An international orientation on institutional strategies and governmental policies for the use of ICT in higher education

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Abstract
This article provides an international comparative overview of institutional strategies, collaboration patterns and governmental policies related to the use of ICT in higher education. It has been produced as part of an international comparative study on the use of ICT in higher education. It covers the following range of countries: Belgium, Finland, the United Kingdom, Australia and the United States of America. Additionally some main initiatives at the European level have been taken into account. On the basis of this international comparison, the following main conclusions were drawn. Due in part to the fact that in many cases institutional strategies for ICT are still lacking, interesting experimentation does not generally lead to successful dissemination and adoption on a wider scale. In many cases, the push for a substantial use of ICT in distance learning programmes has come from new educational markets, life long learning and international education in particular. The response of higher education to these markets is leading in many countries to a convergence of distance and traditional (on-campus) education. Inter-institutional and inter-sectoral collaboration between universities and companies are characteristics of many successful ICT initiatives, although they do not generally continue into sustainable implementation in the individual institutions. Governments facilitate the use of ICT through the establishment of infrastructure, networks and inter-institutional and public-private partnerships, and try to create the right regulatory environment. Further deregulation will enable institutions to respond to new market demands and will inspire the necessary organisational change in higher education institutions.

Key words: governmental policy, institutional strategies, collaboration and competition.

Introduction

Over the last years strong developments have taken place in the use of information and communication technology (ICT) in higher education. However, what these developments actually include and what they will cause is not yet very clear. While the higher education press regularly reports on the start up of virtual universities, most traditional universities do not yet seem to have an institutional vision or strategy on the use of ICT and their activities are limited to the grass-root level (CRE, 1996, 1998). Regarding the implementation and effects of ICT, various different views and opinions can be observed. There is much discussion on whether or not the prevailing educational paradigms will be changed by the use of ICT. In particular the questions of whether and how ICT influences the interaction between instructors and students and between students seem to attract contrasting viewpoints. Although there seems to be a broad consensus on the importance of ICT for higher education, also here a contrast can be observed: the importance of ICT is seen both in terms of opportunities and in terms of threats. Opportunities are in particular perceived in relation to enrichment and the enhancement of the curriculum and the efficiency and flexibility of
learning processes. More flexibility, in terms of place and time for more independent learning, will not only better meet the needs of modern young students, but will also facilitate the development of new educational markets (e.g. for lifelong learning). These markets are not limited to age groups or to the national context. Threats are seen in the fact that ICT enhances the competition in higher education. As traditional higher education institutions seem to be loosing the monopoly on academic and degree-awarding programmes, competition from foreign and new corporate higher education providers is quickly emerging. These developments require higher education institutions to reconsider their roles, profiles, positions, and the alliances that they will need to make. It is generally accepted that alliances will be necessary, but how such alliances can best be created and how they can function is in many cases still to be discovered. National governments are also facing difficult questions in relation to ICT. To make decisions, it is appropriate to ask questions about the country’s situation as compared to that in other countries, the types of initiatives should be taken and what the role of the government should be in this area. This range of questions formed the background of this study.

Research questions and design
The study was wide in scope, including also educational aspects and issues of costs and effectiveness. Regarding the policy and strategies for ICT, the following research questions were formulated:

- To what extent and on the basis of which perceptions and strategic considerations are institutional or faculty level policies for ICT being developed?
- Which forms of inter-institutional, inter-sectoral and international collaboration exist and how do they function?
- What is the role of the (national) government regarding the use of ICT in higher education?

The study was mainly based on desk research, including policy documents and recent and current research on the use of ICT in the countries concerned, with a particular emphasis on national surveys as important sources of information. Additionally, intensive use of the Internet, interviews with key persons and study visits to all the countries concerned have been made.

Institutional strategies for the use of ICT

A general view on Europe
A general impression of the situation in European universities with regard to policy development for ICT is provided by the reports of the Association of European Universities (CRE 1996, 1998). From the CRE project Universities and the Challenge of New Technologies (1996) it was concluded that there is a lack of clear institutional strategies to provide a framework for the development of new technologies in teaching and learning. The range of experimentation with ICT in many universities is impressive, but in general these activities are disconnected from the institutional framework within which they are occurring. Furthermore, it was argued that in order to develop such strategies, universities would need to think more about the place of new learning techniques in their institutional strategies. ICT should be seen as part of the strategy of an institution to fulfil its mission, and not as an end in itself. Development of such a strategy requires that internal (staff and students) and external needs should be better analysed. Each institution must define the market niches it wants to occupy (e.g. initial higher education programmes, continuing education, postgraduate or professional training, lifelong learning, distance education, etc.) and should then determine the academic priorities for each target group of students. Other important conclusions regarded the resistance of both academic and administrative staff to the use of ICT, which may be related to a lack of knowledge and skills in this area, and the problems predicting the true cost of ICT related activities (CRE, 1996).
In the context of the Telematics Applications Programme of the European Commission’s Fourth Framework Programme for Research and Development, overviews of Telematics in Education and Training (TET) activities have been made for each EU member state (I*m Europe, 1999). These country profiles provide information on the general context for the use of ICT in higher education. Additional insights into the extent to which ICT is part of institutional policy making have been gathered through more in-depth national surveys and studies.

**Finland**

The TET country profile for Finland reports that telematics for education and training in Finland is at an advanced stage of development and leads Europe in many areas, particularly in the availability of network resources and in programmes to support education and training providers. Finland is recognised, even in the US, as the most well connected country in the world. The reasons for this include the fact that Finland has a large geographical area and a small sparsely distributed population, which makes distance tele-work and tele-learning a necessity. Another reason is that there are a large number of educational institutions in Finland and the Finnish population is arguably the most highly educated in the world with respect to the diversity of choice and opportunity. A third reason is the highly developed network infrastructure. The FUNET project, initiated in 1984, was the beginning of the university and research network in Finland. FUNET involves research institutes, all the universities and almost all the polytechnics. Through FUNET, all the members have access to the Internet. At the end of 1995 all the universities had ATM technology at their disposal. This automatically gives Finnish universities and research organisations a very sophisticated environment in which to develop network-oriented multimedia applications and to collaborate with other European partners (I*m Europe, 1999).

Nevertheless, the results of an extensive technology assessment project on ICT in Teaching and Learning which was carried out in Finland in 1997-98, reports the following regarding the extent to which educational institutions have implemented ICT. ‘If we consider ICT from a very narrow perspective, such as technical skills and routine use, then we can say that most educational institutions are doing rather well. If, however, we expect implementing ICT to bring about profound pedagogical innovations and improvements, to be a tool of pedagogical change, then we are still struggling in the wide chasm between early adopters and the rest, a chasm which is always difficult to overcome’ (Sinko, 1998: p.218). Also here it is underlined that the dissemination of good practice to the larger instructor groups beyond the select enthusiastic pioneers is an important problem. Furthermore, experiences show that positive results may deteriorate dramatically when applied on a large scale. It is stated that: ‘The Achilles heel of national education ICT strategies is just this problem: not only how to disseminate the results of small scale experiments effectively, but how to replicate them on a large scale’ (Sinko, 1998: p. 218).

**United Kingdom**

The TET country profile for the United Kingdom states that telematics for education and training in the UK is highly advanced in terms of technological infrastructures. Also social structures and content development channels are strong, although there are a number of obstacles to the level of development which is being aimed for at policy level. This advanced stage of development in TET in the UK relative to other European countries is due to a strong tradition of high standards in, and access to, education at advanced levels. And furthermore to sophisticated and highly focused educational options for students and trainees and a broad base of high-technology development, research and innovation which is now well incorporated into the working and learning culture. The UK has a long history of using and developing flexible approaches to learning. As early as 1963 the National Extension College (NEC) provided distance learning with a vocational focus. The Open University, founded in 1969, has pioneered flexible learning methods. It has always used broadcast technology in its
provisions and is currently involved in an increasing number of projects using multimedia technologies for education and training. Perhaps the widest use of on-line services and networks for educational purposes in the UK is by the Open University. Currently, 15,000 (10%) of their students and 1,700 tutors (25%) were said to be registered to access on-line services. The UK higher education and research community has pioneered the use of rapid multimedia applications on the high performance network SuperJANET (the Super Joint Academic Network). The British Association of Open Learning has also made an important contribution to this successful tradition in the UK. (I*m Europe, 1999).

