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Transforming On-Campus Education: Promise and Peril Information Technology in Traditional Universities

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Abstract: *The governing bodies of all European universities have identified opportunities that, in the mind of the friends of technology, take the form of Napster universities where students would download from a huge reservoir of courses created by a multitude of universities what suits them and be able to send questions to professors from anywhere in the world. In 1998, in the framework of a plan to support innovation in teaching, the Rector decided to promote the Campus Global project conceived, initially, as an intranet designed exclusively for teaching purposes, and which aimed at complementing and supporting on-campus teaching. In effect, the loss of identity of university teaching as opposed to that at the secondary level is the result of political, economic, social, and demographic factors that led to the 'schoolfication' of university teaching. Unlike the post-graduate level where individualized service to the student is characteristic and essential, the criterion for teaching at the undergraduate level is spreading a scarce resource - the teacher - over the maximum number of students, while setting limits on the effort the teacher must expend to protect the time devoted to research by expressing this in formal terms of number of hours lectured - or credits.*

Keywords: ICT, Campus Global project, The University Pompeu Fabra, Agency for Innovation in Teaching, the Network for Innovation in Teaching.

I. INTRODUCTION

There is probably not a single university in the world that does not information and communications technologies (ICT) both a source of and a source of constant concern. The area where these opportunities have become most obvious since 1995 is that of distance education where one can now respond better than ever before to the needs for continuing education of a large group of people with relatively high purchasing power who do this a viable business with important economies of scale. The opportunities have been identified as the opening or consolidating of new markets in an environment where competition among universities is taking on a global dimension. In Europe, however, the universities that best responded to these opportunities from the start were not pre-existing distance universities, but rather the departments, sections, and units in the traditional universities that offer continuing education for professionals. They were probably much more aware of the business opportunities of ICT and of the ferocious competition that loomed in a market that was not necessarily as captive as that of the traditional distance universities. The governing bodies of all European universities have identified opportunities that, in the mind of the friends of technology, take the form of Napster universities where students would download from a huge reservoir of courses created by a multitude of universities what suits them and be able to send questions to professors from anywhere in the world. The mirage of the Napster University was soon joined by that of the University.com, i.e. an almost blind confidence in the potential of traditional universities to be transformed into .com businesses with extremely high profitability, given the prospect of access to a planet-wide market. Leaving aside the question of whether these legitimate technological and business ambitions will ever become a reality, the fact is that life goes on at traditional universities where the basic mission is, let us remind ourselves once again, generating and transmitting knowledge, while educating people who will work as professionals or academics. At present, there is not a single European university that does not have some kind of virtual campus, i.e. an intranet that is suitable for off-campus university education. It is less clear, though, that we in Europe have experience in integrating ICT into teaching, research, academic, administration, and management. There are several reasons why it has been easier to develop virtual campuses offering distance continuing

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education than to transform everyday university life by taking advantage of ICT. One may be a fear of uncertainty. This article is a reflection on the huge benefits and the stumbling blocks that must be overcome when a traditional university decides to commit itself to an intensive use of ICT in teaching, research, and everyday functioning.

II. The Starting Point: Innovation in Teaching

The University Pompeu Fabra is a public university based in Barcelona. It was created in 1990 and grew with a calling to develop its own model of teaching centred on effectiveness and play a significant role in research. It has 8,000 students, making it Catalonia's smallest public university. Its rate of academic success, its graduates' success in finding employment, and the volume of research contracts and projects show that its initial calling has been fulfilled. In 1998, in the framework of a plan to support innovation in teaching, the Rector decided to promote the Campus Global project conceived, initially, as an intranet designed exclusively for teaching purposes, and which aimed at complementing and supporting on-campus teaching. In 1998-1999, a first version of the platform was pilot tested in biology a nascent area, and in public administration, one of the university's oldest. It was decided to design a specific platform because none of those available at the time met the requirements of on-campus teaching and because the institution, i.e. all relevant groups (students, faculty, and services) would need to participate in its design and configuration. The feeling was that, in this way, one could guarantee that it would be a clear reflection of the university in its basic options and that this would make itself felt in such simple, but important, elements as the order of presentation of the options menus. The following year, the platform was greatly improved and gradually spread. The year after that it spread to the entire university so that all students and teachers, as well as technical and administrative staff, had access to a broad range of information, applications, and services in accordance with their assigned profiles.

