Summary remarks and challenges for the future

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The symposium, 'The Virtual University? Educational Environments of the Future', was aptly named. First, it proved difficult to define the virtual university with precision — the term is used to cover a wide range of activities and institutional models, and the presentations in the symposium, particularly the case studies, were a testimonial to this fact. Second, the multiplicity of models pointed to the growing diversity in university systems and in higher education at the global level, and therefore to a multiplicity of potential future environments.

Worldwide, universities face a range of challenges, and these challenges have implications for all of the stakeholders, national governments, institutions, staff, students and employers. In addressing both current and anticipated challenges, there is a growing trend to look to the promise of new information and communication technology (ICT) and its power to overcome the barriers of time and distance in the provision of educational opportunities. Certainly, the potential of technology varies from country to country, depending upon economic, cultural and technological conditions and constraints. Nonetheless, in time, market forces and the pervasive process of globalization promise to change conditions and mitigate current constraints.

In a network society, universities will find themselves operating in the context of a global environment, rather than a national or even regional one. Technology enables the institution to reach beyond the geographic area it normally serves, and to take its place in this global marketplace. If the present has any lessons for the future, it is that the environments in which the university operates will change more rapidly than in the past. The university will have to make choices about its role and function in these new environments.

The university at the end of the 20th century

When viewed across the centuries, the university as an institution appears to have retained a continuity in its form and function: "…of the 75 institutions founded before 1520, 60 are universities doing much the same things in much the same places, in much the same ways and under much the same names. Most economic and political institutions, by comparison, have been almost completely transformed" [1]. The traditional university has been campus-based, and organized to support teachers in a collegiate mode and to teach students in a face-to-face mode. Its main mission has been to search for truth, to undertake independent research and to teach 18–22 year-olds. Regarded more closely, the university has not

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remained unchanged: it has proliferated and evolved in response to changing social and economic conditions and resulting demands.

At the close of the 20th century the institution was faced with a number of challenges:

- the continuing growth in demand for higher education, resulting in part from the transition from a system of elite to mass higher education;
- the consequent increase in the diversity of student backgrounds and interests;
- growing resource constraints and associated pressures for income generation;
- increased demands on higher-education systems for accountability in the expenditure of public funds;
- the difficulty of keeping up with the ever more rapid pace of knowledge generation;
- the emergence of other actors that compete with universities in the provision of higher education.

There are other emerging challenges. In addition to the increasing demand for initial higher education, there is a growing demand for lifelong learning opportunities. The importance of lifelong learning has been cited for decades, and universities have responded with varying levels of commitment. The year 1996 was designated the European Year of Lifelong Learning to communicate the importance of the concept, and in the same year UNESCO (United Nations Educational, Scientific and Cultural Organisation) released the report *Learning: The Treasure Within* [2]. The report stressed the powerful role lifelong learning will play in the future: "The concept of learning throughout life is the key that gives access to the twenty-first century" [2].

Whereas most institutions do, in fact, have a continuing education function, it is not normally a core activity. The presentations and discussions during the symposium identified the provision of lifelong learning as a key role of the university. Lifelong learning is essential to ensure the stock of up-to-date, highly qualified personnel essential to the more complex work environments resulting from the increasing rate of change of almost everything, which guarantees a rapid obsolescence of knowledge and skills. It is seen as one of the primary applications of technology-supported distributed learning. Adult learners do not need, nor do they have time, to take advantage of the social environment provided by a university campus. They need efficiency and flexibility, both of which are considered key characteristics of distributed learning.

A university commitment to offering lifelong learning opportunities will compound the heterogeneity of the student body, which will be comprised of both full-time and part-time students receiving either initial or continuing education. This means that universities will need to accommodate not only the diversity of the student body that has accompanied increasing enrolment at the level of initial education, but also the considerable diversity among adult students. The teaching and learning methods appropriate for 18–22-year-olds are not necessarily appropriate for adults. There is some doubt that universities are ready to take on a role as major providers of lifelong learning; however, if they fail to do so, other organizations will lay claim to the market.