The importance of the development of institutional strategies on ICT is declared in recommendation 41 of the Dearing Report which states that: ‘all higher education institutions in the UK should have in place overarching communications and information strategies by 1999/2000 (Department of Education and Employment, 1998). Some indications of the extent to which such strategies are actually in place can be derived from the evaluation of the impact of the Teaching and Learning Technology Programme (TLTP). These findings are obviously limited to the institutions participating in the TLTP programme. Stern (1997) reports that the strategic co-ordination of ICT efforts has been both a precursor and consequence of TLTP. The projects were expected to involve main teaching departments and to have active support of the participating institutions’ senior management. Furthermore, most of those higher education institutions reviewed and visited as part of this evaluation, had on paper, at least, confirmed institutional support for the project at a senior level. Several were able to demonstrate a track record of coherent corporate developments, e.g.:

- Developing teaching and learning plans and setting up associated institution-wide committees;
- Funding innovations in teaching and learning;
- Serious investment in computing infrastructure;
- Merging information systems and libraries;
- Asking departments to include in plans their teaching and learning priorities;
- Creating central media/technology resource units.

It was striking how many higher education institutions have committed resources to TLTP follow-up: on funding of specialist staff, further funding of courseware development, new commitments to staff development, further investment in PCs for staff and students, network improvements, etc. The senior-management personnel who were interviewed recognised that TLTP had contributed to the emergence of new institution-wide reviews, policies, co-ordination mechanisms and investments. This, however, meant in some cases only very limited progress and it was said that ‘senior management support is still very weak, and awareness is restricted to enthusiastic individuals’. Furthermore it was found that higher education institutions are faced with the general problems of balancing bottom up and top down tactics, whatever their implementation strategies. For example, it is now common in higher education institutions to create a central fund to which departments may bid, or to offer academics the opportunity to shape initiatives (such as TLTP) in relation to their needs. Ownership by senior academics and management given the decision-making processes of higher education institutions is usually seen as vital. And before initiatives can be decentralised, some more coherent, and often less-voluntary system, is needed. This is certainly the case for teaching and learning, staff development, reward and promotion systems and infrastructure. Finally, the implementation of ICT was in many reports associated with changing the organisational culture of the institution; the need to pursue fundamental and systemic change in higher education institutions (Stern, 1997).

Belgium
The TET country report for Belgium states that telematics for education and training in Belgium is in early stages of development, being only partially implemented, and very often inaccessible, especially at the primary and secondary school levels. Belgium is attempting to create an atmosphere, which will be conducive to enhancing the profile of telematics for
education and training in order to ensure that the domain is to become viable. Possible reasons for the slow uptake of telematics technologies in education, more so than in training, include the small geographical area (every Belgian is within at most 50km of an education institute) and a well developed and accessible traditional education and training infrastructure. There is no serious driver for developing this technology at a local level. Thus, in spite of the fact that Belgium is one of the most-cabled countries in the world with most households receiving more than 30 TV channels, and in spite of the close proximity to French and Dutch TET facilities and developments, the evolution of telematics had been slower than was expected five years ago amongst experts. Another important factor which explains this state of affairs is the lack of high-level co-ordination and the lack of partnerships between organisations, industry, schools and universities (I*in Europe, 1999).

Unfortunately, no detailed information is available on the extent to which higher education institutions in Belgium have developed ICT strategies. The policy paper on Innovation of Higher Education of the Flemish Ministry of Education (1998) reports in general terms that, as opposed to the situation in other sectors of society, there is not yet a broadly implemented use of ICT in higher education. Therefore, the Ministry aims at an accelerated introduction of ICT in this sector. Although in general the scope of activities seems to be quite limited, some interesting and more far-reaching initiatives at the institutional level can be reported. These include the activities undertaken by the Catholic University of Leuven, notably the EuroPace2000 project. Many projects are also being undertaken by the universities of Gent and Antwerpen. A number of Flemish institutions are involved in the open-learning facilities consortium, which is co-ordinated and supported by the Dutch Open University (I*in Europe, 1999).

United States of America

The title of the report of the 1998 National Survey of Information Technology in Higher Education indicates the situation with regard to ICT strategies in USA higher education as follows: “Colleges Struggle With IT Planning”. The author states that: ‘Roughly two decades after the first microcomputers arrived on college campuses, American colleges and universities continue to struggle with computer and information technology (IT) planning. Just under half of US colleges have a strategic plan for information technology, more than 60 percent do not have an IT financial plan, and only about two-fifths have an IT curriculum plan. Moreover, two-fifths have an instructional plan for using the Internet, less than a third have a plan for using the Internet in their distance learning initiatives, and only a fourth have a campus policy regarding intellectual property for WWW-based instructional resources developed by faculty’ (Green, 1998). The differences between the various types of institutions are displayed in the diagram below.

*Figure 1: Institutional strategies for ICT in the USA (Green 1998)*
The above data are quoted in a recent (1998) OECD study on the use and impact of the ICT in the science system. It was added that although hardware and networks are generally available in the USA, costs remain an issue. In trying to remedy the funding problem, a growing number of universities in the United States are charging students a special technology fee. More than half of all public colleges and universities did so in 1996, with fees ranging from US$ 20 to US$ 200 a year, and some institutions have attempted to charge students on a use basis. While this is intended to cut down on abuse of resources, it could discourage students from using the technology. Students opposed the fees a few years ago, but are now willing to pay for services they consider essential, although critics consider that the costs should be included in tuition (OECD, 1998).

Australia
The 1998 report on Education Technology in Higher Education (DEETYA, 1998a) reveals that there has been a substantial shift in the importance of information technology in university teaching and administration in the last five years. Whereas five years ago, information technology was viewed by university management as experimental seeding on the edge of mainstream teaching, it is now viewed as having strategic importance (Yetton 1997). Yetton conducted a study on the introduction and management of ICT in Australia and investigated the efforts and strategies of 12 Australian universities. He found that Australian universities are focusing on information technologies to improve administration, research and teaching and learning. The universities are linked through the Australian Academic and Research network (AARNet) which was introduced into service in June 1990 to improve research through linking Australian scholars with each other and with overseas researchers and through access to global information resources. With its upgrade to the use of ATM, the network has the capacity to carry voice and video services as well as data.

Yetton states that although there is widespread agreement that the role of ICT is critical to the future success of Australian universities, there is little understanding and, hence, agreement about how it should be managed. It is observed that an increasing competition in the higher education sector is leading to greater differentiation between and an increased strategic focus by universities. Six strategic issues are identified; all of which have important ICT drivers. They include: quality of teaching, cost efficiencies, serving multiple campuses, competition for students, different types of students, and inter-university collaboration. Three generic strategies are observed to be emerging as universities compete across these six areas:

- a value-added strategy for the traditional elite university which uses ICT to enrich the student’s experience as a member of a high-service, high-variety and high-reputation educational community;
- a cost-based strategy for a new university which focuses on using ICT to develop and deliver high-quality programs anywhere, anytime for a restricted range of degrees to a mass market; and
- a hybrid, mass-customisation strategy for a large devolved university, which would use ICT to obtain the benefits of a low-cost central IT infrastructure, while empowering innovation and student focus in strong academic faculties.

