LIFELONG LEARNING IN THE DIGITAL AGE

Sustainable for all in a changing world

Edited by
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IFIP

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Lifelong Learning in the Digital Age

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IFIP – The International Federation for Information Processing

IFIP was founded in 1960 under the auspices of UNESCO, following the First World Computer Congress held in Paris the previous year. An umbrella organization for societies working in information processing, IFIP's aim is two-fold: to support information processing within its member countries and to encourage technology transfer to developing nations. As its mission statement clearly states,

> *IFIP's mission is to be the leading, truly international, apolitical organization which encourages and assists in the development, exploitation and application of information technology for the benefit of all people.*

IFIP is a non-profitmaking organization, run almost solely by 2500 volunteers. It operates through a number of technical committees, which organize events and publications. IFIP's events range from an international congress to local seminars, but the most important are:

- The IFIP World Computer Congress, held every second year;
- Open conferences;
- Working conferences.

The flagship event is the IFIP World Computer Congress, at which both invited and contributed papers are presented. Contributed papers are rigorously refereed and the rejection rate is high.

As with the Congress, participation in the open conferences is open to all and papers may be invited or submitted. Again, submitted papers are stringently refereed.

The working conferences are structured differently. They are usually run by a working group and attendance is small and by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is less rigorous and papers are subjected to extensive group discussion.

Publications arising from IFIP events vary. The papers presented at the IFIP World Computer Congress and at open conferences are published as conference proceedings, while the results of the working conferences are often published as collections of selected and edited papers.

Any national society whose primary activity is in information may apply to become a full member of IFIP, although full membership is restricted to one society per country. Full members are entitled to vote at the annual General Assembly, National societies preferring a less committed involvement may apply for associate or corresponding membership. Associate members enjoy the same benefits as full members, but without voting rights. Corresponding members are not represented in IFIP bodies. Affiliated membership is open to non-national societies, and individual and honorary membership schemes are also offered.

Lifelong Learning in the Digital Age

Sustainable for all in a changing world

IFIP Technical Committee 3 (Education)
Lifelong Learning Working Track in the IFIP conference,
E-Training Practices for Professional Organisations
Pori, Finland, 7-11 July 2003

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KLUWER ACADEMIC PUBLISHERS
NEW YORK, BOSTON, DORDRECHT, LONDON, MOSCOW

eBook ISBN: 1-4020-7843-9
Print ISBN: 1-4020-7842-0

Created in the United States of America

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International Federation for Information Processing (IFIP)

Mission

IFIP’s mission is to be the leading, truly international, apolitical organisation which encourages and assists in de development, exploitation and application of Information Technology for the benefit of all people.

IFIP takes no account of political, social or economic aspects of its member organisations because IFIP is totally dedicated to the transfer of scientific and technical information and experience.

IFIP work is based on volunteers who cover their own expenses in respect to their attendance at meetings.

Developing nations are of special concern to IFIP. It is a major and an important task to contribute to technology transfer between these nations and developed nations and newly industrialized countries.

IFIP Technical Committee 3 - Education (established 1963)

IFIP TC3 deals with two broad fields:

- Teaching informatics;
- Educational uses of communication and information technology (ICT).

TC3 Aims

a) To provide an international forum for educators to discuss research and practice in:
   - Teaching informatics;
   - Educational uses of communication and information technology (ICT).
b) To establish models for informatics curricula, training programs, and teaching methodologies.
c) To consider the relationship of informatics in other curriculum areas.
d) To promote the ongoing education of ICT professionals and those in the workforce whose employment involves the use of Information and Communication Technology.
e) To examine the impact of Information and Communication Technology on the whole educational environment:
   - Teaching and learning;
   - Administration and management of the educational enterprise;
   - Local, national and regional policy-making and collaboration.
f) [Proposed 2003] To engage with formal and informal learning environments, including homes, communities and the world of work, as characteristics of the knowledge society.

TC3 Taskforce on Lifelong Learning

IFIP TC 3 aims to establish a (virtual) learning community for Lifelong Learning. With this aim in mind a TC3 Lifelong Learning Taskforce was established with the following members:

- Mike Kendall (United Kingdom);
- Brian Samways (Chair, United Kingdom);
- Tom van Weert (The Netherlands);
- Jan Wibe (Norway).

The first activity of the Taskforce was development of an *IFIP TC 3 Position paper on Lifelong Learning*. The next activity was a working meeting in the form of a *Lifelong Learning Working Track* in the IFIP TC3 e-Train conference, 'E-Training practices for professional organisations', Pori, Finland, 2003. Next to other invited papers this Lifelong Learning Position Paper was input into this working track and was reviewed there.

The working track 'Lifelong Learning in the Digital Age' was organized as a working conference with the TC3 Taskforce on Lifelong Learning as Programme Committee. Within IFIP Technical Committee 3 (Education) there is a tradition of working conferences in which invited experts give input and participate. The invited papers are reviewed by the Programme Committee. Through their special organisational features these working

conferences allow in-depth treatment of the conference themes, in-depth discussions, but also informal exchange of ideas and experiences. The working conferences are designed in such a way as to encourage establishment of new professional and personal relationships. The working conferences are a stimulating experience because of the intensive work done by experts in the field coming from all over the world. Results of the working conferences are shared with the international scientific community through the proceedings which are usually published by Kluwer Academic Publishers. Results are also disseminated through the IFIP network.

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Preface

IFIP TC3 Lifelong Learning Working Track

This book is the result of the IFIP Lifelong Learning Working Track at eTrain, 7-11 July 2003, Pori, Finland organized by the Lifelong Learning Taskforce of the International Federation for Information Processing (IFIP) Technical Committee 3 (TC3) on Education. Members of the TC3 Lifelong Learning Taskforce are:

- Mike Kendall, United Kingdom;
- Brian Samways, United Kingdom (Chair);
- Tom van Weert, The Netherlands;
- Jan Wibe, Norway.

The members of the Taskforce constituted the IFIP Lifelong Working Track Programme Committee that invited the contributing authors and reviewed contributions.

Papers

This book has been produced from reviewed papers by invited authors from Australia, Brazil, Bulgaria, Poland, Slovenia, The Netherlands, and the United Kingdom. The papers were invited to add to and reflect on the IFIP Technical Committee 3 Position Paper on Lifelong Learning, published by IFIP Technical Committee 3 in October 2003.

Focus Group Report

In addition the book contains a Focus Group Report on Lifelong Learning in the Digital Age with associated resource documents. This Report was produced during the Lifelong Learning Working Track by invited participants:

- Sasa Divjak, Slovenia;
- Carolyn Dowling, Australia;
- Petra Fisser, Netherlands;
- Anna Grabowska, Poland;
- Marijke Hezemans, Netherlands;
- Mike Kendall, United Kingdom;
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Tom J. van Weert holds the chair in ICT and Higher Education of the Hogeschool van Utrecht, University of Professional Education and Applied Science, Utrecht, The Netherlands. Earlier he was managing director of Cetis, centre of expertise for educational innovation and ICT, of the same university. Before that he was director of the School of Informatics (Computing Science) at the University of Nijmegen, The Netherlands. Tom has studied applied mathematics and computing science. He started his working career in teacher education and software engineering. He has been chair of the International Federation for Information Processing (IFIP) Working Groups on Secondary Education and Higher Education. He currently is vice-chair of IFIP Technical Committee 3 on Education. He is also member of the TC3 Taskforce on Lifelong Learning.