Another major challenge is the increasing, and increasingly aggressive, involvement of the private sector in higher education, which signals an end to the monopoly position of the university as the primary provider of higher education. In-house training of the workforce and even the corporate university are not new phenomena. What is new is the intention of some organizations to offer training to non-employees, and thereby compete directly with the traditional university sector. On the other hand, there are opportunities for partnerships of a symbiotic nature, with individual organizations contributing according to their areas of competence. Universities may enter into mutually beneficial arrangements with publishing houses, for example, for the preparation and distribution of teaching materials. At a time when universities are struggling to meet new demands with stable or decreasing resources, such partnerships may prove advantageous, provided that the university is not driven by or subsumed to the mission of other partners.

It is clear that increasing societal expectations are causing universities to rethink their aims — it is indeed impossible to meet all demands and, therefore, it is essential to determine an appropriate niche in an emerging global marketplace. However, the question is whether traditional universities will be able to keep up and adapt to new environments.

ICTs — tools for change

At the start of the 21st century, universities have at their disposal a powerful tool in ICT. There is a considerable level of agreement that this technology is having, and will continue to have, a transformational impact on all sectors of society, education included.

ICT is seen as offering potential solutions to some of the problems universities currently face by increasing access, improving instruction and assessment, and reducing costs, among other factors. Although use in the instructional function is perhaps of highest current interest, ICT has applications in other functions of the university such as research, and in the management of the institution itself and its contacts with other institutions and organizations.

It must be remembered that universities have been early adopters of technological innovation. Over the years, there have been many examples of experimental use of new technologies in the teaching process. Broadcast radio and television, satellite delivery of audio and video, and computer-assisted instruction have all been tested in educational environments, sometimes with great promise and dashed expectations, sometimes with modest success and eventual integration. These various technologies have found their appropriate places and uses in many institutions, usually as complementary or supplementary to the traditional teaching methods — the lecture, seminar or laboratory session. But none has had what might be called a transformational impact on educational institutions or systems. Will this be the case with ICT? Some comments made during the symposium suggested that it shows every promise of being capable of transforming in a fundamental manner how higher education is both organized and delivered.

The questions to ask are why is this technology different, and why will it have a more profound impact on education than others have had in the past? When confronted with a new technology, users often replicate current practices in the new form, without reflecting on what the new medium offers in terms of advantages as well as disadvantages. For example, early uses of educational television transformed the classroom lecture into a 'talking head'. It is essential in determining the optimal use of a new technology to discern its advantages and to assess whether they can be captitalized upon in the educational environment in question. In the case of the Internet, the technology supports both immediate and delayed interaction equally well, thereby offering a new flexibility in communication and learning. The worldwide web provides access to a wealth of information, instantaneously available but neither controlled nor classified in the familiar manner of formal publications and libraries. The challenge to the stakeholders in the educational environment is to determine best practices in the use of ICT.

In order to develop Internet-based learning opportunities, educational institutions need software to support the instructional process and to permit integrating or sharing content in virtual learning environments. This need for the development of instructional software and the development of standards is being addressed by the Instructional Management Systems (IMS) Co-operative. IMS is a global consortium with members from educational, commercial and government organizations. The goal of IMS is the development and promotion of open standards for online distributed learning opportunities [3]. Common standards will serve to reduce waste through an elimination of duplication, cut costs and improve quality. Information technology allows the 'objectification of knowledge', making it storable, transmittable and accessible. The importance of standards in this context is evident, given the potential 'unbundling' of the educational process into learning materials and interactive technology supported instruction. The development of 'chunks' of electronic information or 'learning objects' means that information can be used and re-used in different learning situations, provided that a standard format is used. Copyright will be an important issue, even more important than it has been in the context of distance education.

Technological innovation, and the associated need to create a market demand for these new technologies, is often the driving force behind experimentation. Instead, managers of higher-education systems and institutions need to give much greater attention to how educational plans and objectives can be used to shape the thrust and extent of technology planning.

Above all, technology is merely a tool, a means to an end, and the ultimate focus must be the appropriate use of technology that offers the greatest benefit to the user, that is the learner primarily, but indirectly all of the stakeholders in higher education.