One expects that as differentiation increases, other strategies will be discovered. With regard to the management of ICT the following three approaches were identified:

- The integrated approach with a central unit managing the integration of teaching and learning with ICT, emphasising support for professional development in educational and information technologies and linking it to university goals.
- The parallel approach, creating an ICT-based teaching and learning unit which operates separately and in parallel with existing staff development units.
- The distributed approach, which is more bottom up and devolves responsibility for ICT-based teaching and learning developments to local innovators across a range of faculties and units (Yetton, 1997).
A trend in strategies: the convergence of distance education and campus education

From the country studies it occurred that the traditional differences between distance teaching universities and traditional universities are fading. This trend is also underlined by John Daniel (1996), who describes that campus universities feel threatened by distance-teaching universities as they are seriously competing with them in terms of access, cost and teaching quality. For this reason, Daniel states that, in OECD countries there has been a rapid recent and substantial change in numbers of universities providing distance education. In Canada, for instance this resulted in an increase of 50% in eight years. The proportion of universities offering distance education in some other countries are France – 40%, Sweden – almost all, USA – almost all and for the UK the figure is around 75% (Daniel, 1996). In Australia, at least 23 (out of 39) universities are offering distance education (EADTU, 1998). Distance education is increasingly supported by ICT, although different traditions in distance education among the USA, Europe and Australia still play a role (see EADTU, 1998).

Reflection: obstacles to the implementation of ICT strategies

From the various country reports it can be concluded that, although there is considerable experimentation, the adoption of ICT strategies is not yet a widespread phenomenon in higher education. As a consequence, dissemination of practices and application on a larger scale is problematic. This conclusion is also presented in the 1998 OECD study on the use and impact of ICT in the science system (OECD, 1998), which summarises the following reasons for the delayed adoption of ICT-based strategies in traditional institutions:

- technological development, especially of courseware, and technology acquisition still pose many difficulties;
- human aspects appear to be a significant constraint;
- many educational institutions continue to deploy and use information technologies without due planning;
- in many countries, scarce funding inhibits the large front-end investments needed to fully exploit the potential advantages of ICT;
- the courseware market may also be constrained by the (small) market for certain languages, as for instance in Finland;
- producing quality courseware is very complex, and product development and improvement is an ongoing process;
- although hardware and networks are generally available, costs remain an issue;
- conservative tendencies of staff;
- the possibilities of ICT are not always well understood by administrators;
- training and organisational change may also be needed.

Collaboration and competition

The main trends that compel universities to seek for collaboration in the area of ICT are twofold. First, the huge investments and complex multi-sided expertise that is necessary to develop and implement comprehensive ICT strategies. The second reason is related to ICT itself: the use of these new technologies is resulting in more and global competition among universities. This competition is often likely to come from abroad. Bates (1997) adds that: ‘Even more of a threat is likely to come from multinational corporations in the areas of telecommunications, entertainment and information technology, such as Microsoft, IBM’s Global Networks, and the Disney Corporation, who are all targeting education as a natural growth area for value added services and products. As a consequence, we are beginning to see strategic alliances emerging between universities and between universities and the private sector’ (p. 14). With many other authors, Latchem (1998) highlights the need for partnerships and alliances in the increasingly competitive global higher education market. He also points at the role of corporations (e.g. telecommunications, software companies, and media industry),
whose primary business is not education, but who do control facilities which play a central role in the delivery of education. Such organisations mainly aim to play a role as brokers, in collaboration with organisations that can deliver content, e.g. universities. The threat that is felt is that such consortia may become very important and powerful, as is phrased by Marchese (1998): “A big fear among U.S. university leaders and post-secondary start-ups alike is that – just as happened in banking and health care – major international combines will emerge to quash today’s smaller-time competitors. What would the post-secondary marketplace look like if (say) Microsoft, Deutsche Telecom, International Thompson, and the University of California combined to offer UC courses and degrees world-wide? In time, its only competitor could be a combine of like standing and deep pockets: an IBM-Elsevier-NEC Oxford combine for example”. Also in Europe, both the need to join forces and the threat that universities are losing the monopoly over higher education and academic degrees are felt. And also here collaboration initiatives are being undertaken.

European level collaboration
In many instances European collaboration is stimulated and supported by programmes of the European Union. An example of such European inter-institutional co-operation is Open to Europe, an open and distance learning project started in 1995 and funded by the European Commission within the SOCRATES programme. Nineteen European partner universities in 10 countries aim to establish an effective network for interactive distance learning, so that non-mobile students, who account for almost 90% of all European students, gain European experience relevant for their future careers in the Single Market. They will be able to work with a student from any European country as closely as with a student from their own university. Through this project, which explores the concept of virtual mobility, the partners hope to enhance the quality of studies, increase the European dimension, improve skills in new communications, technologies and open and distance learning and gain expertise in cross-cultural team working (http://www.salford.ac.uk/iti/ote/homepage.html).

A major European initiative, which comprises both inter-institutional and inter-sectoral co-operation, is EuroPACE2000, a trans-European network of universities and private enterprises, regional and professional organisations and public authorities. Approximately 60 member organisations (45 of them universities) participate in this network throughout Europe. The non-university partners include enterprises and research institutions, such as BELGACOM, ALCATEL BELL Education Centre, IBM Europe Education and Training, Philips, and RAI. EuroPACE2000 demonstrates and develops the potential of telematics for the European university of the future and considers the lifelong learning market as its main challenge (http://www.europace.be/). EuroFace2000, together with the Coimbra Group (33 traditional and comprehensive European universities, which engaged in ODL projects through its HUMANITIES project) and with the Consortio NET.T.UN.O (a consortium endorsed by the Italian Ministry of University and Scientific Research as a non-profit consortium of universities and enterprises providing distance education) engaged in 1996 in the VirtUE (a Virtual University for Europe) Project. The VirtUE project was created as a pilot project for the launch of a European tertiary distance education network and to test and validate a Euro-ISDN based European higher education network.

Another initiative concerns the European Association of Distance Teaching Universities (EADTU), a strategic-level project which aims to promote and support the creation of a European network for higher-level distance education. EADTU was established in 1987 by the principals of Europe’s major distance-teaching institutions to foster co-operation between European organisations dedicated to higher education through distance-teaching methodology. EADTU is comprised of 18 national members from 14 countries collectively providing distance education programmes to over 900,000 students. All members of the association are non-profit institutions. More than 4,000 academic staff is directly involved in the development and delivery of courses through 875 study centres of which 55 are
EuroStudyCentres. Already EADTU membership includes 150 conventional universities utilising distance learning through dual-mode infrastructures (see: http://www.eadtu.nl).

Finally the European Distance Education Network (EDEN) was formally established in 1991, following the first pan-European conference on distance education in Budapest in 1990. By the provision of a platform of co-operation and collaboration between a wide range of institutions, networks and individuals, it aims to foster developments in distance education. In 1998 the number of institutional members of EDEN was 85, in addition there were 110 individual members. EDEN has established special relations with other networks in Europe (for example Europace 2000, EADTU). In 1994 a Joint Task Force with EADTU was established, to provide a support structure for the channelling of expertise in connection with the development of distance education in Central and Eastern Europe (http://www.eden.bme.hu).

Finland
The Finnish Association for Distance Education, FADE, is an association for distance education institutions or organisations, which offer higher education at a distance, and includes 10 universities and university colleges. FADE was founded to co-ordinate co-operation at a national level and to promote international co-operation, research work and training in areas of distance education. Distance-education activities in Finnish universities are usually organised by the centres for continuing education, which work as an integral part of the conventional universities. FADE has a special sector for co-operation of higher-level distance education institutions with 10 member institutions. Six of these have the co-operation by joining the EADTU activities and have also joined the EuroStudyCentre Network. FADE’s objectives are to promote the development of distance education, and to encourage the research and development of methods and techniques used in distance education.

Inter-institutional co-operation at the international level mainly occurs through the various EU Programmes. Collaboration between Finnish Universities and industry, to facilitate the use of new technologies, is not yet a common phenomenon in Finland. Finland’s move from a rigid and highly centralised system of top-down administration towards a more-flexible system of informational decision making, has resulted in the encouragement of educational institutions to work more closely with other institutions in different fields and at different levels of the education system, as well as with the local community and work places. Finnish corporations like Nokia do invest heavily in academic co-operation, not only in Europe and the US but also in Japan and China. Top-level universities such as Harvard, Stanford, UCLA and MIT are Nokia partners. In addition to university programs, Nokia has also initiated projects with polytechnics, colleges and upper secondary schools.