Mike Kendall is the Principal Adviser for Learning and ICT to Northamptonshire County Council, United Kingdom, providing leadership to 350 schools with 130,000 students between 4 and 19 in their use of ICT. He is also Chairman of the East Midlands Broadband Consortium which provides broadband connectivity, content and services to 2,500 schools. Earlier, he was Learning and Standards Manager responsible for establishing the Birmingham Grid for Learning. Mike started his career teaching design and technology subjects in secondary education before working for Birmingham City Council leading educational information technology projects. He is a member of the British Computer Society Schools Expert Panel. Mike is a member of the IFIP TC3 Taskforce on Lifelong Learning and the Working Group on Secondary Education.

Foreword

This book, "*Lifelong Learning in the Digital Age, Sustainable learning for all in a changing world*" starts with an overview over the field of Lifelong Learning in the Focus Group Report "Lifelong learning in the Digital Age". All aspects deemed important by the contributors are covered and references are made to both the papers in this book and other resources. This Focus Group Report provides a comprehensive introduction to the field of Lifelong Learning and the role of ICT.

Lifelong Learning in the Digital Age

Focus Group Report

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Abstract: The growing importance of Lifelong Learning must be seen against the background of profound changes, reflected in all aspects of our living environment. These changes concern the global environment, but also our personal, economic, social, cultural and political environments. Lifelong Learning is a 'must' in the real-life context of the Knowledge Society and covers "all purposeful learning from the cradle to the grave" of very divers groups of learners. The Lifelong Learning environment has specific characteristics and is strongly supported by Information and Communication Technology. Sustainability of the learning environment is a critical issue. The growing demand for Lifelong Learning will force educational institutions to change.

Key words: age groups, civic perspective, community, cultural perspective, economic perspective, formal learning, informal learning, Information and Communication Technology, knowledge society, learning context, learning environment, learning organisation, non-formal learning, personal perspective, social perspective, sustainability

ACKNOWLEDGEMENT

This Focus Group Report on Lifelong Learning in the Digital Age has been created by the invited participants of the IFIP TC3 Lifelong Learning Working Track of the eTrain conference, Pori, Finland, July 7-11, 2003. Contributors are: Sasa Divjak (Slovenia), Carolyn Dowling (Australia), Petra Fisser (The Netherlands), Anna Grabowska (Poland), Marijke Hezemans (The Netherlands), Mike Kendall (United Kingdom), Pencho Mihnev (Bulgaria), Magda Ritzen (The Netherlands), Maciej M. Syslo (Poland), Rosa Vicari (Brazil) and Tom van Weert (The Netherlands).

Motivation ↔ *Sustainability*		
Learning context	**Learning environment**	**Learning organisation**
Professional context	Workplace	Formal **Companies; Teams** **Educational Institutions; Student teams**
Local/civic community context	Local/dispersed	Semi-formal/informal **Community of interest**
Individual/personal context	Personal/dispersed	Informal/semi-formal **Community of interest**
Information and Communication Technology Services		

Figure 1. Lifelong Learning

BACKGROUND OF CHANGE

The IFIP TC3 Position Paper on Lifelong Learning (Kendall et al. 2004) makes clear that Lifelong Learning must be seen against the background of change. These changes concern the global environment, but also our personal, economic, social, cultural and political environments.

The changing global environment

The World Bank sees changes in our global environment as presented in Table 1 (World Bank 2002A; p.8). Next to specific opportunities there are specific threats which may be countered by Lifelong Learning approaches.

Table 1. Opportunities and threats stemming from changes in the global environment

Change factor	Opportunities	Threats
Growing role of knowledge	Possibility of leapfrogging in selected areas of economic growth Resolution of social problems (food security, health, water supply, energy, environment)	Increasing knowledge gap among nations
ICT revolution	Easier access to knowledge and information	Growing digital divide among and within nations
Global labour market	Easier access to expertise, skills, and knowledge embedded in professionals	Growing brain drain and loss of advanced human capital
Political and social change Spread of democracy Violence, corruption, and crime HIV/AIDS	Positive environment for reform	Growing brain drain and political instability Loss of human resources

The changing personal environment

Personal development has been changing and is more and more geared towards fulfilling to the fullest the own individual potential in life. The environment we live in is changing:

- Technology that we use on a day-to-day basis;
- The amount of information that "bombards" us packed in different media formats;
- The ways we communicate with other people, with institutions and in the workplace;

- The amount of things that we have to know and be able to handle in order to keep up with the world around us.

In total all this means that we should be able to learn in a new manner and from the cradle to grave in order to be able to realise our life potential, and to fulfil our goals in life to a maximum extent.

The changing economical environment

Demand for knowledge workers (World Bank 2002B; p.ix)

"A knowledge-based economy relies primarily on the use of ideas rather than physical abilities and on the application of technology rather than the transformation of raw materials or the exploitation of cheap labor. Knowledge is being developed and applied in new ways. Product cycles are shorter and the need for innovation greater. Trade is increasing worldwide, increasing competitive demands on producers. … In the knowledge economy, change is so rapid that workers constantly need to acquire new skills. Firms need workers who are willing and able to update their skills throughout their lifetimes."

Working and learning melt together (Keynote Lifelong Learning, Weert 2004)

"To keep up with developments in a knowledge intensive economy (knowledge) workers need to adapt continuously to new developments: they are in a process of Lifelong Learning. "In the old economy, the basic competences of the industrial worker, bricklayer, or bus driver were relatively stable. True, you might have applied these competencies to different situations, such as different construction sites, but the learning component of your labour was small. In the new economy, the learning component of work becomes huge. ..... Think about your own work. Work and learning overlap for a massive component of the workforce." (Tapscott 1996; p. 198)."

Knowledge creation at the work place (WRR 2002; p. 22)

The Dutch Scientific Board for Governmental Policy (WRR), in their Report to the Government 61: "In the knowledge economy the term knowledge was used originally to denote scientific knowledge However,

partly under the influence of Information and Communication Technology the concept of knowledge is broadening: knowledge, wherever it is stored, becomes available. Knowledge in the heads of or hands of workers can be codified; tacit knowledge can be a commercially valuable asset. … Mass distribution of ICT and the Internet seem to contribute towards the development of new knowledge and new attitudes towards knowledge. The concept of knowledge has been extended from purely theoretical knowledge ('old knowledge') to knowledge that is also more practice-oriented ('new knowledge')."

The changing social environment (World Bank 2002B; p.ix)

"The global knowledge economy is transforming the demands of the labour market in economies throughout the world. It is also placing new demands on citizens, who need more skills and knowledge to be able to function in their day-to-day lives.

Lifelong Learning is crucial to preparing workers to compete in the global economy. But it is important for other reasons as well. By improving people's ability to function as members of their communities, education and training increase social cohesion, reduce crime, and improve income distribution."

An 'enterprising' society (Keynote Lifelong Learning, Weert 2004)

"Long term developments lead to fundamental changes in economic activities and put more weight on unique human qualities such as knowledge creation. Robotic type of work is taken over by automates. 'Human capital' is becoming more and more important and allows workers more freedom in giving form to their work commitments. Supported by Information and Communication Technology they become more and more responsible for all dimensions of their work. This contributes to the 'wholeness' of working life. "More and more people give meaning to their lives in paid professional work. The reason for this is the changing character of work. By and by an 'enterprising' society of dynamic professionals is developing." (Beek 1998)".