The virtual university at the beginning of the 21st century

The emergence of the virtual university is a concrete example of the impact of technology in higher education, and it may be the most significant one. Although the university, as an institution which has served society for centuries in a largely consistent form, may find changing direction a slow and even painful experience, the emergence of the virtual university illustrates its capacity to evolve. And the rate at which virtual university initiatives are being developed shows the speed with which the university is both capable and willing to respond to new challenges and new opportunities.

What characterizes the virtual university? The following points were proposed to distinguish it from the traditional institution:

- a university without walls;
- unconstrained by its physical location;
- with global connections of potential learners, learners, teachers, alumni and employers, and of researchers, research funders and research users — existing in a flexible and ever-changing organization for knowledge creation and distribution.

In addition, the virtual university can also be envisaged as a continuum of practice that ranges from technology-assisted teaching on the one extreme to teacher-assisted instructional technology on the other. There is a variety of institutional models:

- a campus-based university using an intranet and the Internet for distributed learning;
- a university that operates in both a physical and virtual environment, sometimes labelled a dual- or mixed-mode institution;
- a university that operates in a completely electronic environment offering courses and programmes, or acting as a clearing house.

Many initiatives have been built upon existing structures, as in the case of a traditional university offering distributed learning opportunities to on-campus students, or to both on-campus and off-campus students. Some distance-education institutions are re-inventing themselves as virtual universities. But some virtual universities are entirely new institutions, building themselves entirely in cyberspace. Some are networks of institutions, such as the University of the Highlands and Islands in the U.K. The case studies described in this publication point to the diversity of models and approaches and the challenges inherent in each.

Open and distance learning have lessons for developing virtual institutions, from the use of teams of professionals for designing effective learning materials, to the costing and amortization models. Traditional institutions that have had experience with distance education in the past may be better placed to develop virtual learning opportunities, particularly if they have developed new activities in a manner congruent with other methods utilized by the institution.

In the short term, there seems to be no indication that the virtual university will supplant traditional institutions, but a word of caution has been

expressed in this volume — in future educational environments, traditional institutions that do not evolve may eventually disappear.

Implications

It is evident that the growing use of ICT in the university, of which the emergence of the virtual university is evidence, will have an impact on all the major stakeholders. The precise nature and extent of that impact cannot be clear as yet, but the previous chapters in this volume have raised a number of issues for consideration.

National governments

The virtual university can be seen as a globalizing force in the offer of higher education, and national governments may no longer be able to plan effectively for its provision at the system level. Students may be able to search for the best response to their educational needs in an international marketplace. Nonetheless, governments have a role in ensuring access to higher education in order to meet individual, societal and economic needs. The issue of equity of access is important to the debate on whether ICT will exacerbate the gap between those that have and those that do not — the much cited 'digital divide' — thereby creating individuals, groups and even societies that are information-rich or information-poor, with the concomitant economic consequences. Government policy will have an important role to play.

A global higher-education market will also create the need for co-operation and collaboration at the international level with respect to such issues as standards, quality assurance, assessment and certification. These functions may no longer reside primarily within the individual institution or national system. Examples of international initiatives include the IMS initiative described earlier and the American-based Global Alliance for Transnational Education (GATE). GATE is a co-operative activity of business and government to assist institutions and organizations in the development and evaluation of quality education that crosses national borders [4].

Along with globalization in general, but of higher education in particular, comes the spectre of cultural and linguistic domination. Governments will have to decide to what extent they wish to protect national culture and values, and the education system is an important means of doing so. However, the proliferation of the virtual university and its capacity to ignore boundaries will pose a challenge, particularly if the movement continues to be driven largely by institutions in industrialized countries.

Government has responsibilities related to all the other stakeholders in higher education, and while its role may change, it cannot leave these responsibilities to other forces. It needs to remain vigilant and informed of the implications of change in the higher-education sector worldwide, and mindful of the needs of its own citizens and society.

Institutions

New ICT offers the university a powerful tool for supporting its functions and for creating new institutional models, namely, the virtual university. However, its utilization will result in demands on the institution for new infrastructure, different organizational structures, support and training of staff, and support of students. In short, the implication is significant institutional change.