In 1998, the three basic goals in order of priority were:

1. Improving student learning thanks to the integration of ICT into teaching. This apparently simple objective is the one that has turned out to be most difficult and is discussed in detail in the following section.
2. Facilitating communication among all members of the university community. While thinking back on it may bring a smug smile to our lips, in 1998, most Spanish universities were still debating whether it was appropriate or feasible to provide every student with an e-mail address. It goes without saying that this goal was rapidly achieved. Indeed, the institutional e-mail system had already existed for years for faculty and technical and administrative staff.
3. Improving services in terms of student access and administration. While at the time, this objective seemed secondary, ICT's potential and, above all, the process of institutional learning that the design and implementation of Campus Global brought to the university has rendered formulation of this objective obsolete. Now, the issue is that of re- inventing the university as an organisation. This issue, which universities generally downplay, has great potential for the future and is the focus of the last section of this article.

III. Shaking up Teaching in Traditional Universities

Using ICT to promote innovation in teaching is little more than a sign of the times. Indeed, it is relatively easy to agree on a diagnosis of the current state of teaching in undergraduate education in most European universities and on the degree to which the emergence of ICT can contribute to calling it into question by shaking the foundations on which it stands. To put it another way, much of the effort now invested in promoting innovation in teaching has probably gone into dead-ends, given the obsolescence of the technologies used and has, therefore, seemingly been wasted. More important, however, than the projects and products generated per se, which are doomed to become obsolete, is the fact that issues regarding how one teaches and how one learns and how both processes can be improved remain an inseparable part of the university's concern.

In effect, the loss of identity of university teaching as opposed to that at the secondary level is the result of political, economic, social and demographic factors that led to the 'schoolification' of university teaching. Unlike the post-graduate level where individualised service to the student is characteristic and essential, the criterion for teaching at the undergraduate level is spreading a scarce resource - the teacher - over the maximum number of students, while setting limits on the effort the teacher must expend in order to protect the time devoted to research by expressing this in formal terms of number of hours lectured - or credits. Thus, as in primary and secondary instruction, the ratios have gradually declined to 25, or indeed in some countries to as low as 11 pupils per class, at the university level having double that number is considered a true

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privilege. Paradoxically, it is only at the latter level that one can teach without completing professional training other than in content.

High student-teacher ratios, an emphasis on fixing teaching hours, a lack of teacher training, as well as pressure caused by study habits learned in school generally produce teaching practices that are centred on lecturing and are not always equally successful or appropriate. The main disadvantage is that they generate a model of study centred on repeating what was imparted in class, with emphasis placed on memorisation, thus creating a passive attitude. In the long run, the main danger of excessive lecturing is the creation of a student who does not have a true university experience based on independent study, the comparison of sources, the resolution of problems, and the acquisition of professional and academic autonomy.

Obviously, another issue arises when, in addition to class attendance, the demand of supplemental work for the students multiplies classroom hours by two or three. But this is quite rare, since the structuring of an academic career provides more incentives for investing time in research or the dissemination of knowledge outside the university than for devoting more hours to ordinary teaching than those specifically set out as classroom hours. Finally, there are neither incentives nor adequate support for efforts made by teachers to tray to innovate and improve their teaching. Inversely, inadequate or poor-quality teaching practices are not the object of sanctions because the evaluation system, centred almost entirely on students' opinions, is not considered a critical element in the regulation of teaching.

IV. Difficulties and Questions

The diagnosis, then, is clear. But it is much more difficult to have a clear idea of how the organisation of teaching should be oriented in order to transform scattered innovations into models that work for all teachers and for every course they teach. When the Campus Global project began, it seemed clear from a teaching standpoint that emphasis would have to be placed on two new elements which would require changes in the organisation of teaching;

- The use of electronic mail and, more generally, of communication tools (chats, forums, bulletin boards, etc.); and
- The publication of teaching material in digital form.