Enhanced citizenship

The concept of the community to which a person belongs to and engages with is changing in a such a way that the leader of the Church of England, the Archbishop of Canterbury, commented that "Increasingly we are not only citizens of the world but also citizens of the World Wide Web" (Carey 2000). Whilst it can be seen as a 'sound bite' of a newspaper article, it is a position adopted more widely. The OECD noted "New ways are opened up by ICT for enhanced citizenship, whereby people can participate in the governance of their communities and societies, through access to new knowledge, through the creation of debating forums which cross the boundaries of geography, time and social status" (OECD 2002). For the citizen, ICT offers opportunities to belong to, or to observe, many more communities and societies, identifying those that may match their interests and requirements, offering participation and opportunities to change that community and society more widely.

Integration of ICT (Keynote Lifelong Learning, Weert 2004)

The Dutch Scientific Board for Governmental Policy, in their Report to the Government 61: "Information and Communication Technology is integrating quickly in industrialised countries. For example, in the Netherlands the distribution of ICT over the population is rather even and shows no clear boundaries. Particular groups, such as older people, single women, lower educated people and low income people less often have a computer or an Internet connection. However the connectivity rate among all groups is growing so quickly that no insurmountable differences are expected (WRR 2002, p. 68)."

There is, however, a considerable difference between the North and the South where digital inclusion is an issue (Figure 2) (World Bank 2002A; p.16).

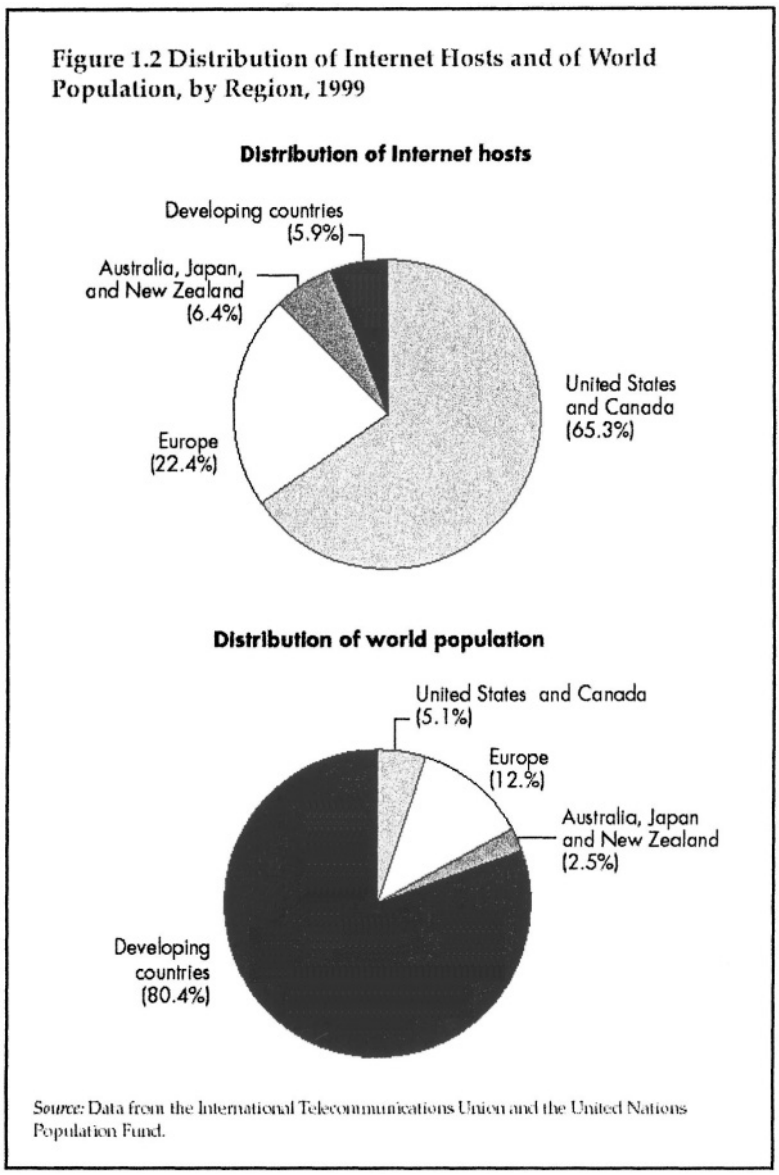

Figure 2. Distribution of Internet host and of world population

Homo Zappiens (Keynote Lifelong Learning, Weert 2004)

"A new generation of students is presently knocking at higher education doors: the media generation. Wim Veen (Veen 2002) characterises this media generation as 'Homo Zappiens', in contrast with 'Homo Sapiens'. This media generation has been raised with the remote control of the TV, a computer mouse or a game stick in one hand, and the mobile phone in the other. From early morning till late at night this generation is playing computer games looking for 'fun' and 'kicks', changing the rules of the game whenever they feel like it. For this generation school is a meeting place, not a learning place. From the teacher perspective these students are not able to concentrate for very long, being over-active and showing no discipline, nor respect. However, on closer inspection this media generation can be seen to have new competencies:

- *Multi-dimensional scanning*
  Research by Wim Veen reveals that the media generation is able to absorb text, sound, movement, colour and image at the same time and integrate discontinuous information. For example the boy who is zapping from one television channel to the other and still able to reconstruct the plot of a soap running on one of the channels.
- *Multi-tasking*
  The media generation is able to do several tasks at the same time and in a non-sequential way. A media generation girl is doing her home work, at the same time talking on the mobile phone, surfing the World Wide Web and listening to music.
- *Virtual environment*
  The media generation is able to live in a world of 'unreality', virtual actions and objects that they may mistake for the real world."

The changing cultural environment

'Zap'-culture (Keynote Lifelong Learning, Weert 2004)

Just as electricity in the past, the integration of Information and Communication Technology (ICT), gives rise to profound changes in our culture. Television has promoted a 'zap'-culture, now intensified by ICT. Small 'chunks' of information or entertainment together constitute the mosaic of our cultural experiences, a 'blip'-culture. The penetration of the mobile phone certainly has contributed. The Short Message Service (SMS) has enriched our cultural life with a new form of writing.

Table 2. SMS words, emoticons and figures

SMS words	Meaning	SMS emoticons	Meaning	SMS figures	Meaning
Cu	See you	:-))	Just joking	>^00^<	Cat
Id	Idea	:-))	Great laugh	|_|>	Cup of coffee
-Id	No idea	:-<	A bit sad	(\0/)	Angel in flight
W8	Wait	:-(	Very sad	<*}}}}}<>	Fish

Virtual 'communities' and cultures (Keynote Lifelong Learning, Weert 2004)

Information and Communication Technology (ICT) allows creation of a virtual reality: "a world without limits where the frontier between fact and fiction is fuzzy. The more senses are involved the more real this Virtual Reality is. Here digitalisation is the 'most extreme' form of abstraction. It is learning by experience (but there is a risk involved). It enables money and time efficient creativity. ". Video and Internet games, with their sub-cultures of players, integrate in our culture. "Internet is transforming the social interaction among different age groups in society in all countries". Granddad and Grandma surf the World Wide Web looking for their cross words puzzle and may be part of a 'community' of cross words fans. "As we have more control, and more isolation and exclusion, we expect to be able to create our own cultures, finding like-minded people in a community, or to establish our own identity and community of interest to the exclusion of others. These communities and cultures may be virtual, but have a very real physical impact."