ICT will have an impact on both academic and administrative aspects of the university, whether it is largely traditional or largely virtual. The implementation of technology-supported applications promotes, even demands, institutional change. This change may be planned or unplanned, but whichever it may be, it appears that change is inevitable. In this shifting environment, the definition of mission is crucial for both new and existing institutions. Institutions will need to define and promote their distinctiveness based upon the focus of their mission statements and areas of strength, thereby determining their desired place in the global market.

The use of ICT in the university requires costly investment in the infrastructure, but the implementation of new procedures and approaches may be even more costly in terms of the resources necessary for conversion or development of instructional materials and processes, and staff training and support. The use of ICT in the core functions of the institution has the power to change these functions. This is evident not only in the instructional and research functions, but also in the organization and administration of the institution. Existing policies and structures may need to be revised so that they support rather than act as barriers to innovation and development.

Lessons drawn from some of the experiences described in this publication point to the importance of institutions taking small steps, being very explicit about what is to be accomplished and ensuring a degree of congruency between current and new practices, such that change does not become a destablizing force. Indeed, tensions may develop in institutions between different factions, for example, between students who seek a scholarly education and those who seek a professional education, or between staff members who conduct their research and teaching functions in a traditional manner and those who explore new approaches and implement ICT applications. Explicit and clearly communicated policy will help support institutional change and development.

Distance education offers useful models for the development of financial and administrative policies and procedures for distributed learning. There is a similarity between distance and virtual institutions in many respects, including the need for up-front investment in the development of teaching materials, and the appropriate technological infrastructure to support teaching, learning and administrative functions. Open- and distance-learning institutions have lessons for virtual institutions in all their forms.

The diverse experiences described in the case studies presented in this volume underline the fact that there is no single institutional model emerging in response to the educational environments of the future. On the contrary, there is a rather wide range of models, a range that may be necessary if the university as an institution is to respond to the diverse needs of the various stakeholders.

The magnitude and rapidity of change in the implementation of ICT warrants a philosophical discussion of societal change and the response of the university. In such a debate, the university needs to be capable of defining its values and its role in society, and of communicating its value as an institution to the outside world. In the past, universities have found it difficult to act or speak collectively, therefore such action will constitute another challenge.

Staff

Using ICT, within either the traditional university or the virtual university, staff members have at their disposal new tools to improve and enhance instruction, manage the process more closely and efficiently and better assess learning outcomes. In turn, they will have to develop new competencies and rethink their roles, both in the institution as a researcher/teacher, and with the learner in the teaching/learning situation.

Academic staff members are key to the development of the new and innovative approaches to teaching in the virtual university, and, once again, open and distance learning have lessons to offer. The development of excellent teaching materials and efficient instructional approaches demands new competencies of staff, and this requirement has been addressed in distance-education institutions by the formation of teams of individuals with complementary skills. However, teamwork is not characteristic of academia; the recognized and rewarded work of academics is based largely on individual effort. Incentives may be necessary both to encourage change in behaviour and to convey the message that work undertaken in teams is valued positively within the culture of the institution.

Staff members that experiment with or implement new instructional methodologies need the support and recognition of the institution, but also an appropriate amount of time and resources. One important finding has been that there is a high demand on teachers of online courses from students who expect an instant response to their questions and work assignments, regardless of the day or hour. The immediacy of interaction on the Internet is one of its strengths, but it poses risks for staff if the interaction in courses is not designed and managed carefully.

As academic staff become increasingly involved in developing new methods of instruction, the focus on teaching activities and the demand that learning new skills places on the staff member may eventually result in a growing separation of research and teaching within the institution. The image of the great researcher who, through his or her teaching, inspires, instructs, guides and challenges the student may not exist except in rare circumstances, but it is an image that remains the expression of an ideal. It is clear that a focus on developing new teaching methods may result in a weakening of the link between research and teaching, given the energy and commitment needed to develop new and innovative instructional approaches and materials. The end result could be a separation of the functions within the institution.