The availability of e-mail for all students and the Campus Global's easy access to the address of the teacher of any course soon raised opposition among teachers, who saw in this the prospect of being overwhelmed with work and seeing their mailboxes jammed with messages from students every day. It was decided to create a specific mailbox for each course. But at a university where an ongoing presence is an essential part of the educational model, the number of messages students generate is minimal. It is easier to speak to the teacher either in his office or after class. Other modalities of synchronous and asynchronous communication made possible by Campus Global, with the exception of forums, tend to be used far less because they cannot compete with the immediacy and warmth of face-to-face encounters. Soon it became clear that the initial attitude was not supported by the behaviour of students.

But the publication of teaching material in digital form continues to be a source of concern for a number of reasons, the most important being:

1. The difficulties, in technical terms, in terms of resources and in terms of a lack of qualification among faculty, to ensure that material made available to students is more than digital photocopies of text and truly takes advantage of the potential of ICT (interactivity, personalisation, use of multimedia resources, etc.)
2. The lack of a tradition of use and of an appropriate set of norms for handling the issue of intellectual property rights related to this material.
3. The access of teachers, but more especially of students, to adequate technological infrastructures both on and off campus (student/computer ratio, obsolescence rate, network band width, Internet service providers, etc.).

But, on the whole, the concerns related with ICT tend to raise more specific issues which call into question the organisational model of teaching at the university and the teaching contract, i.e. each teacher's teaching (not research) duties which were, until now, expressed in terms of credits (hours taught per year), as is required in the current legislation. In essence, the questions are:

- Should one reduce the number of on-campus classes and move toward campus or less on-campus teaching?
- Should one consider the number of classroom hours an essential criterion in the organisation of teaching?
- Should one decrease or increase the number of students per group?
- Should one change the way classes are conducted?

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- Are classrooms appropriate for the new teaching formulae?
- Does all teaching material need to be digital?
- How does one evaluate the quality of teaching in the new context?
- What incentives can the university offer to compensate efforts related to innovation and quality in teaching?
- What types of pedagogical and technological support and advice have become necessary?

V. Bases for a New Model of Teaching

At an international level, there has been a continuous trend away from emphasis on teaching/instruction towards emphasis on study/learning. There is a tendency to look at the problem of quality in teaching not from the standpoint of how to improve the teacher's communicative or didactic abilities - something which still needs to be done - but rather from that of the students and how to get them to learn more and better. It is believed teachers must become the facilitators of the student's education, the engineers of this highly complex process, and not merely a store of academic knowledge to be transmitted during classes.

Educational psychology has shown that significant learning only takes place when the learner actively constructs his learning. This is an individual process which works best when learning takes place in cooperation with other students and is oriented to problem solving or a quest for new knowledge which the teacher must regulate. Thus, in a sense, contemporary psychology has, paradoxically validated the original medieval model of university teaching. Returning to the origins, however, is not easy. There are two principles that could inspire such a return:

1. Moving from a model of teaching centred on instruction to one centred learning. Conceiving university teaching not as a presentation, ho brilliant, of contents during on-campus classes, but rather a structuring of every means possible - from the design of a co evaluation procedures, not to mention technological resources - in way as to make student learning passible.
2. Exploiting the potential of technologies to ensure access to study m both inside and outside the classroom. Applying the potential of t information and communications technologies and especially of multimedia didactic material and virtual environments such as Campus Global to the improvement of teaching processes, both on a group/class and an individual (in-person or distance) basis.

According to the vision of the future of teaching suggested by the University, the essential changes are: more time devoted to the design of courses (and supporting material); less time devoted to lectures; and more time devoted to monitoring the progress of the course and to tutorials. In a show of political realism, an equal amount of effort is devoted to formal evaluation of students because, in a country like Spain, as in other European countries, public opinion would find it difficult to understand if universities gave up strict evaluation practices (at least over the next five years).

VI. From Innovation in Teaching to a Change in the Organisation of Teaching

The two principles above require new conditions for the practice of teaching. For a public university that functions in the framework of national and regional legislation that limits autonomy in key related aspects, such as faculty selection processes, teachers' working conditions (qua civil servants), university admissions requirements, or the content of officially recognised degree programmes, changing the organisation of teaching is difficult. It was therefore decided to promote experimentation through a new model of teaching in some subjects, using selection process open to all faculty.