Changes in the political environment

"The concept of Lifelong Learning, or lifelong education, became current in the 1970s. In its early development the concept was equated with giving adults access to formal courses at educational institutions. In choosing the goal of "Lifelong Learning for all" in 1996, OECD Education Ministers signalled a major departure by adopting a more comprehensive view. This goal covers all purposeful learning activity from the cradle to the grave, that aims to improve knowledge and competencies for all individuals who wish to participate in learning activities. International organisations, such as UNESCO and the European Commission have also adopted the more comprehensive approach" (OECD 2001A; p. 10)

That political importance of Lifelong Learning is illustrated by "The Lisbon declaration, issued after the extraordinary European Council (European Commission 2000), <which> shows that the transition to a knowledge intensive society is high on the political agenda. The scale of current economic and social change, the rapid transition to a knowledge-based society and demographic pressures resulting from an ageing population in the industrialised countries are all challenges which demand political attention and a new approach to education and training. This is illustrated by the high priority given to Lifelong Learning in the context of these challenges by meetings of the European Council. These meetings resulted in the communication of the mandate of the *Feira European Council*. In this communication, A Memorandum on Lifelong Learning (European Commission 2000) Lifelong Learning is defined as: "all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competence, within a personal, civic, social and/or employment-related perspective." " (IFIP TC3 Position Paper, Kendall et al. 2004).

Risks for the developing countries and transition economies

Risks for the developing countries and transition economies

"Developing countries and transition economies risk being further marginalized in a competitive global knowledge economy because their education and training systems are not equipping learners with the skills they need. To respond to the problem, policymakers need to make crucial changes. They need to replace the information-based, teacher-directed, directive-based rote learning provided within a formal education system with a new type of learning that emphasizes creating, applying, analyzing, and synthesizing knowledge and engaging in collaborative learning throughout the lifespan." (World Bank 2002B; p.ix).

WHAT IS LIFELONG LEARNING?

"A Lifelong Learning framework encompasses learning throughout the life cycle from early childhood to retirement):

- formal learning (schools, training institutions, universities);
- non-formal learning (on-the-job and household training); and
- informal learning (skills learned from family members or people in the community).

It allows people to access learning opportunities as they need them rather than because they have reached a certain age (Figure 3)." (World Bank 2002B; p.3)

The distinction between informal and formal learning

People may be able to make choices between formal and informal learning in meeting their needs and those of their family and community. In the early days, the choice was generally limited to a few traditional learning institutions where choices had to be made from a specific menu of courses and vocational options. With increased demand and opportunities for access to learning, when "...new technologies enable the faster conversion of information into knowledge as well as the generation and more rapid diffusion of new knowledge." (OECD 2001B). The demand is upon formal learning institutions to meet economic and social needs as well as informal learning.

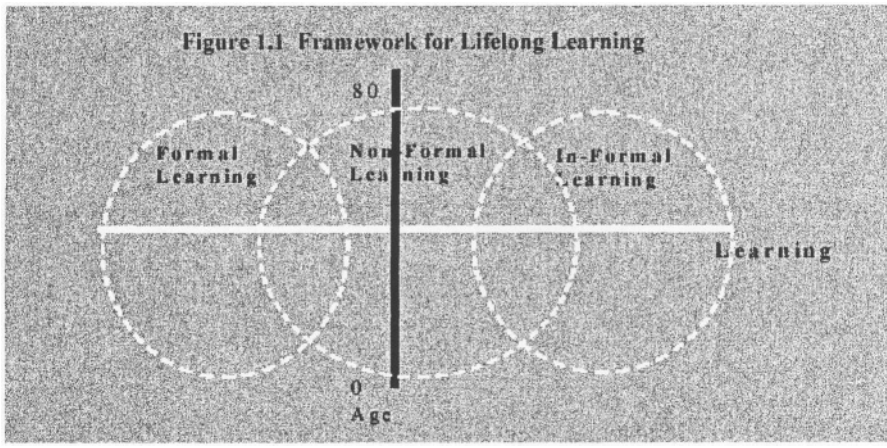

Figure 3. Framework for Lifelong Learning

The increased access to technology in the home and community is opening new channels for learning, such as the BBC offering of '*Webwise*' as an online information and learning service to "explore, participate and learn" offering the opportunity to "connect to learning with the BBC" (BBC 2002). The access is available to anyone, anywhere in the world where access is available. An advantage of informal learning is that activities are generally not mapped to a formal learning process or qualifications, and are often motivated by fun, or the sense of achievement that comes from completing a project, individually or in face-to-face or virtual group. "It

would be a mistake, however, to see formal and informal learning as two entirely separate worlds." (OECD 2001A)

What is learning?

The first question to be answered is: "What is learning". Here we assume that learning is the use and the creation of new operational knowledge (Invited paper Lifelong Learning, Go & van Weert 2004) that steers our actions. Learning is a social activity in which interactions with the environment (human and non-human) play an important role. Learning is a personal activity: Nobody who does not want to learn, can be made to learn. On the other hand: a motivated learner, wants to learn and will learn.

Real-life setting

Lifelong Learning takes place in the real world, that means in a real life setting where new knowledge has to be created and applied, because it is needed (to steer our actions). Therefore Lifelong Learning may appear in different contexts:

- Professional context;
- Local/dispersed community context;
- Individual context.

Formal learning following traditional education methods is ill suited to provide people with the skills they need to be successful in a knowledge economy, because the traditional learning model differs from Lifelong Learning methods in important ways. The following table (Table 3), emphasizing these differences, is taken from a World Bank Lifelong Learning report (World Bank 2002B; p.xi).

Table 3. Traditional versus Lifelong learning

Traditional learning model	Lifelong learning
The teacher is the source of knowledge	Educators are guides to sources of knowledge
Learners receive knowledge from the teacher	People learn by doing
Learners work by themselves	People learn in groups and from each other
Tests are given to prevent progress until students have completely mastered a set of skills and to ration access to further learning	Assessment is used to guide learning strategies and identify pathways for future learning
All learners do the same thing	Educators develop individualized learning plans
Teachers receive initial training plus ad hoc in-service training	Educators are lifelong learners. Initial training and on-going professional development are linked
"Good" learners are identified and permitted to continue their education	People have access to learning opportunities over a lifetime

Professional context

Creating a labor force able to compete in the Global Economy" (World Bank 2002B; p.xi)

"In traditional industries most jobs require employees to learn how to perform routine functions, which, for the most part, remain constant over time. Most learning takes place when a worker starts a new job. In the knowledge economy, change is so rapid that workers constantly need to acquire new skills. Firms can no longer rely solely on new graduates or new labour market entrants as the primary source of new skills and knowledge. Instead, they need workers who are willing and able to update their skills throughout their lifetimes. Countries need to respond to these needs by creating education and training systems that equip people with the appropriate skills.

Working as a professional

In the professional context the learning is aimed at developing operational knowledge to perform better as a professional or to become a starting professional. Working as a professional may be characterised by the following three phases (Simons & Ruijters 2001):

1. *Relate*: working with knowledge, learning-on-the-job on and making explicit the implicit results of learning;
2. *Create*: extending knowledge by, for example, carrying out research, explicit learning;
3. *Donate*: putting into practice, presenting, promoting one's own knowledge, contribute to the profession.