United Kingdom
In the United Kingdom, many higher education institutions are (often leading) partners in international inter-institutional co-operation projects. As for new technology in distance education, the Open University certainly is the most important player. The OU is Britain’s largest university, with more than 200,000 people studying its courses. Since the OU was established 29 years ago as a world pioneer of supported open learning, more than 2 million people have used it to gain access to higher education from their homes and workplaces. Today the OU remains at the forefront of the global development of distance education, with students in 42 countries using a combination of traditional teaching methods and the latest communications technologies to study for a range of degrees and vocational qualifications. The OU is involved in various international consortia. Interestingly, the OU recently got involved in a partnership with the Western Governors University in the USA (see below).

Another initiative in the UK concerns the Clyde Virtual University, a project involving West Central Scotland Universities and aiming at converting existing courseware for delivery on
the WWW. UK institutions are known for their overseas operations. ICT supports this type of off shore delivery, as for instance through Online Education, a Hong-Kong based enterprise offering an electronic campus with technology and online courses and student support and services. Responsible universities are Universities of Paisley, Scotland, the University of Lincolnshire and Humberside (UK) and Charles Sturt University (UK).

Belgium
In Belgium the lack of partnerships between universities and industry was identified as one of the reasons for the weak situation with regard to the use of ICT in higher education. The main collaboration initiatives that can be reported are connected to the Catholic University of Leuven and concern the EuroPace2000 project (see above). Another significant initiative is The Consortium for Innovation in Higher Education, which is led by the Open University of the Netherlands, is a joint venture of several institutions for higher education located in the Netherlands and the Flanders region of Belgium. The aim of the Consortium is to encourage the systematic use of information and communication technology (ICT), thereby helping to foster innovation in higher education in relation to the new demands being placed on higher education. Such demands are the result of recent trends and challenges which all the members are facing, for example the need for lifelong learning and the growing demand for competence-oriented education which will not only match career profiles but also satisfy the requirement of tailor-made education. (http://145.20.24.230/consortium/index.html).

United States of America
In the USA, consortia among businesses, universities and governments are the primary vehicle for experimentation in the area of ICT. Many consortia of universities, publishers and major technology companies have been created under the auspices of EDUCAUSE. This association focuses on the management and use of computational, network, and information resources in support of higher education’s missions of scholarship, instruction, service, and administration (see: http://www.educause.edu/).

A major initiative sponsored by EDUCAUSE is the National Learning Infrastructure Initiative (NLII). It was launched in November 1994 and is a membership coalition of colleges, universities, non-profit organisations, publishers, software companies, and information-technology businesses that work to enhance and improve teaching and learning environments through innovative applications of information technology. Its mission is to create new collegiate learning environments that harness the power of information technology to improve the quality of teaching and learning, contain or reduce rising costs, and provide greater access to American higher education (see: http://www.educause.edu/nlii/)

Increasingly state governments are becoming strong advocates of statewide consortia with inter-sectoral involvement. Examples of such state-level initiatives are: the California Virtual University, Florida’s Campus, Indiana College Network, and the Pennsylvania Virtual University (see for an overview: The Chronicle of Higher Education. http://chronicle.com/free/v45/i05/05a3701.htm).

A well-know initiative at the inter-state level is the Western Governors University, which was founded in 1996 by the 17 governors of the western states of the USA, with a vision of making higher education more accessible by using information technologies to promote interstate co-operation between colleges and corporations. WGU’s business partners include IBM, Sun, AT&T, KPMG, Cisco, 3COM, Microsoft and International Thompson. WGU does not employ teaching faculty, or develop courses: its on-line content comes from a range of qualifying providers (colleges or businesses) and its role is thus that of a broker, delivering on-line courses to students wherever they are. Recently a new partnership was announced between WGU and The Open University of the United States (OU-US), creating Governors Open University System. The Open University of the United States is a private American
university established recently with the full backing of the Open University in Britain (OU). The distance-delivered degree and learning opportunities available today from both WGU and the OU-US will be offered through the Governors Open University System (http://www.wgu.edu).

Another interesting example at the national level is the National Technological University, in which some 50 US engineering and management colleges co-operate in order to provide graduate and continuing education courses to more than 1,000 locations in Canada, Mexico, the US and the Asia Pacific. Many companies and other commercial organisations use the NTU for their university-level education needs.

In the report of the Survey of Telematics for Education and Training in the US (1*im Europe, 1999), the importance of educational networks in the USA is underlined. It is said that many of the educational networks that have supported distance education were small systems connecting a few universities and that today, many of these education-based systems are becoming parts of state-wide or regional systems that are offering general telecommunications services to business, industry, government, etc. Furthermore, it states that industrial need has been the main reason that many university-based distance-teaching programmes have developed. Many large companies provide classroom and telematics support systems for such programmes and also pay the tuition cost for their employees to participate (EADTU, 1998).

Australia
In Australia, developments in the field of ICT in education are strongly driven by the national government. Also here, collaboration is a typical feature of successful initiatives. Consortia, with government support, are behind major national initiatives. Inter-university collaboration is seen as a driving force and a critical factor for ICT development. A first example is the Education Network Australia (EdNA), which was set up by the government as a comprehensive education network service. The networks’ proposed features include: national coverage, a vehicle for convergence of the full range of current networking initiatives, including Open Net, educational use of AARNet and the Internet, and service to all educational sectors, schools, further, and higher education.

The Open Learning Initiative OLI was designed to increase flexibility and innovation and facilitate access to higher education by allowing completion of university degrees through study with the OLI. The OLI has three components: Open Learning Australia (OLA), The Open Learning Electronic Support Service (Open Net), and The Open Learning Technology Corporation (OLTC). OLA is a company established by Monash University, Victoria, in conjunction with a consortium of universities, delivering undergraduate-university level units of study. Open Net is an open-learning electronic support service to enable open learning students to take advantage of a communications system based on the use of personal computers and associated hardware and software. OLTC, which was established by Australia’s Ministers of Education and Training to provide a co-ordinated national approach to the use of communications technology in open learning. The role of the OLTC is to provide services that will assist the education and training community to achieve equitable provision of high-quality, cost-effective open learning.

The Professional and Graduate Education (PAGE) Consortium offers postgraduate professional education. Delivery is by broadcast television on the Special Broadcasting Service (SBS Television) Network supplemented by packaged materials. Consortium members include 12 Australian universities. The University of Auckland, New Zealand and SBS Television are associate members. The universities develop the subjects and are the program makers in collaboration with SBS. Approximately 400 hours of television were produced in 1994. Students receive print materials, assignments, examinations, tutorial support and library services in addition to the television broadcasts (EADTU, 1998).
Besides inter-institutional co-operation, also strong competition between institutions can be observed. This is related to the fact that Australian universities develop ICT-supported distance learning as part of their aggressive competition for the international higher education market - primarily focusing on the Asia-Pacific region. In Australia, inter-sectoral collaboration with media and telecommunication industry has a strong focus, although at the same time competition is feared from this sector. However, a recent study on the convergence between global media networks and higher education provision revealed the following. ‘While there is a good deal of hype relating to the involvement of global media networks in higher education, there is currently little evidence of this involvement, and, at least in the declared strategies of many of the global media networks, little intention of involvement beyond current interests in the carriage of educational content produced and controlled by other providers. The greatest single involvement by large corporations is via the corporate university model. Rather than global media networks penetrating the higher education sector, this model describes the provision of training (distinguished from education) within a large and often international corporation which may result in the growth of a sector increasingly competing with higher education for lucrative programs. Contributing factors to the present lack of interest and involvement of global media networks in higher education include:

- divergence between the corporate cultures of communications and media networks and higher education;
- the strong perception that there is no established way to profit from higher education provision within the constraints that media networks work; and
- the current commitment of a number of communication networks to providing, where necessary, corporate training rather than generalised higher education.