The conditions for these experiments, which are to be the precursors of the process of re-engineering the organisation of teaching over the next five years, are the following:

6.1 Reducing lecturing and emphasising seminars.

- The lecture format is to be reserved for lessons that present original content (state of the art) that is not yet published or which set the general framework for activities the student will engage in. The basic function of exposition is to be transferred to teacher-created reading material and the recommended bibliography. In suitable conditions, lectures could be reduced to 1/3 or even 1/5 of current classroom hours. By their very nature, they could, however, be given to large groups of students that are two or three times the size of current classes.
- What, in an ideal situation, characterises university education is the seminer and organisation tuition. For financial reasons, however, it is currently unthinkable for the work of each student to be guided efficiently on an individual

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basis. At the same time, this would not give enough of a role group work. Therefore, it would be advisable to promote seminars, understood as intensive working sessions involving a small group (no more than 10 students) and a teacher, that are designed to allow for a monitoring of the results of the group's work by the professor, as well as their discussion and validation. There is no doubt that knowledge acquired through such a process will consolidate itself because it will have been constructed by the student in cooperation with others and, if need be, with the help of the teacher as often as is necessary. Most importantly, it will have been discussed and validated by the teacher. Under suitable conditions, the classroom hours the professor devotes to seminars could represent at least 2/3 of the total.

6.2 Seeking more Appropriate Formulae to Quantify Teaching Workloads and thus define Working Conditions

This implies the need to reformulate the teacher's contract in terms of teaching units rather than of lecture hours. Teaching units would make it possible to account for teaching time, whilst considering two variables simultaneously: the number of credits assigned to each course and number of students in the group. This would permit a judging of tea giving greater consideration to the personal attention required by each student seminar group.

6.3 Moving from the Individual Teacher to the Teaching Team

In order to recognize the use of lecture time. While this would seemingly not result in any savings, economies in time spent might come in basic, required classes taken by more than one group were the teachers of the two groups to coordinate their teaching: both groups could attend the same lectures. However, one could also seek more innovative formulae if, instead of applying them to subjects, one attempted a more global approach by coordinating lectures in different subjects in the same area.

6.4 Experimenting with New Teaching Roles

The new model 582recognized t need to take into account the fact that not all teachers can or should do the same things. One needs to imagine a situation where teachers with different profiles each carry out a different set of clearly defined teaching functions (recognize tutoring, authoring, ...), even in relation to the same same subject.

6.5 Investing in Teaching Material

The process of student learning is based the availability of good material, which can range from study guides to multimedia materials. This means gradually increasing the budgetary funds under the current plan for measures to promote innovation. However, investments will also have to be made in incentives, e.g. by reaching marketing agreements for material reducing teaching time during periods of material preparation by the number credits corresponding to the course for which the material is being an idea of the evolution over time of the University's investment the creation of teaching material and the spectacular reception of this initiatives expressed in terms of projects approved.

But the policy of providing incentives of incomplete if we did not consider the issue since less than 1% of the material generated the most appropriate policy at present see authors' intellectual property rights over m to participate in the innovation in teaching specifically for the creation of the material university would expect a return of its initiatives.

6.6 Guaranteeing Pedagogic and Technical Support for the Faculty

The model adopted is based on two developments: on the one hand, the creation of technical and pedagogical faculty support units in each school or centre which would be under the auspices of the dean's team so as to guarantee a first line of support made up of scholarship students under the direction of a teacher with the status of vice-dean and operating as close to faculty as possible; on the other, the creation of recognized support, which is much more recognized both technically and pedagogically and generates guidelines and models, coordinates, and gives support to these units. The path taken two years ago in humanities and journalism, and in recognized582 the Support Unitform Innovation in Teaching and the Laboratory for Innovation in Teaching, respectively, has also been followed in the areas of law and political science and public administration. It is expected that this year a similar move will be made in the areas of translation and interpretation, biology and audiovisual communication where there are already significant cores of teachers who have taken the lead in applying new technologies to processes of innovation in teaching. The heads of these support units, together with deans and

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vice-deans, have structured and given content to the Network for Innovation in Teaching, whose goal is to promote innovation in teaching within the University by suggesting measures and mechanisms and, ultimately, by extending beyond the confines of the Campus Global concern for a better quality of teaching and sharing experiences. The efforts in the context of this Network have been oriented toward Campus Global's pedagogical services. At the same time, the university has decided to create an Agency for Innovation in Teaching that guarantees the technical and pedagogical coordination of the network, develops research programmes and offers its services to outside clients.