Professional development is not part of everyday schoolwork in class, so it needs an extra effort. Universities should work in co-operation with business, industry and other organisations in the field to develop and implement programmes which are intended to give students optimum preparation for the reality and dynamics of professional practice (Invited Paper Lifelong Learning, Go & Weert 2004). These new programmes aim to provide learning environments which enable students to develop into starting professionals: they develop their competence and professional expertise in learning environments of varying complexity. The introduction of new competence-based programmes means adopting a new methodology and this assumes that the tutor also develops competencies and professional expertise in relation to the programme (Witteman 2001).

Community context

In the community context learning is aimed at developing operational knowledge that enables the community to perform better.

Professional community context

One example is a learning community of professionals who want to exchange ideas and share experience in relation to innovations and their own learning (Hezemans & Ritzen 2004). Learning professionals are aware of the opportunities offered by innovation and are motivated to learn. In support of this community learning process digital environments prove to be of help. In fact this leads to the creation of a 'Community of Practice'. The most important characteristics of a Community of Practice are (McDermott 2001), (Wenger & Snyder 2000):

- Group size of 3 – 500;
- Oriented towards sharing information and experience, and learning together;
- Focussed on a specific domain;
- Based on problem or questions;
- Within or between organisations;
- Not directed towards the primary working process.

Local community context

Another example is a local community (which may be dispersed); a group of people working together to exchange and develop knowledge to a specific aim. The community exists thanks to the participants; there is role differentiation; and the community members decide how long and about what they will continue to interact with each other (McDermott 1999),

(Römgens 2001). The community remains in existence as long as it provides something for its members. The functioning in the community is fed by the experience (practice) of the participants. The community aims to learn from this and to arrive at new forms of 'practice'. In all communities alternation of physical and virtual is important; meetings are needed to agree on approaches and to discuss problems.

Individual context

The individual context is one in which individuals want to perform better in areas of interest. This can be an interesting hobby, but also learning to draw like an artist or learning to type with ten fingers.

Learning environments

(Lifelong) learning takes place in a learning environment that must be seen in a context.

Professional context

The professional learning environment is the workplace or a professional community: "Learning = Working and Working = Learning" (IFIP TC3 Position Paper, Kendall et al. 2004).

The learning can be formal and informal, and involve both tacit and explicit knowledge (Nonaka & Takeuchi 1995).

Local/dispersed community context

The learning environment of the local/dispersed community is the community itself. Here the learning in many cases is informal, and will involve both tacit and explicit knowledge: "Living = Learning" (IFIP TC3 Position Paper, Kendall et al. 2004).

Individual/personal context

Individual learning may be formal or informal, and depending on that will have an institutional or a community of interest learning environment: "Living = Learning and Learning = Living" (IFIP TC3 Position Paper, Kendall et al. 2004).

WHO ARE THE LEARNERS?

"Lifelong Learning can be defined as: "All learning activity undertaken through life, with the aim of improving knowledge, skills and competencies within a personal, civic, social and/or employment-related perspective" (European Commission 2000). This implies that there is no restriction on the list of the lifelong learners. (IFIP TC3 Position Paper, Kendall et al. 2004). However, it is useful to describe categories of learners and learning situations that could be made available to lifelong learners in formal and informal contexts. The OECD (OECD 2001A) identifies a four-way breakdown of the Lifelong Learning market:

1. "The early years and compulsory schooling…
2. The initial tertiary and higher education level (18-24 years of age)… characterised as learning and earning…
3. The adult or continuing education clientele… characterised as earning and learning…
4. And the least tangible and predictable, is the whole of society learning nation. …ultimate vision of enabling lifelong, life-wide, self directed and flexible learning…"

It is possible to identify many groups in each of these categories within different contexts. It is useful to think of the learners themselves who are able to benefit from the different types of lifelong learning, those who work within these sectors to support the learners and those who benefit from the new knowledge that has been constructed by the learners.

Specific groups of Lifelong Learners

We can look at a few specific groups to illustrate their role as lifelong learners.

School teachers

School teachers are:

1. lifelong learners themselves, developing their own professional knowledge;
2. to ensure that they develop their students as lifelong learners.

Many examples from the practice from schools (Invited paper Lifelong Learning, Samways 2004) and continuing and distance education illustrate the diverse impact of ICT (Invited paper Lifelong Learning, Divjak 2004), (Invited paper Lifelong Learning, Grabowska 2004), (Invited paper Lifelong

Learning, Syslo 2004), (Invited paper Lifelong Learning, Vicari & Silveira 2004).

Engineers

Engineers need to continually refresh their professional knowledge requiring new learning methods to complement, or even replace traditional course to provide more flexible, just in time learning programmes.

Third age people

Third age people (For 3rd age 2003) are a very valuable learning resource for the community, supporting other people formally and informally, learning across society, as well as supporting their own learning to enjoy their new life, whether for hobbies, new careers or formal education.

Informal groups

When informal groups appear, the question is how to value this collaboration and learning. "An interesting example of informal learning has emerged. A number of users, mainly women, have began playing backgammon online and chatting online with other participants around the world as they do so, discussing and learning about time differentials, weather patterns, national differences and so on."

(http://www.lifelonglearning.dfee.gov.uk/;http://www.scotland.gov.uk/who/elld/).

LEARNING ENVIRONMENTS

The characteristics of learning environments for Lifelong Learning can be described in several ways. In this document we distinguish general issues, pedagogical issues and software-related issues.

General issues

Learning environments in this document are broadly defined as any environment in which a person can learn. This can be a traditional classroom setting, a distance course with some face to face meeting, a course on the web, a learning community, learning on the job, workplace related learning etc. Learning environments can therefore be off- and online, supported by ICT applications such as an electronic learning environment, discussion groups, etc.

Adaptability

Learning environments should be adaptable to the characteristics of the learner, the content and the context. For instance, an inexperienced learner will have different needs than an experienced learner. Also the content of the course will have specific characteristics. Teaching a course about mathematics could be different from a course in communication sciences. Finally, sometimes it might be useful to adapt the environment to the context in which the environment is used. In this way you can take into account cultural differences, differences in background, differences in computer literacy, etc.

Flexibility

In Lifelong Learning flexibility is one of the key issues. The environment should be flexible in several ways:

- Flexibility in time and place;
- Flexibility in ease of use for the teacher and the students;
- Flexibility in re-usable content and adding new modules and materials;
- Flexibility in relation to what kind of device you use.

Flexibility in time and place is the most obvious type of flexibility. When talking about lifelong learning, many learners will not have a 9 to 5 access to a university, teachers and computer rooms. Most of the learning will be done at the working place, at home, or somewhere else. Flexibility is also needed in the ease of use of the environment for both the teachers and the learners. This is usual applicable to electronic environments where the learning takes (partly) place in an electronic way. Flexibility in re-usable content and adding new modules and materials is one of the aspects that is getting more and more attention. Re-using materials instead of re-inventing them over and over again seems to be an effective way of developing learning materials. Flexibility in relation to device will be discussed in the section about software and technical issues.

Availability

The learning environment should be available for all learners and for all kinds of learners. Therefore, when designing an environment the context in which the environment will be used (country, culture, availability of

computers, subject area, type of learner, experience in learning, etc.) should be taken into account.

Dynamical and stimulating

The learning environment should be dynamic and stimulating. This means that there should be a pedagogical model underlying the environment. This should be developed by a multidisciplinary team with technological, communication and educational people. The model underpinning the environment should be communicated to the teachers

Pedagogic issues

How do teachers and students interact in the learning environment and how is the learning environment managed for learning?