The cultural differences between the two sectors are perhaps best demonstrated through an understanding that the core business for many media networks is entertainment and infotainment, rather than education, together with the economic necessity to maximise audiences, rather than to meet niche market needs. For most other communication firms, core business is carriage rather than content. In this respect, the companies are seeking to establish a presence as a carrier, rather than a provider, of educational content’ (DEETYA, 1998b).

Reflection: issues of collaboration and competition
Inter-institutional collaboration has been observed in all countries as a strong feature of successful initiatives and is encouraged in all governmental policies. The support from public funding sources, e.g. EU programmes, for collaboration initiatives is an important stimulus and seems to attract many willing partners. This raises the question, however, whether these initiatives will result in institutional strategies once the external subsidies have disappeared.

The degree of international collaboration seems to differ between the countries in question. In some cases, there is more of a focus on international competition than on collaboration. It is clear that the UK, the USA and Australia, with their lingua franca advantage, an entrepreneurial spirit in higher education, and a long history in distance learning, aim at exporting higher education services through ICT. Their target markets include continental Europe, where this trend is much less observed, where a strong focus is placed on co-operation and where financial incentives largely consist of subsidies, e.g. from the EU. In this respect, it is interesting to note that the European Association of Distance Teaching Universities in their report on Telematics for Education and Training in the US, Canada and Australia, recommends strongly that the European Commission promote joint EU- non EU co-operation. This could include intercontinental research projects, international partner-finding mechanisms, and European participation in North American and Australian projects.

It is widely acknowledged that inter-sectoral collaboration is necessary and that many successful initiatives are resulting from co-operation among companies, universities, and governments. It is also evident that collaboration between the corporate and the higher education sector may be problematic because of differences in organisational culture and mission (see DEETYA, 1998b, and Latchem, 1998). Nevertheless, such collaboration is
needed as each party (higher education institutions, publishers, software developers, etc.) can bring competencies, which can be linked with the competencies of the other. Bates states that: ‘It may seem obvious that in order to match the creative skills of media producers with the instructional skills of educators and trainers, partnerships between media producers and educational organisations will be essential. However, broadcast television production companies in particular have not shown a great deal of interest in working with educational institutions on an equal footing. In the meantime, educators may find telecommunications and multimedia computer software companies more willing and co-operative partners. In the USA and Canada, there is an explosion of small to medium-sized multimedia software production companies. Europe in particular seems to lack multimedia software companies willing to develop new materials for new markets, on a commercial basis (Bates, 1997).

It seems that market forces trigger most initiatives in the development of ICT in higher education. The lifelong learning market (including professional and industrial training) and the international student market are particularly powerful. This segmentation of the market introduces the following problems. The lifelong learning market is largely self-funded or employer-funded. In countries where traditional higher education institutions are not meeting the demand for lifelong learning, the market is open for new providers. Consequently, traditional institutions may be left serving the less profitable, government or family-funded, undergraduate market, in times of decreasing governmental funding for higher education (DEETYA, 1998b). And in case the national system does not meet the needs for flexible learning, foreign providers will be ready to provide students with this on a fee-paying basis.

The role of the government

Finland
In Finland, a government position paper in 1995 outlined an information-society strategy, with the aim of providing every citizen the opportunity to acquire the new skills needed and to obtain access to information. In response to this, the Ministry of Education has expressed its information strategies in the National Strategy on Education, Training and Research (1995) and in the document Towards a Culture-Oriented Information Society (1996). The central goals of the National Strategy on Education, Training and Research are:
- moving from once-and-for-all training to lifelong learning
- basic information society skills for all
- high level of vocational skills
- high level of instructors’ professional skills
- securing the development of information products and services
- support for multidisciplinary research on the information society
- building education and research networks into an open global network.

The key element in the successful implementation of these goals is modern information technology. So, from the very beginning, the Ministry of Education concentrates on two fundamental issues: networking the education system using the latest technology, and guaranteeing the basic skills necessary to use that technology to everyone. From the total 1998 budget of 44 million ECU, the allocation for the higher education sector consists of 19 million ECU for hardware, research and training in universities and polytechnics, and 8 million ECU for inter-university activities, such as scientific computing, FUNET and hardware (Jylhä-Pyykönen & Salmi, 1997).

The national policy plan reveals as a general vision on education and training for the information society that: ‘At all levels of education, possibilities for individual study should be increased. Teaching material and information services should be developed, the quantity of open and distance teaching should be increased. Networking of the education system should be promoted and open learning environments created to support the move from once-and-for-
all education to life-long learning’. The link of ICT policy with the concept of life long
learning is strong and is worked out in the implementation strategy. It indicates that open and
distance learning should be recognised as being equal to other forms of study. Therefore, the
criteria for obtaining financial support for studying and contracts concerning instructors’
wages and working hours need to be changed. Training in open- and distance education
techniques should be increased for all instructors. The universities need to prepare plans for
restructuring their teaching and teacher-training departments have a key role to play in
developing pedagogy as regards the application of information technology. The tasks of
university service institutions, such as computing centres and libraries, need to be planned and
adjusted to support as effectively as possible new forms of teaching, study and research which
are based on utilising information technology. The development of teaching, the use of
modern teaching methods and materials, and the application of information technology are
quality aims of teaching which should be specified in performance agreements between the
Ministry of Education and the universities. Research and development projects, which apply
information technology to education and training, should be supported. Finally, experimental
results should be collected and the introduction of good solutions and applications is
promoted (Ministry of Education, 1995).

In the report on the national education assessment project the importance of strictly adhering
to the national strategy is underlined with the following arguments:
• Finland has not yet reached sustainable cost levels;
• modern, hardware is not sufficiently available;
• there is a shortage of high-quality digital learning materials;
• pedagogical and technical support is insufficient;
• teacher-training needs to be increased and better focused;
• the need to retain the present level of research and development of high-level learning
  environments;
• the need to improve the dissemination of promising practices;
• the need to deal with the paramount and constantly growing issue of equality (Sinko,

Belgium
In Belgium, the two linguistic communities have evolved politically separate responsibilities
for education. In Flanders, the Department of Education is mainly responsible for the
introduction of new technologies in schools and universities. The Ministry of Education aims
at an accelerated introduction of ICT in higher education, since unlike the situation in other
sectors of society, there is not yet a broadly implemented use of ICT in higher education. This
aim is worked out in the policy paper on Innovation in Higher Education (Ministry of
Education, 1998). It indicates that the Ministry has been supporting initiatives undertaken by
higher education institutions since 1997. Limited resources (approximately 0.8 million ECU
in 1997 and 1 million ECU in 1998) were distributed over projects which combine a
 technological and a pedagogical innovation. This is based on the assumption that a systematic
use of ICT, as a technological innovation, will trigger innovation in content and teaching
methods. Furthermore, it will enhance the interactivity and lead to more student-oriented
learning processes. Governmental funding is prioritised for initiatives with a general
character, which can also be applied in other study programmes or disciplines. Eligible
institutions operate preferably in a co-operation structure and commit themselves to applying
the outcomes in their own institution. The Ministry acknowledges the importance of
continuing and enlarging the support of such institutional initiatives. Besides, it aims to create
a better information structure and to disseminate the results of innovation projects through
databases, seminars, publications, WWW sites, etc. The budget for 1999 will increase to
approximately 2 million ECU and the following changes in the policy are anticipated:
• Priority for projects with a broad institutional embedding: inter-institutional co-operation
  will become less important.
• Extra emphasis on projects in which the training of instructors plays an important role.
Extra support for projects that bring open and distance education and traditional education closer together, e.g. through joint development of learning environments and courses. (Ministry of Education, 1998).

**United Kingdom**
The main initiative undertaken by the government in the United Kingdom is the *Teaching and Learning Technology Programme (TLTP)*. The programme was launched in 1992 by the (then) Universities Funding Council (UFC). The aim of the programme was to make teaching and learning more productive and efficient by harnessing modern technology and help institutions to respond effectively to the current substantial growth in student numbers and to promote and maintain the quality of their provision. There have been two phases to the project:

- Phase 1 – supported 43 projects - totalling approximately 40 million ECU- for the years 1992-93 to 1994-95;
- Phase 2 – supported an additional 33 projects – totalling 20 million ECU- for the years 1993-94 to 1995-96.