6.7 Creating More Flexible Classrooms

With this new model, more class hours will be spent on seminars of 10 or fewer students than on lectures which bring together larger groups. There is a need to experiment solutions in architecture and furniture that permit spaces to be recognized or made suitable for multiple purposes.

6.8 Promoting Access to Technology as a Teaching Tool

The parameters of investment in computer technology must be gradually changed: teachers' computers are now both research and teaching tools, and, as essential tools, need to be considered in financing. As for the students, while the spread of the Internet means that most will have computers at home, the current ratio of students to on- campus computers will have to be reduced gradually to 1 computer for every 12 students. In addition, one should note that the spectacular changes that have taken place in a very short period: last September, over 90% of the students entering the University had computers at home, and of these 63% had an Internet connection.

VII. ICT AND DAILY LIFE IN THE UNIVERSITY: RAISING EXPECTATIONS AND UNVEILING CONFLICTS

In addition to the process of reengineering teaching, dealing with the C Global has challenged the University as an institution, since ICT greatly current practices, not only in teaching, but in every aspect of its daily fu ICT also raise the issue whether they can help researchers to better manage their. Contracts and funds, or students to benefit more easily from services, or the to be aware of students' criticisms and opinions. The answer is recognize affirmative, but two conditions should be fulfilled.

The first is that the processes are re-designed from the very outset: the not be slightly improved; they will be new. To quote but a few exam professors and researchers can access financial data about their research contracts in all confidentiality via the Campus Global. Students can access their academic records, look for an Erasmus destination, see whether the recommended reading for each course is available in the library, or buy goods via the Campus Global. Finally, deans and department chairs, as well as university administrators, can deal with a greater number of administrative and academic procedures on an anytime, anywhere basis. The problem is that all the actors need to learn how these processes are designed and how to deal with them. Better still, they should be involved in the redesign process.

The second is that the university admits the need for organisation renewal. Processes and procedures change, so does the institution. And in this respect, bringing the Campus Global to the entire institution would seem to show that conflicts generated at an institutional level can, in general terms, be divided into five broad categories: institutional culture, leadership, internal organisation, contradictory references, and, finally, incremental expectation.

Usually, the first institutional conflicts to appear are related to the supposed existence of a dominant **institutional culture**. In most universities on the European continent, it would be hard to argue that such a culture exists and is shared to the same degree as would be the case in a company or firm of equivalent size. The adoption of a virtual learning environment (VLE) such as the *Campus Global* as an emblematic project for innovation in teaching usually produces two opposing cultures: that of the advocates of innovation, who are convinced it will bring better quality teaching to the university and ultimately transform it into better teaching institution, and on the other, that of the people who think in business terms and believe that a VLE needs to become a mechanism to find new markets and thus make profits that help the institution to recuperate the investment made or teachers to increase their income through, for example distance education programmes. In theory, the two cultures need to be compatible (otherwise, how does one assume the VLE's costs?) in order to make innovation viable. In practice, in the shorter or longer run, there is a divorce between the two cultures, and the one with the governing bodies' support is the one that shapes the VLE's development. Therefore, in some universities, VLEs will mainly be instruments

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for entering new markets, principally in the area of distance education. A smaller number of VLEs will primarily be instruments to renew traditional teaching.

It is only possible to make the two cultures compatible if the institution adopt VLE that is backed up by a decision to build clear **leadership** that embodies the coordination of all efforts in the technological, economic and financial, human resource, organisation reform, or innovation in teaching areas. In such situations, building leadership is extremely complex, given the diversity o resources involved and of institutional cultures. Maintaining it is even more difficult. One must not forget that opportunities to adequately remunerate the related positions are not exactly ideal in public universities and those academics, who are the only ones with enough legitimacy among their peer group to exercise. This leadership does not want to exercise it for long, because it harms their careers and research records. But without clear leadership, it is impossible to set a course for development and growth or to respond in a consistent manner to the challenges and crises that constantly arise.