Scaffolding

Making use of scaffolding: guiding the young student, letting the older student in control. The term "*scaffolding*" was coined by Bruner (Wood, Bruner & Ross 1976) to specify types of assistance for learners. "Scaffolding" is currently used to describe how a more able mediator (other student, teacher, computational artificial agent, etc) can facilitate the learner's transition from assisted to independent performance. So, the Support (or scaffold) is a kind of assistance offered to the learner to perform some task. This support is applied according to the level of the learner with relation to a given domain knowledge. The selection of support is based on the notions of stereotype and community described by Kay (Kay 2001).

When a task is selected, there is offered assistance to achieve a solution. This assistance is temporal and adjusted to the level of the learners. It means, the scaffold process must be updated with the learner's performance. The scaffold approach includes using some "scaffold tactics" to support the activity and discussions about how and when providing some help. The assistance can be also interpreted as a "step-by-step" formation, where through mediation activity the gradual transfer of responsibility is transferred from the mediator for the learner. There are three different levels of support. The low level is adequate for those who need maximum assistance, generally in the start of the activity. The moderate level is usually suggested in the middle of the learning process, during the performing of task. The advanced

level is more used when students have a high level of confidence in their knowledge and are able to express or explain their reasoning.

Adaptability to cognitive style

The purpose of learning environments is to provide support within a specific knowledge space taking account of the learner's style of interactions. From student interactions the learner's cognitive style is identified. Then the tasks are adapted to the needs of the style, presenting suitable learning paths to the learner looking for optimal learning results. The learner model should integrate important information about the learner. For example in a digital environment: the Web log of learner interactions, a set of indexes obtained from the Web log and the most likely cognitive style pattern. A computational architecture is needed that: supports the identification of cognitive patterns, that knows how the domain is organised in the Web, that knows the psycho-pedagogical rules to support cognitive diagnostics and that knows the appropriate pedagogical strategies fitting the cognitive pattern.

Building on background and experience

The learning environment has to be close to the background and experience of the students. Learning is an interactive process and learners construct their own knowledge actively interacting with the world, interpreting their own experiences. So, a good environment enables learners to develop processes of interaction that allow them to reflect on various implications. The learning experience promoted by the environment must fit individual learner needs at each time. An instructional planner is the computational mechanism that may support this.

Collaborative work

Learning is a process of construction and interaction that can benefit from computer networks and multimedia. However, in the collaborative modality little attention has been given to affective and motivational aspects of interaction. Mainly the competitive model of traditional school class has been reproduced. It is necessary to create an educational model of distance learning which privileges the collective and the social and not just the individual.

Evaluation of own performance

Learning environments may offer tools to student for self-evaluation. These tools, in majority questionnaires, ask students to evaluate how well they think they did. These self-evaluations promote introspection and help to build the learning experience.

In the case of a digital learning environment, this will provide information about student performance like number of mistakes, success, time spent on a particular task, login/logout time, number of participations in a particular chat etc. However, motivation is the key in learning, and emotions have an important role when we talk about motivating the student. Therefore failure and doubt can be used for self-evaluation and reflection. A digital learning environment may propose a self-evaluation and decide on the level of confidence as variable to be taken into account in the evaluation process

Motivation

The learning environment should be stimulating and motivating, including enough communication and feedback. Nowadays, with the Internet, there are powerful technological tools available for distance education, which provide a rich and interactive environment for study. A big information base is available on the Web and through other Internet tools. The question is how to internalise all available information. Pedagogical theories, such as the socio-interactionist theory (Vygotsky 1962), may be used to augment the cognitive potential of the student and the motivation for learning.

Researchers are working on improving the interfaces. Technologies such as virtual reality (Rickel, Johnson & Steve 1996), animated agents (life-like characters) (Johnson, Shaw & Caneshan1998) may make the learning more attractive and entertaining, as may taking account of affective and emotion (Bercht & Vicari 2000). Multimedia offer great and new possibilities of learning that sometimes cannot be experienced in the classroom, as for example in virtual reality.

Assessment and testing

The way students work in a learning environment may force us to change our way of testing and assessing. Learning assessment is a challenge for teachers in distance education because there is no physical presence of the

students. The evaluation process therefore should include a variety of evidence that goes beyond the traditional final examination based on paper and pencil. In a face-to-face context, teachers use more than just formal mechanisms to evaluate students. Body language, the participation, and quality of questions proposed by students are used by the teachers as indicators of learning. But in distance education normally only the formal mechanisms are used. Authentication ("how to know if it is really the student logged in") and legal aspects ("can an online evaluation be used?") play a role. Common means of assessment in distance education are: individual work sent by regular mail or by email, assessment based on contributions for group discussions, tests (automatically handled by computer program), term papers (analysed by professor or assistants) and oral or written tests conducted in the presence of the instructor (some times through videoconference) or with a remote assistant. The primary reasons for having assessments are: providing feedback, giving grades, and motivation (Hack & Tarouco 2000).

Learning theories state that group learning has significant relevance and must be supported also in distance education. But there is lack of good tools to help evaluate the participation of distance education students in group activities (Jaques & Moreira de Oliveira 1999). However, thanks to the evolution of networks and computers and specially the Internet, mechanisms that can fill this gap have been created little by little. New tools have been provided to keep track of students' activities and interactions within the learning environment, with colleagues and with the professor. This kind of information presents new opportunities for monitoring the way students learn and for learning assessment (Hack & Tarouco 2000).

Software /technical issues

These issues concern software conception, design, and development. The focus should be on services offered instead of on the technology. Much is already available. Among the issues are the following.

Tool architecture

Architectures usually are very implementation-oriented: they provide schemas to build systems. A great variety of architectures is used for distance education systems: client-server architectures, pedagogical agents (the system is formed by intelligent computational systems), platform dependent and others. The choice of the architecture depends on the

functionalities that is required of the system. For example, an agent-oriented architecture is more complex, but can accomplish more interesting activities such as to maintain a user model, to offer artificial tutors and so on. Theoretical foundations for such tools are, for example, instructional, training, social model and collaborative learning. Clearly there is no teaching without learning. Therefore it is necessary to look for an approach, to establish learning strategies, which foster shared understanding and distributed solution of problems. Formal models come into place, as we are interested both in describing and analyzing the behaviour of the tools.

The *distributed classroom model* may have small satellite groups of students at locations outside of the 'home' classroom. The instructor and school control these, with little control exercised by the student. This traditional system requires synchronous communications. However, visual contact greatly enhances learning and may be crucial to the success of the learning activity. Direct e-mail, computer moderated classrooms (CMC), or message boards may aid in student learning through additional instructor feedback.

The *independent learning model* relies on numerous telecommunication tools and Internet resources. A student may utilize e-mail, e-mail discussion groups, CMC, or a message board. Asynchronous tools allow for the learner to set their own pace, "although the learning goals should drive the selection and use of the technology".

The *open learning plus class model* involves traditional printed text and computer disks or videotape. The class meets at appointed times for the instructor led portion, using online tools to enhance the model rather than act as the main tools for delivery. The use of both asynchronous and synchronous systems provide for a wide variety of applications by the student and instructor in this model.

Ergonomic interfaces

Ergonomic interfaces are important to:

- Add expressive power to presentations;
- Help students perform procedural tasks by demonstration;
- Help students without distracting or distancing them from the learning experience.