In addition, the Funding Bodies have allocated an additional 3.5 million ECU for support and ongoing maintenance of the Phase 1 projects. The total allocation to the TLTP programme is therefore approximately 60 million ECU. Funds were provided for courseware development, staff costs and for developmental hardware essential to projects. For the institutional projects, funds were provided for staff development and training activities. The programme’s objectives - in terms of bringing about the aims set out above are, in brief:

- to ensure that the benefits of the programme can spread throughout UK higher education as a whole;
- to encourage consortium projects in order to enhance opportunities for disseminating the benefits of the programme;
- to improve the productivity of teaching and learning;
- to involve main teaching departments and have the active support of institutions’ senior management;
- to integrate technology into the delivery of existing or planned courses;
- to make use of relevant past and present activity in the area of introducing technology into teaching;
- to ensure that developments are accessible and capable of use by all relevant teaching staff and students.

A major evaluation exercise on the TLTP was conducted in 1997. Findings relating to institutional impact were reported above (see Stern, 1997).

The National Committee of Inquiry into Higher Education, the Dearing Committee, has provided important guidelines for further governmental policy on higher education. The Report: Higher Education in the Learning Society (Department for Education and Employment, 1998) provides the following recommendations with regard to ICT in higher education:

- ‘We recommend that the Funding Bodies, through the Joint Information Systems Committee (JISC), should continue to manage and fund, on a permanent basis, quality and cost-effective Communications and Information Technology (C&IT) services for researchers and should, in due course, introduce charges for services on a volume-of-usage basis.
- We recommend to the Government that it should review existing copyright legislation and consider how it might be amended to facilitate greater ease of use of copyright materials in digital form by instructors and researchers.
- We recommend to the Funding Bodies that the Joint Information Systems Committee (JISC) should be invited to report, within a year, on options to provide sufficient protected international bandwidth to support UK research.
We recommend to the Government and the Funding Bodies that, to harness and maximise the benefits of Communications and Information Technology, they should secure appropriate network connectivity to all sites of higher education delivery and further education colleges by 1999/2000, and to other relevant bodies over the medium term.

We recommend that institutions of higher education, collectively or individually as appropriate, should negotiate reduced tariffs from telecommunications providers on behalf of students as soon as possible.

We recommend that all higher education institutions in the UK should have in place overarching communications and information strategies by 1999/2000.

We recommend that all higher education institutions should develop managers who combine a deep understanding of Communications and Information Technology with senior management experience.

We recommend that the Committee of Vice-Chancellors and Principals, in collaboration with other institutional representative bodies, reviews the functions of the Universities and Colleges Information Systems Association to ensure that it can promote the implementation of Communications and Information Technology in management information systems.

We recommend that by 2000/01 higher education institutions should ensure that all students have open access to a Networked Desktop Computer, and expect that by 2005/06 all students will be required to have access to their own portable computer.

We recommend that all institutions should, over the medium term, review the changing role of staff as a result of Communications and Information Technology, and ensure that staff and students receive appropriate training and support to enable them to realise its full potential.

The Joint Information Systems Committee (JISC), mentioned in the Dearing recommendations above, is an important element of the infrastructure supporting the implementation of ICT in higher education. The committee is funded by the Scottish Higher Education Funding Council, the Higher Education Funding Council for England, the Higher Education Funding Council for Wales and the Department of Education Northern Ireland. The mission of the JISC is to stimulate and enable the cost-effective exploitation of information systems and to provide a high-quality national network infrastructure for the UK higher education and research-councils communities (http://www.jisc.ac.uk).

The JISC has set up the JISC Technology Applications Programme (JTAP) as a highly focused programme aimed at assisting the higher education community to get the best from its investment in IT. To achieve this it reports on best practice in the community, both within UK higher education and on experiences beyond. This enables the community to learn from each other and avoid unnecessary duplication of effort in introducing, developing and exploiting systems. Secondly, JTAP funds projects, which demonstrate the application of technology. This may be the application of novel technologies or applying existing techniques in new ways or in new areas. Thirdly, JTAP has funded four clearinghouses to actively inform the community in distinct areas (http://www.jtap.ac.uk/).

United States of America

In the United States, a strong focus is put on expanding access to higher education through distance learning. For this purpose, the federal government aims at reducing regulatory barriers. In this respect the government removed the restriction that institutions that enrolled more than 50% of their students through distance learning, were not eligible for student-aid programmes. Furthermore, it decided to allow students to include the cost of computers in their living expenses and to eliminate the requirements for length of academic programmes.

In order to support innovative pilot projects, the Clinton administration awarded a $10 million (for 1999) grant programme: the Learning Anytime Anywhere Partnerships (LAAP). This programme authorises a new grant competition to promote student access to high-quality
technology-mediated learning opportunities that are not limited by the constraints of time and place. It focuses on the post-secondary sector. The programme will fund partnerships among colleges, industry, community organisations, and others, whose projects will have a national or regional impact and will encourage innovative solutions to the biggest challenges facing technology-mediated learning. Some of the concerns that the LAAP programme wants to address are the following:

- How can education opportunities be made responsive to what learners need and want while still maintaining coherence and quality?
- How can institutions reinvent their offerings into new more-flexible formats that are instructionally sound yet scaleable to large enrolments and priced affordeably?
- How can educational providers compete effectively in the marketplace while safeguarding the primary interests of learners? (see: http://www.ed.gov/offices/OPE/FIPSE/learnany.html)

Kalil (1998) gives the following overview of activities at the federal level:

- The President directed the National Economic Council and the Office of Science and Technology Policy to develop a government-wide strategy for taking advantage of technology-based training. The plan is supposed to show how agencies will make use of best commercial practices when purchasing instructional software; work with businesses, universities and other entities to foster a competitive market for electronic instruction, and support R&D that will accelerate the development of new instructional technologies.
- Some agencies are already moving in this direction. For example, the Department of Defence has launched the Advanced Distributed Learning (ADL) initiative, which is designed to meet the education and training needs of the military and the nation’s workforce using computer and Internet-based training. The Defence Department is an active participant in EDUCAUSE’s efforts to develop the necessary technical specifications.
- The administration has also been increasing its investment in R&D to advance the state-of-the-art in learning technologies. Recently, for example, the Department of Commerce’s Advanced Technology Program issued a request for proposals for Adaptive Learning Systems (ALS). The overall goals of ALS include the development of network-centric instructional systems that are more affordable, accessible and better adapted to the individual requirements of educators and learners.
- With the aim of creating a WWW-based market for education and training resources, the federal government supports the Department of Labour, which has been developing a whole suite of services called America’s Career Kit. Americans can use these services to search for job openings, post resumes, identify education and training related to their skill needs, and locate labour market information related to their occupational interests. For example, America’s Labour Exchange (ALX) is an effort by the Department of Labour to create a WWW-based marketplace for education and training resources.
- In addition to the specific policies that have been outlined above, the Clinton administration is interested in fostering a broader national discussion about the appropriate role of information technology in supporting higher education and lifelong learning.

Besides these national level policies, ICT in higher education is addressed at the state-level as part of the responsibility of the state authority for higher education. In Virginia, for example, the Governor and General Assembly initiated a four-year plan to provide $79 million for technology equipment through the Higher Education Equipment Trust Fund (ETF) and $25 million for technology operating funds. This funding was to be used to integrate technology in teaching and learning and provide automated systems to advance restructuring and cost-cutting efforts of institutions. But even this considerable effort is far from sufficient to address burgeoning needs. For the 1998-2000 biennium, Virginia’s public institutions have requested an additional $250 million for technology-related needs. For the first time, the total technology requests are more than the requests for all other operating budget needs,
underscoring the growing importance of technology to the teaching and research missions of institutions (Bradford, http://www.schev.edu/dlreport.html).