The third type of conflict is not always recognized as such, but experience shows that it brings most developments in the short term. Indeed, it seems clear that, besides bringing innovation in instructional and learning processes, the application of ICT to the university's **organisation** should afford as many, if not more, benefits as those that might accrue at any other institution or even private firm. Among the most important, one should note the improvement in the effectiveness of internal administration, in the provision of services to different groups within the university community and, most importantly, the transformation of structures that go back to Napoleon and organisation many universities on the European continent into dynamic structures that efficient manage institutional organisation and ultimately into learning organisation. This transformation has two quite evident short-term implications: the promotion of those in charge of the university's internal and external information systems the highest levels of the organisation hierarchy; and the creation of internal un specifically designed for the management not of systems (hardware and software but of the contents they host and the issues they raise. In both cases, the university has to compete with very attractive professional opportunities in the private sector. But this problem is minor compared with the resistance generated by the promotion of document a lists and other specialists dealing with contents and information sources among information systems staff. It has often been said that academics are the principal force who resist change, but it is high time to test the willingness of non academic staff to change.

The fourth area of conflict relates to **contradictory references**, i.e. to the fact that the resounding failures of a blind faith in ICT's transformational power are so numerous at universities. In more than one case, critical voices have been raised admonishing that the crises that threaten many .com businesses will ultimately have an effect on the confidence organisation and universities place in ICT. These contradictory references are quite evident in relation to the integration of ICT into teaching and even more so to the question of whether costs added by this integration really produce benefits for teaching. This discussion demonstrates that the debate is related to pedagogic paradigms: the benefits that supporters of the traditional teaching paradigm hope to find are not precisely those that motivate advocates of the integration of ICT, who ultimately aspire to change basic assumptions and challenge pre-existing paradigms. Some ask whether much more can be learned more effectively; others answer that one now must learn different things in a different way. It is difficult to find evaluation mechanisms of current practices that meet both groups' expectations.

The final area is certainly the one most widely shared among European universities, no matter how low their level of adoption of ICT: the appearance of rising expectations, in other words, the awareness that the crisis in user support services will become a permanent feature of universities, whether in support for teaching or for research and management applications. When faced with new applications, users demand quantitatively and qualitatively more support. The universities invest more in support (staff, online support, etc.) but this produces a greater mastery of the applications and ultimately an increase in user expectations (*altius, citius, fortius*) which again produces a crisis in support services. In summary, one never reaches a point of optimum equilibrium, suggests that the crisis in support services will be with the universities for long time, even if it does not become a permanent characterstics.

VIII. The Heart of the Discussion and the Bases for a Consensus

What the existence of these five areas of institutional conflict shows is that the discussion about the impact of ICT at traditional universities goes far beyond the search for new teaching models, since it challenges the university as a whole. Putting the question correctly is necessary for success. In teaching, the issue is not how we can integrate ICT, but what we want university teaching to be and in which areas we want technology to help us change. The question is not what ICT will let us do that we were not able to do before, but whether we want to transform the university, in what direction and, finally,

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what role we assign to technology in the process. One needs to start, then, by having a clear vision of the university in today's rapidly changing context, proceed by asking how processes could be made more effective and conclude by deciding what type of organisation and people will be needed. Obviously, all these questions have various possible answers if ICT intervene. Inevitably, one will need to look for answers, while keeping in mind, in an interactive way, what technologies allow us to do in terms of the effectiveness of processes and structures. In any case, one must avoid a situation where the technology appears first and one looks for the application afterwards. However, the implications of ICT for the internal organization of universities can already be felt.

First, our confidence in strategic planning has gradually vanished. The mission and the vision may remain as they were stated a few years or decades ago, but the strategies demand dynamic planning. If strategic planning was supposed to give direction to middle and long-term action, at a time when the impact of technology is such a recent factor, we cannot adopt planning that is not revised every three months.

The second implication is that the issue of the impact of technology potentially brings with it so many risks that there must be an ongoing institutional consensus. This consensus, forged by strong leadership, demands that planning involve mixed teams of technical staff, users, and politicians in the interest of integrating the different sensibilities and expectations that are found within the university.