Robust artificial personalities allow study of the implementation constraints, effectiveness and appeal of social interaction between a system and students. The agents (personalities) are capable of expressing emotions, based on theory, through various multimedia manifestations. Emotions are

important in human social situations as a by-product of goal-driven and principled (or unprincipled) behaviour, simple preferences, and relationships with other agents. By intelligent reasoning automated tutoring systems may make use of a subset of these techniques which in principle are only associated with human teachers.

24 hours, 7 days a week

Distance courses should be available for being accessed by students at any time, since many students access the virtual class after the work. At the same time students meet a lot of technological difficulties. Therefore the technological infrastructure, with the necessary support, should be available to the students 24 hours a day. 7 days a week.

Student log files and control information

Mechanisms are being developed that allow us to keep track of student activities and interactions with their learning environment, with their peers and with the professor. This information may be used to evaluate performance and participation of the students in virtual classes. However, this use must fit social and cultural values; there are, for instance, differences between the USA and Brazil in this. In principle this use should reflect the real-life situations in the reality of a specific country's economic life, social life, ICT-life and personal life.

Flexibility in device

It should be flexible what device you can use: computer, mobile phone, etc. Lifelong Learning must be adaptable to the student ICT reality (Mobile Learning, Network learning, Home learning, work learning, community learning). Different realities present different access facilities (net speed, computational capacity, cost, etc.).

Platform independence

Some distance courses use a complete digital learning environment which offers all the necessary tools to the students in an integrated way. Other courses use tools available freely on the Internet. In any case, platform

independence is an issue, since students access the virtual environment from their houses or offices. With this in mind tools use client-server technology (as for example, CGI, Java Servlets, Perl, etc.) to construct dynamic web pages which can be shown in any web browser independent of platform.

SUSTAINABILITY OF LEARNING ENVIRONMENTS

Governance of Lifelong Learning systems

"To create effective Lifelong Learning systems, countries need to make significant changes to both the governance and financing of education and training. In many OECD countries governments that once focused exclusively on public financing and public provision of education and training are now trying to create flexible policy and regulatory frameworks that encompass a wider range of institutional actors. These frameworks include legislation and executive orders, arrangements for ensuring coordination across ministries and other institutions involved in education and training activities, and mechanisms for certifying the achievements of learners, monitoring institutional and system performance, and promoting learning pathways. *Within this framework, the role of incentives is critical.*" (World Bank 2002B; p.xii)

Motivation as internal driving force

Lifelong Learning may take all kind of forms - Mobile Learning, Network learning, Home Based learning, Work Based learning, Community Learning-, but it is essentially a social activity involving interaction with others. ICT comes in to support these interactions from anyplace at anytime. For this social process to be sustainable the motivation of the students must be sustained. Self-motivation is the driving force in the social process of Lifelong Learning. It is therefore important in the learning process that it should lead to positive action, motivating to learn more. The process invites the learner to evaluate results and perceive the action as positive. Proper management of student perceptions therefore is a key to sustainability. The age profile of learners will change, as Lifelong Learning is from cradle to grave, for example retired people will take part. Also in their case it is self-motivation that is the driving force to learn.

In Lifelong Learning progression and personal achievement are important. It is not what students can reproduce that counts, nor the solution of artificial exercises. What counts is what the student is able to achieve in real-life situations, be it in real economic life, real social life and real personal life, measured by common, realistic real-life standards. This, however, raises the question: What to do then about the socially excluded? What to do with people who cannot motivate themselves or be motivated to progress to personal achievement?

Lifelong Learning can be self-fulfilling, leading to positive action by individuals and groups to make a different, perhaps selfishly, but generally for a perceived wider social benefit. Imagine the impact of a school intranet that provides continuous information, regularly updated in real-time, offering opportunities for all members of the school community to actively participate in decision making, even polling on the quality of aspects of the school, including the teaching. (Kendall 2000)

Inclusion

As Lifelong Learning is a social process it is only sustainable when there is social inclusion: Lifelong learners in general must be part of a community or team, informal or formal, in order to be able to learn. But also digital inclusion is important to be able to take part in the communication and to access resources that are more and more (only) digitally available.

In achieving social and digital inclusion it is essential to consider all ages, from birth to grave, and not to exclude through oversight or ignorance. The needs of individuals will not be determined exclusively by their age, but by their social and economic context. This implies personalised formats and content.

Cost effectiveness

Cost effectiveness is essential for sustainability. With Lifelong Learning becoming a necessity in a continually changing world, the sheer scale of the learning makes it impossible for all learning to be teacher supported or teacher coached. Much learning will have to be organised in such a way that the learners themselves guide the learning en evaluate the learning. In this they must be supported by tacit or explicit operational knowledge in the form of patterns of action. These patterns of action will have to be developed, so there are innovation costs involved in Lifelong Learning.

Capacity building for knowledge creation

In order for any community to function effectively, to be sustainable, it requires the capacity to grow, based on a capacity to create new knowledge and situations which sustain economic and social improvement for the benefit of all citizens. For example, the Swedish "...government stresses the necessity to develop skills and knowledge in the workplace, in order to widen employee's opportunities, and ensure the continuing strength of business and community." (OECD 2001 A) Lifelong Learning will only be sustainable in communities that sustain capacity building for knowledge creation.

ROLE OF EDUCATIONAL INSTITUTIONS

Societies that want to sustain capacity building for knowledge creation, and therefore Lifelong Learning, should demand that formal educational institutions (formally responsible for education, spending public money) play a new role. They need to keep the student interested in learning, motivated and prepared for Lifelong Learning. Schools in primary education provide the fundament for this.

Needs of the learners

There is a demand (person-, labour market-, or society-conditioned) for the following learner skills:

- Methodological skills (learning to learn, learning to create knowledge, pursuing Lifelong Learning, coping with risk and change);
- Interpersonal skills (teamwork, leadership, communication skills);
- "Technical" skills (literacy, foreign language, mathematics, science, ICT skills, information processing, problem-solving, analytical skills).

Educational institutions should learn to provide educational environments where the learner can develop these skills in such a way as to benefit from these in real-life.

Requirements for teachers

Teachers should be able to coach the learners in Lifelong Learning and be Lifelong Learners themselves. They should:

- Be pedagogically literate in Lifelong Learning and adopt a another role (counselling, interpersonal skills, …);
- Know how to create, promote and integrate innovations;
- Be competent ICT users.

With respect to ICT four different stages of development have been identified (IFIP ICT in Higher Education, Buettner et al. 2004) in the way teachers may master ICT:

1. When the educational institution is in an *emerging stage* of development, teachers will **discover** ICT tools and their general functions and uses; this implies ICT literacy and basic skills.
2. When the institution is in an *applying stage* of development, teachers learn **how to use** ICT tools and learn to make use of them in different disciplines; this implies general or particular applications of ICT in the different subject areas.
3. When the institution is in an *integrating stage* of development, teachers learn to understand **why and when** to use ICT tools in achieving a project; this implies recognising situations where ICT will be helpful, choosing the appropriate tools and combining them for solving real problems.
4. When the institution is in a *transforming stage,* becoming a centre of Lifelong Learning for the (professional) community, ICT has become a ubiquitous tool. ICT is an integral though invisible part of daily personal productivity and professional practice. Teachers, students and management creatively **rethink and renew** institutional and curricular organisation. The focus of the curriculum is now learner-centred and integrates subject areas in real-world applications.

Requirements for educational organisations

What is required of the school as organiser of Lifelong Learning? The school must pay attention to:

- Resourcing;
- customers' needs awareness;
- matching opportunities to interest;
- dealing with change and innovation;
- entrepreneurship and risk management;

– partnership approach (internal and external).