An example of state-level policy in the area of adult education concerns the California Distance Learning Project, which has been created to usher in a new era of distance learning. This project provides educational activities, information, and support to adult educators and learners whom are using or participating in distance learning. The goals are to create a distance learning knowledge base linking experts, to promote education product development through partnerships with private businesses, public government agencies, and non-profit organisations and foundations. Another aim is to create the technical assistance capacity and to establish a statewide delivery system for adult education. Participants in the project include the California Department of Education, the California State University, telecommunications and instructional content providers and a video production firm (see: http://www.otan.dni.us/cdlp/cdlp1/cdlpdescripold.htm.htm).

Australia

In 1991, the Australian government established a National Open Learning Policy Unit (NOLPU) in the Department of Education. The government has played a major role in the development of ICT in higher education by initiating the various networks and collaborative initiatives as described in Section 3.3. Furthermore, the government has encouraged the use of ICT by funding some infrastructure directly, by funding innovative practice and by commissioning research relating to the use of ICT.

Through the Higher Education Innovation Programme, the government has provided several million dollars to support universities to establish state-of-the-art technology to improve teaching quality and students' learning and performance. Projects funded include:

- Development of online courseware;
- Development of student learning-centre networks allowing computer-based access to centrally held university resources;
- Infrastructure to assist off-campus links to universities; and
- Development of university library infrastructure.

Funding has been predicated on the dissemination of results achieved and universities have been asked to make courseware developed with public funding available to other universities. Collaborative projects have been encouraged.

From 1997, Capital Development Pool grants have been available to help institutions meet establishment costs associated with the purchase, installation, and testing of hardware and software for the electronic delivery of higher education courses. The initiative on Innovative Practice has been funded through the Committee for University Teaching and Staff Development (CUTSD). In 1996, 79% of its grants had an ICT element or base. Yetton (1997) argues that CUTSD plays a crucial role in assisting university teaching in changing teaching practice. However, the current reward and incentive schemes for university academic staff are too heavily focused on research and have been of limited success in the recognition of skills in the new environment of teaching using ICT.

In its report on educational technology in higher education (DEETYA, 1998a), the government considers alternative approaches to government-funding support. It first of all states that collaboration in development of learning materials using ICT will be critical. On this basis, the government could support courseware development in high-demand subject areas, collaborative approaches using ICT for courseware development and delivery in courses of low enrolment that may not be viable with a single institution. Also collaborative endeavours for the establishment of network infrastructure such as learning centres, accessible to students from all universities, could be supported.
Reflections and views on the role of governments

In various papers recommendations on the role that governments should play in the development of ICT in higher education have been expressed. In others, questions with regard to certain areas of governmental involvement have been formulated. The main issues arising from these recommendations and questions will be summarised below.

Bates (1997) argues that: ‘Governments can do a great deal to facilitate the development of a networked, multimedia educational community. Governments can help by recognising the importance of lifelong learning for economic development and the importance of telematics for lifelong learning’. He adds that: ‘there is no need for governments themselves to build, pay for or operate wide-band networks at the infrastructure level. They need to concentrate instead on supporting the development of educational services that will flow across those networks. Furthermore, governments can not only facilitate the use, but also influence the design, of wideband information highways. For instance, government can take the initiative to establish educational networks that sit on top of the basic telecommunications infrastructure of an information highway. Secondly, government can encourage educational users to come together to agree on common technical standards and collaboration so that there is joint production, interoperability and sharing of networks by individual institutions within a system. Finally, and perhaps the most valuable action that governments can take though is in the area of regulation. Comparing the European and North American contexts, it is clear that the right regulatory environment as much as capital investment is a critical factor in establishing the wide-band services that could be so valuable to education and training’ (Bates, 1997).

Twigg and Heterick (1997) argue that a climate for change and the creation of new market forces should be facilitated by the deregulation of higher education. In a report on discussions on public-policy implications of a global-learning infrastructure that were held in the context of the National Learning Infrastructure Initiatives, Heterick, Mingle and Twigg (1997) summarised the recommendations for governments that were made as follows:
- deregulate electronic delivery;
- lower the barriers for institutions operating on national and international scales;
- increase consumer-information functions in order to inform choice and improve programs;
- use the power of competition and choice to inspire organisational change among public institutions;
- use their program approval authority to expand the availability of electronic offerings;
- encourage inter-institutional co-operation
- seek and support creative public/private partnerships in support of ICT needs.

The importance of stimulating, on the one hand co-operation through partnerships and on the other hand more competition through deregulation, are also found in the recommendations that are formulated by Matthews (1998), who reflects on the implications of ICT for the state higher education finance policy. His conclusion is that higher education finance needs to be reinvented. Without change, higher education funding structures could obstruct the ability of higher education institutions to respond and adapt to the new environment resulting from the revolution of information technology. Also Twigg and Heterick (1997) point to the importance of funding mechanisms. They state that FTE (full-time equivalent) student enrolment funding formulas are a significant barrier to change in the ICT area. This is because they are based on a seat time, or a time on task (or time in class) concept rather than a learning achievement or outcome model.

Fielden (1998) takes the case even further when he compares those universities that decide to offer studies globally via the Internet with multinational companies. This raises policy questions as to the role that the government wants to take in regulating the delivery, the quality or the price of such services. Related to this is the role that the government wants to


take towards learning materials that are distributed by an institution based abroad, i.e. the consumer-protection issue. He concludes that it is much easier to monitor those providers who are in a country with visible enrolments and support systems than to respond to the problem of nationals that are studying electronically with an organisation that has no worthwhile accreditation.

Bradford (1998) also brings up the issues of quality assurance, accreditation and consumer protection in a report prepared for the State Council of Higher Education for Virginia. Also Twigg and Heterick (1997) state that although market forces should be stimulated by deregulation of higher education, at the same time, accountability to the public and to student consumers needs to be established. Education is too important to exist without controls, without licensing, or without credentials. However, accreditation can also serve as a barrier to fundamental change because accrediting standards have been input oriented (number of books, number of seats, number of Ph.D.’s and entrance scores of students). The authors state that in a desegregated higher education environment, new quality-control mechanisms are required.

An organisation that is designed to address this type of quality issues is the Global Alliance for Transnational Education (GATE). This organisation represents a partnership of the multinational corporate community, national associations, governments, higher education institutions, and international organisations such as the OECD and UNESCO. Its primary purpose is to address the assurance and improvement of education that crosses national borders. Transnational education is defined as: ‘any teaching or learning activity in which the students are in a different country (the host country) to that in which the institution providing the education is based (the home country). This situation requires that national boundaries be crossed by information about the education, and by staff and/or educational materials (whether the information and the materials travel by mail, computer network, radio or television broadcast or other means).’ (http://www.edugate.org).

**EU Policy on ICT in higher education**

The first phase of the DELTA Programme in the 1980s marks the emergence of a new actor in the field of flexible and distance learning: the European Community. A large number of programmes gave a new impulse to initiatives. The formalisation of this process was achieved with the Memorandum on Open and Distance Learning (1991) and the two articles of the Maastricht Treaty of 1992, that recognise the role of open and distance learning in the European policies in the field of education and vocational training. After 1992 the number of programmes has grown so much that it is difficult to identify the main policy orientations behind the individual measures. Two trends seem to be common in the change of policy orientation since the early 1980’s (Dondi, 1997):

- a shift from support to the supply-side to support to demand-driven projects and measures to improve the working of the market mechanism (information, certification etc.)
- a shift from isolated to integrated policies: policies are more often integrated into mainstream policies concerning education and training or technical innovation.

In the years 1994-95 the Union made an analysis on the role of the research system and the instruction training system and necessary interventions. This analysis is contained in the White Paper *Growth, Competitiveness, Employment - The challenges and ways forward into the 21st Century*, It elaborated and approved a new generation of research programmes (the fourth Framework Programme) and the new education (SOCRATES) and training (LEONARDO) programmes. In these programmes space has been given to the new technologies in instruction and training and in particular to distance learning. Moreover, the central objective, as stated in the Treaty, is growth of the European dimension of instruction. The instruments foreseen are those of co-operation through programmes and networks. For
current policies on information technology in education, background considerations are given in the White Paper *Teaching and Learning, Towards the Learning Society* (1995). These policies are being carried out through different Directorate Generals. A new initiative of the EU is *PROMETEUS*, based on a memorandum of understanding with respect to the area Multimedia Access to Education and Training in Europe. Over 300 universities and commercial partners have joined this initiative. Through it, the EU will stimulate special-interest groups, rather than short-term projects.

