factors for the development of a successful initiative if they are adequately combined. They are very often taken into consideration but looked at independently. The TOP-triangle that we propose presents the three elements in a situation of mutual influence and correspondence. Therefore, the initiatives for ICT integration or for e-learning development in universities has to be based on a strong link between all three vertexes and have to create the appropriate context for the development of an ICT integrated environment that leads us to efficiency and sustainability through a strategy of institutional dimensions.

In relation to the three vertexes of the TOP-triangle it is important to reflect upon the profile the university leaders and the process managers should have: a strong capacity for implementation of a very concrete strategic plan in which they have to manage the organisational and economical aspects adding a high level of understanding for the technological aspects in the context of an adequate pedagogical approach.

To discuss this we have employed the criteria for an efficient strategy as discussed by Mintzberg, Quinn and Voyer (1997: 13-14) and adapted them to our TOP-triangle in order to propose a number of guidelines that can help in creating strategic plans for ICT integration in the universities:

1) The plan is concrete and specific regarding ICT integration in the university or its improvement, and it clearly identifies a vision.
2) It outlines the internal strengths and weaknesses that should facilitate or could hinder the achievement of the plan.
3) It defines the ICT integration model or model for the improvement of ICT integration and its real motives.
4) It clearly indicates who takes leadership in the plan.
5) It defines the strategies and actions to be implemented according to the desired model and based on a previous SWOT-analysis, indicating the responsible agents, the resources and the timing.
6) Communication tools that guarantee clear and complete information reaching every implied member of the institution have been created.
7) Mechanisms for the revision of the plan allowing its flexible application have been established.
8) The coordination and the execution of the plan and with its actions having been assigned to a specific unit in order to create a unified command.
9) The necessary resources to execute the plan have been brought together. The command unit controls the appropriate execution in time.
10) Instruments that allow for the evaluation and the monitoring of the strategic plan while it is executed and of its impact at the end of the process have been created.

c) Trends and future research lines

In general subsequent research and studies should continue studying the use of the tools that are applied in business management and determine their potential of management improvement in educational institutions. This does not mean at all that we should make our universities work like businesses. But it does mean that in the same way that we use tools that come from communication or technological contexts in order to improve our teaching and learning, we should also be receptive about the contributions that the studies of organisational management and leadership can bring to the educational sector in terms of opportunities to improve the possibilities of achieving the objectives of knowledge creation and transmission and social transformation.

The present study could be continued in at least three well defined directions. The first one should be the development of a study with a wider scope that would follow the objective of generalizing the conclusions, which was not the declared aim of this present research. Based on a much bigger sample and complementing the study with a quantitative method is would be possible to create a map of the situation that could reflect reality very well.

Second should be the analysis of the evolution through time of the studied cases. In which direction have the applied strategies, or the absence of strategies led? What are the results of the executed actions? Have the universities achieved the objective of their vision? All this data would be of great interest and could help continue with the improvement of the strategic plans for ICT integration in the universities.

Eventually, we have been able to observe that all studied universities have set up units and services that became responsible for a considerable part of the implementation of ICT integration strategies. These units were formed using already existing structures, modifying others or creating completely new ones. It would be very interesting to get a deeper understanding of these units: their role, their structuring, and the professional profiles that are involved, how they work and evaluate their results. This could be the third direction.

We have uncovered some concerns that could be further analysed:

I. The power of the available technologies

Technology is evolving in terms of an incessant increase of the number of well designed tools that can be used for free over the Internet and that promote collaboration and the establishment of social networks or the creation and the sharing of high quality content.

The increasing possibilities of an active, interactive and creative Internet use without high economic investment for technological infrastructure makes it more and more attractive to gather experiences in ICT supported teaching and learning. These new tools also facilitate the organisation of learning communities, working groups or shared repositories without a big technological effort, although they still need a pedagogical and organisational basis that allows giving a better support to online learning.

II. The design of new learning contexts

These new contexts have to take into consideration the need of developing student centred approaches that allow taking the most advantage of elements like learning flexibility and autonomy. This has to lead to take advantage of the positive contributions of social constructivism and collaborative learning respecting the different needs adult learners can express in this changing society. But it should also lead to a combination with robust teacher support systems that guarantee the development of their competences in order to be able to use the current and future tools providing the students with significative experiences and to adapt to the new roles that are emerging.

III. To become nodes in the network

We become more and more "wired people" and as such we have a multiplied capacity of learning if we can activate the possibilities that the Web offers. It is necessary to eventually achieve the definition and application of pedagogical models that do not replicate traditional models with the only added value of using the latest technology that makes us look modern.

It is necessary to create a new model based on the empowerment and the use of the learning capacity of those people that form a node in the Web and that interact with other nodes. Some of these nodes, particularly the ones we have more confidence in and contribute with criteria and expertise, would eventually become "quality nodes". The teachers and educational institutions have to become such quality nodes adopting the role of a moderator in the virtual communities (Gairin, 2006: 55).

IV. Reflection about the appropriate use of ICT: the role of Bologna and the EHEA

We have to take the opportunity. The Bologna process is a trigger for change, where its meaning has been understood and therefore is able to be assimilated (Fullan, 2002: 62). It is necessary to take advantage in order to change the university's organisation on one hand and, on the other hand, the educational strategies, modernising them and above all, making them more effective and efficient. Some of those interviewed have made particular reference to this: "The objective is to adopt the ECTS system's current programs where we consider that it is exactly that process in which the teachers should be conscious about the need of integrating the new technologies in their educational activities." (UDC2)

The use of ICT can help with the implementation of the changes brought about by the EHEA. But we can observe that it is rarely used profitably in order to produce real change in the study methods: new ways of searching for information, online research, teaching based on case studies and problem solving.

These things are lacking, probably due to the poor pedagogical training of the majority of university leaders that assume the EHEA implementation, and combined with the equally poor ability of the teachers to face these changes as an opportunity to improve their own teaching.

It is necessary to shift from content based learning to activity based learning. We have to quit the "empty box model" (Hanna, 2002: 24) according to which the objective of the universities is to fill the students' heads with as much content as they can assimilate in a determined period of time. The EHEA suggests such a change, but it is not very clear if the universities have understood this... or if they want to understand.

V. The universities of the Net Generation

It does not look as if the universities pay too much attention to the changes that are happening among their students (Oblinger & Oblinger, 2005; Oblinger, 2003). And this should also be a strategic axis for their development in the coming years.

E-learning will also ask for immediate change and it will be necessary to adapt, to be innovative: the difference that is already visible (Prensky, 2001) between digital immigrants (us) and digital natives (our current or future students) puts us in a situation where we have to be imaginative and keep in mind that the e-learning of the future - some call it 2.0 and others even have started talking about 3.0 in an attempt to recover the primacy of technology in this field – will bring about a change of the teaching and learning approach we have been using so far.

We need studies and research that take into consideration the new generation of students in terms of how and where they learn and up to what extent the characteristics and the possibilities of the Web 2.0 tools can help them to learn more efficiently. We have to find out if the inventories of learning styles on which we have based our work in the past (Kolb, 1984; Murray, 1990; Sarasin, 1998) are still valid or if it is necessary to change them.

Because, if the digital natives are already here... who are going to be the new students and what will their expectations be? ICT play a predominant role in their everyday lives. What role are they going to have in the future? And above all, what is going to be more important for us... How will we have to adapt the teaching and learning processes to that new situation? (Van der Wende & Van de Ven, 2003).