The third implication is that we must recognize our ignorance as to what the European university will be like over the next hundred years. This goes as much for teaching as for organisation. We must therefore proceed with experimentation and the piloting of new initiatives that provide the university with alternative formulae for teaching and for internal organisation. The universities that are successful in this undertaking will be those that, while promoting experimentation, are able to track and closely evaluate the results and apply them thanks to an institutional consensus.

IX. The Lessons Learned ... are the Issues of the Future

It seems clear that some of the lessons learned over the last three years can applied to traditional universities as a whole and to how ICT can modify instructional and learning processes and the organisation of teaching. But it would be prudent to treat these lessons not as principles or tried and true norms with universal validity, but rather as open issues that will have to be solved in the future. The most significant would seem to be:

- **Lesson 1:** The integration of ICT into everyday teaching at traditional universities is not compatible with a preservation of the current organisation of teaching. It will thus be necessary to find new formulae that put back into everyday teaching the original and distinctive sense of a university education. Paradoxically, ICT should enable one to take teaching back to its origins, i.e. transforming it into a process of accompanying the individual and collective search for knowledge and know-how.
- **Lesson 2:** In most continental university systems, this change in teaching organisation, in order to be politically and institutionally viable, must be accompanied by incentive mechanisms for teachers and more mechanisms to evaluate teaching. Both require, despite universities' relative autonomy,that governments either increase universities' autonomy regarding teachers' contracts or generate regulatory frameworks that favour the creation of incentives and mechanisms for the evaluating not of academic careers – these already exist – but of teaching performance.
- **Lesson 3:** Support for change in the organisation of teaching cannot be based on the creation of highly specialised, centralised structures, but rather on the establishment of units at the different centres and schools that are as close to faculty as possible. This allows for the respect of the disciplines' different traditions and sensibilities, which are also reflected in their teaching methodologies, and the guarantee of an immediate local response (next-door support). It is only when these structures grow in number and when complex technological and pedagogical demands arise that it makes sense to create central structures with highly qualified staff. The creation of external support that is highly technical and complex must not become a distraction from the faculty's most immediate concerns. Otherwise, the risk of a divorce between the expectations of some and the abilities of others may mean that support structures generate their own worries.
- **Lesson 4:** The future is uncertain and one must be very flexible. Because of changes in the context and the constant evolution of technologies, one must plan for the future bearing uncertainty in mind and design organisation structures and managerial mechanisms that are flexible enough to adapt to constant change. Two examples: first,

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the constant loss of technical staff in computation, who once they have reached a certain level of qualifications, have better career prospects in private industry; and second, the giving up of old premises like the idea that computers must be bought and not rented.

- **Lesson 5:** University structures and organization will never be what they were. One must adopt formulae that guarantee that universities become flagships of the knowledge society. Again two examples: first, the incorporation of chief information officers into the highest level of university administration; and second, the creation of structures of coordination and support for p concerning the use of ICT that guarantee an appropriate interface be information systems staff and various groups of users: students, f administrators and service providers.
- **Lesson 6:** The effort expected of universities in this area, especially if they become the vanguard of the knowledge society, is incompatible with financing systems where the additional costs generated by investments in ICT assumed by the financing bodies. In this context, the alternatives are external financing, with patronage or sponsorship systems, (which requires national tax systems and ICT policies encourage it); b) the passing on to students of the cost of new services, e.g. print-outs or of the use of computer campus; c) a moving into e-commerce, e.g. in the area of student required reading material or of external services.

X. CONCLUSION

These lessons are not, to be sure, the only ones but are perhaps those which most challenge us because they bring us face to face with a future the uncertainties. In this context, there are three corollaries which ma conclusion. The first is that European universities are quite well pl the vanguard of the information and knowledge society if, besides e in class, they put it into practice in a daring way. The second is the involves a willingness to take risks, prudence suggests that this mu done in the framework of experimental programmes. One must incentives for experimentation and research in each and every area o and not just in teaching. The third and last is that these efforts in e can be greatly aided through cooperation among European universities; this is one area in which the efforts of the European Commission and its various should be recognized and encouraged even more in the future. How of the university community who must make sure that the ad information and knowledge era and the technologies that make it p their way into our classrooms and offices and allow us to regain the our mission: the education of people in search of beauty, virtue and climate of freedom.

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