**Policies in the field of education, training and youth**

Policy on the use of new technologies in higher education is carried out mainly within SOCRATES. The SOCRATES programme promotes co-operation in six areas, one of which is Open and Distance Learning (ODL). The concept of ODL is to be understood in its double meaning of both the introduction of new modes of *open learning* and the provision of distance learning services. According to the Commission ODL can refer to the integration of the new information and communication technologies in traditional education, or to the use of these technologies to introduce distance learning systems to overcome problems linked either to barriers to mobility or difficulties of access to existing education services. ODL-projects carried out within SOCRATES should contribute to the co-operation between organisations and institutions working in the field in question and they should enhance the skills of instructors, trainers and managers in the techniques and methods that are utilised. One of the actions of the new SOCRATES Programme (2000-2004) is ATLAS, a special action line on education and multimedia. The aim of this action is to ensure the co-ordination and consolidation of measures relating to open and distance education and the use of new information and multimedia communication technologies. All these measures serve a dual purpose: to promote better understanding and the critical, responsible use of tools and methods which apply new technologies, and to promote access to and enhance the availability of improved educational resources at European level.

The Leonardo da Vinci Programme contains projects that aim to show workers and young people how to master the tool of technology or make use of multimedia and data-communication networks to disseminate training materials. The use of new technologies will be one of the main priorities in the Leonardo Programme in the future.

**Actions in the field of research and development: the 4th and the 5th framework programmes**

Since 1988, the European Union has been supporting research on the applications of Telematics to Education and Training. In that year it launched a two-year programme, called *DELTA* or *Development of European Learning through Technological Advance*. The Telematics succeeded this Flexible and Distance Learning Programme (1990-1994). This programme produced promising results, which are the foundations of the current Telematics Applications for Education and Training Sector. One of the 19 programmes within the Fourth Framework Programme was the Telematics Applications Programme or TAP, carried out by DGXIII. Its aim was to encourage the development of telematics projects by institutions in the European Union. One of the sectors was Education and Training. This sector attempted to develop cost-effective applications that allow people to learn what, where, when and how they want.

In the *Telematics Applications Programme (TAP)* of the Fourth Framework Programme it was recognised that traditional teaching can no longer meet the needs of today’s society. In the challenge to improve education and training for everyone, TAP utilises ten commandments:

1. Focus not only on industrial competitiveness but also on support for other European Union policies.
2. Be user-oriented and cost-effective rather than technology-driven.
3. Start with market research and an analysis of users’ needs.
4. Associate users’ representatives at each stage of a project.
5. Focus on multimedia telematics rather than data telematics.
6. Concentrate on fewer projects and treat interoperability as a key issue.
7. Devote adequate resources to validation in user environments.
8. Maximise the generic content of telematics applications.
9. Exploit results, including standards, procurement and implementation recommendations.
10. Co-operate not only within a research sector (vertical co-ordination) but also between sectors (horizontal co-ordination).

Within the Fifth Framework Programme (1998-2002), Directorate General XIII will be responsible for carrying out one of the four thematic programmes: the user-friendly Information Society. The strongly user-orientated approach of this programme will focus on four key actions:
1. Systems and services for the citizen
2. New methods of work and electronic commerce
3. Multimedia content and tools
4. Essential technologies and infrastructures

Within Key Action 3, the EU will be focusing on working towards a seamless infrastructure for the provision of lifelong learning in Europe. The aim of this key action is to facilitate lifelong learning, to stimulate creativity, to enable linguistic and cultural diversity and to improve the functionality of future information products and services, taking account of user-friendliness and acceptability. It will focus on technologies to improve acquisition processes; teaching materials; broadening of access to learning resources and services, etc. The intention of the Framework Programme is to foster more strategic projects. According to Rodríguez-Roselló (1998), it is crucial in this respect to have multidisciplinary teams able to cater for all the complexity involved from basic research institutions to high-tech industry and from users to content producers.

The generation of programmes elaborated in 1993-94, and the reflections and actions of coordination of 1995-96 have matured and consolidated the need to integrate the resources available for European action. This is destined to the contents of multimedia (Media, Info 2000) the education programmes (SOCRATES), the training programmes (Leonardo Da Vinci) and research (Telematic Applications, Information technologies, Targeted Socio-Economic Research). The principle of subsidiarity and the defence of plurilingualism and diversity respected, in short, the defence of cultural identities must be respected in all Community actions. According to Ruberti (1997) this is the challenge and the opportunity, which the new technologies offer co-operation, with their potentiality to favour exchanges, common experiments and cross fertilisation.

Conclusions

Policy development and strategic considerations at the institutional level

Within higher education institutions, there is considerable experimentation with ICT in educational processes. However, the dissemination of practices and the application on a larger scale is problematic. One of the most important reasons for this is the fact that in many cases institutional strategies for ICT are still lacking. Not only are there no clear focuses and no objectives regarding the use of ICT, there is also a lack of incentives which would stimulate staff to undertake action in this area. In particular reward systems and quality or performance indicators are ill adapted to the role that ICT is expected to play. Staffing policies do not address the issue and more training of staff is needed. Furthermore, a sometimes weak understanding of technological development and possibilities of ICT by the senior management, a lack of skills, funding problems, and the complexity of the development of
quality courseware hinder the implementation of ICT. It seems that, in order to enhance the impact of ICT on higher education; these contextual conditions would need to be adapted.

**Collaboration and competition**
Successful initiatives in ICT are characterised by strong collaboration features. Inter-institutional and inter-sectoral collaboration between universities and companies is stimulated by governments in all countries and by the European Union. It should be noted, however, that implementation conditions and priorities are specific for every individual institution. Consequently, collaboration arrangements should not be overly dictated by external or national policy agendas and priorities, otherwise they might hinder the sustainable development of ICT in higher education institutions. The collaboration between universities and companies may be complex because of differences in organisational culture and mission. Nevertheless, co-operation between higher education, telecommunications and multimedia computer-software companies and publishers is needed as competencies from the different partners can be matched and thus form the basis of quality products and services. It seems that in Europe, multimedia software companies are less motivated to work on educational-software development than in the USA. International collaboration is observed in particular in Europe when the European Union encourages institutions and their corporate partners to collaborate at a European level. At the same time, a strong international competition for educational markets (including Europe) that can be served through distance education is observed. Here, the anglophone countries, with their *lingua franca* advantage, an entrepreneurial spirit in higher education, and a long history in distance learning, are active in exporting higher education through ICT. There is a strong relationship between the development of ICT in higher education on the one hand, and policy agendas concerning lifelong learning (including industrial and professional training) access to higher education, and international markets on the other. The push for a substantial use of ICT in distance learning programmes has come from these new markets in particular. The responsiveness to these market needs is leading in many countries to a convergence of distance and traditional (on-campus) education. In cases where institutions do not respond, these market forces may lead to a segmentation between a public-funded market for traditional students on which the universities would operate, and a privately-funded market for lifelong learning and international education on which foreign and commercial providers would operate.

**The role of the government**
It is generally agreed that governments should facilitate and support the use of information highways for educational purposes and establish educational networks to support the development of services and to agree on common standards and collaboration. It is important to create the right regulatory environment in order to achieve this. Especially from the Northern American experiences it is emphasised that deregulation will actually be the key to creating new market forces that will inspire the necessary organisational change in higher education institutions. Current funding mechanisms and accrediting systems that are not adapted to the technological innovations in higher education contribute to a lack of incentives for institutions to develop activities in this area. Furthermore, the government should encourage inter-institutional and public-private partnerships and it should take its own responsibility in quality assurance and accreditation and in consumer information and in consumer protection *vis à vis* programmes that are delivered from non-accredited institutions from abroad.

**References**


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