The move to the use of ICT and the creation of virtual learning environments has been met with resistance by some academics. There are many possible reasons for this, ranging from a fear of loss of employment through replacement by technology to a simple refusal to change. Change agents, that is

those staff members who are early adapters to change, serve a very useful function in providing role models. If they are deemed successful by their colleagues and are rewarded by the institution, they will be followed by others.

Although the use of ICT has the potential to improve learning through the focus on a learner-centred approach, the development of just-in-time learning for professionals, access to information on the web and improved assessment, among other aspects, it was noted that not enough is known about what is actually happening in the learning situation. Research studies are needed to explore and explain what is happening in order to identify best practices and develop models. The research community in the field of education has a contribution to make, one that is needed urgently.

Students

From the perspective of the student, the virtual university offers more flexible, more individually oriented and potentially more efficient learning opportunities. However, just as staff members need to develop new competencies to teach effectively in the virtual university environment, students need new skills to learn efficiently. In fact, there is a blurring of roles in online teaching and learning.

It has been stated that learners must be very motivated to study in virtual environments where they lack the support, motivation and inspiration that may result from the association with teachers and peers in a campus setting. To benefit from virtual learning environments, it was proposed that the student will need to know how to learn, and how to manage his or her own learning. The development of critical and analytical thinking becomes even more essential in this context. The Internet can be either a rich resource or chaos, with tangentially connected bits of information losing the student somewhere in cyberspace.

The university serves two types of student — those seeking initial education for scholarly or professional careers and those seeking continuing education for personal or professional development. Their objectives and needs differ. The university campus provides a social as well as an intellectual environment that is deemed important to the development of young adults in initial higher education. However, adults who have completed their initial education and have taken on professional and/or family responsibilities normally have specific learning needs that they wish to address in as efficient a manner as possible. Ideally, the use of ICT will allow the university to respond to the differing needs of each. Adult learners stand to benefit greatly from the flexible, time- and location-insensitive offerings of virtual universities. Young adults will also appreciate this flexibility, and will gain from the wider range of learning opportunities available to them beyond their own institution.

Employers

The university contributes to the economic well-being of the country through the provision of highly qualified personnel for the workforce. However, the rate of change in the workplace guarantees that knowledge gained through initial higher education will become obsolete during the course of a career and employers have the choice of turning to the university or providing the necessary training themselves.

There is widespread agreement that lifelong learning will be the major driver for distributed learning and the virtual university. Universities are currently oriented primarily to the provision of initial education, while some private-sector organizations have considerable expertise in training or retraining professionals. This may give the latter an advantage in developing lifelong learning opportunities. However, with a wider diversification of types of higher-education institution, certain among them may choose to concentrate on the provision of lifelong learning.

It should also be noted that some industry-based virtual university initiatives may look beyond their own personnel and offer their expertise to other learners, thereby competing directly with the university, and blurring another set of traditional roles. The experience of Cisco, indicative of the expertise in the private sector for developing training for its own employees and those of partners, has lessons for the university sector. Technology is used to support learning on demand, which is deemed to be less expensive because it is more effective. The expertise of organizations like Cisco in the development of efficient training systems makes them potential partners, or potential competitors. If the university community reacts with hostility, then a competitive environment will be the result.

Significant issues

A number of significant issues and challenges have emerged from the symposium and this volume. (i) There is an urgency associated with the development of ICT initiatives in the university. (ii) ICT will have a major impact on teaching and learning, and each European university should have a strategy to react to this change. (iii) Institutions, departments and individuals will not be able individually to obtain the best advantages from these new technologies — they will need to specialize on the things they do well and to co-operate with other specialists in matters such as course preparation and online instruction. (iv) The pressures are likely to be for time, rather than additional financial resources. Experience with Internet learning indicates that online students adopt a wide variety of personal schedules and expect their teachers to do the same. (v) Traditional university staff may resist these changes, but institutions that do not adjust to the new opportunities are likely to shrink or even disappear.

These challenges are faced, in varying degrees, by most institutions in the context of an emerging network society. Universities have lessons to learn from one another, and the symposium and this publication were conceived with just this objective in mind.

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