The educational organisation should address all of these issues in the following areas (IFIP ICT in Higher Education, Buettner et al. 2004).

Vision

"This refers to the aspirations and goals of both individuals within an institution and within the institutional system as a unified whole. As the system advances, the vision should become more unified, be written down, and provide a basis for decision-making. It should help individual members of the learning community visualise the future and act in harmony.

Philosophy of Learning and Pedagogy

This refers to ways in which teachers and students interact and the system is managed for learning. These philosophies will necessarily characterise the ways in which ICT is incorporated into the system. A setting that is dominated by the teacher as the provider of content, is a teacher-centred philosophy. ICT in this setting is controlled by the teacher as well. A learner-centred philosophy describes a setting where content comes from a variety of resources, then projects are chosen and designed by the student. ICT tools and resources are selected to by the student to match the project.

Development Plans and Policies

This refers to the detailed steps of how the vision and philosophies are carried out. In this plan, goals and objectives are further defined providing interim and long-term targets. Policies are set, budget is allocated, facilities are dedicated, roles are defined, tasks are delegated, and an evaluation plan is created to define the direction ICT development will take.

Facilities and Resources

This refers to the learning environment in which ICT is used. It includes infrastructure such as, electrical wiring, internet access, lighting, air-conditioning, and space. Decisions on inclusion or lack of ergonomic design and choice of furniture impact not only use of ICT, but the health and well-

being of users. This area also includes various types of technological devices from computers with peripherals and video equipment to specialised tools like digital microscopes. Resources include various types of software as well as traditional tools like books, videos, and audio-tapes.

Understanding of the Curriculum

This refers to the progression of ICT in the curriculum in following various stages of development. First (A.) is an awareness stage in which students become ICT literate with regard to what is available and how it might be used. Second (B.), as students learn basic skills, they begin to apply various ICT tools to their regular tasks and projects. Third (C.), as students become more capable and confident with ICT, they begin to integrate and overlap both subject areas and tools. Last (D.) is transformation of the learning where students are now enabled to tackle larger, more complex, real-world professional problems.

Professional Development of Institution Staff

This involves various stages of development that parallel the curriculum for students. The personal productivity and professional practice are enhanced with the use of ICT. First, is an awareness stage (A.) in which teachers and staff become ICT literate with regard to what is available and how it might be used. Second (B.), as teachers and staff learn basic skills, they begin to apply various ICT tools to their regular tasks and projects. Third (C.), as teacher and staff become more capable and confident with ICT, they begin to integrate and overlap both subject areas and tools. Last, is a change in professional practice in which teachers are now enabled to design lessons to incorporate larger, more complex, real-world projects using ICT tools and resources. As ICT is introduced into systems, there is a tendency to move from discreet skills training to reflective practice and integrative professional development. Budget allocation and provision for release time for professional development seriously impacts the ability of the system to incorporate ITC in a meaningful way.

Community Involvement

Community involvement may include parents, families, businesses, industry, government agencies, private foundations, social, religious and professional organisations, as well as, other educational institutions.

Assessment

This includes both assessment of students, as well as overall assessment of the system. These two parts are intricately interwoven. An improvement in one area should predicate an improvement in the other. Means of student assessment should reflect choices in learning pedagogy and the understanding of ICT in the curriculum. For example in the emerging and applying stages of ICT, assessment may be linked to pencil and paper test, while in the in integrating and transforming stages project based portfolios may be more appropriate. Each area of the system as described in the matrix should be assessed to determine its the impact on learning. Assessment should inform practice and support the management of learning. It should allow the system to determine whether outcomes have been met, then, review and revise accordingly. Budget allocations, policies and procedures for ICT should match vision, philosophies, and curriculum choices." (IFIP ICT in Higher Education, Buettner et al. 2004)

Focus on the University

Universities are crucial for innovation

"Tertiary education institutions have a critical role in supporting knowledge-driven economic growth strategies and the construction of democratic, socially cohesive societies. Tertiary education assists the improvement of the institutional regime through the training of competent and responsible professionals needed for sound macroeconomic and public sector management. Its academic and research activities provide crucial support for the national innovation system. And tertiary institutions often constitute the backbone of a country's information infrastructure, in their role as repositories and conduits of information (through libraries and the like), computer network hosts, and Internet service providers. In addition, the norms, values, attitudes, and ethics that tertiary institutions impart to students are the foundation of the social capital necessary for constructing

healthy civil societies and cohesive cultures—the very bedrock of good governance and democratic political systems.

To successfully fulfil their educational, research, and informational functions in the 21st century, tertiary education institutions need to be able to respond effectively to changing education and training needs, adapt to a rapidly shifting tertiary education landscape, and adopt more flexible modes of organisation and operation." (World Bank 2002A; p.23)

Issues to be addressed:

1. The role of academic knowledge and that of operational knowledge;
2. Impartiality, independence;
3. University role as validator of new knowledge;
4. Need for an independent body for academic accreditation;
5. Need for changes in university organisation, in teaching, in management;
6. Need for sustainable multi-disciplinarity.

University organisation for innovation

"Innovations can benefit from the university as an organisation in three ways:

- 'Weight' of the university when it comes to influence, money, size, critical mass, external network;
- University as knowledge network in which educational issues such as innovation, staff development and use of ICT are addressed, where these are separate from the specific subject context;
- University as managing environment which directs developments.

These benefits do not materialise automatically, but have to be organised. In all cases this involves addressing issues which are independent of the subject-specific context." (Hogeschool van Utrecht Position Paper, Hezemans & Ritzen 2004B)

Regional role

Universities not only are educating high quality graduates, but also have a central role in creation and transfer of knowledge creation within social networks designed to stimulate regional innovation. Higher education is affected by the 'international restructuring race' within a 'borderless' supply chain'. Universities need to co-operate with multiple stakeholders with diverse backgrounds, interests and aims. What will emerge are extended

higher education networks taking form as flexible, interfacing learning communities, with roots in ICT and Lifelong Learning (Go & Weert 2004).

Need for a sustainable interface to the Lifelong Learning market

Mihnev and Nikolov (2004) have outlined a model of a university interdisciplinary structure, termed "interface structure", which could serve as a university 'interface' giving direct service to the Lifelong Learning market. It is designed in such a way as to both long-term survive within the university and to be competitive and self-sustainable on the external learning market. The critical key characteristics are:

1. Business management
   Assures external competitiveness
2. Internal (university) political management
   Assures the within-university long time survival.
3. Marketing (internal and external)
   Transformation of the university "supply"(advanced knowledge and teaching) in ready for use, marketable learning products.
4. Learning design
   Integration of the market learning demands into the learning "products" to be offered.
5. Teaching (delivery) of Lifelong Learning skills
   Assures acquisition by the learners of skills and competencies needed for learning through life. Regular university teaching does not have as a prime concern for these skills (Bridges 2000; pp. 44-48).)
6. Learning (and particularly e-Learning) infrastructure and facilities
   May be considered as continuation of the learning design function.
7. Strategic internal Human Resource Development
   Continuous development of the internal and external expert staff.

All of these characteristics are critical; to neglect any of them will *not* lead to the desired Lifelong Learning results nor to the long-time sustainability of such a structure. Incentives for all actors and for all stakeholders are crucial. (Mihnev & Nikolov 2004)

ROLE OF ICT

For many educators and indeed for many learners, ICT appears to hold the key to the successful implementation of Lifelong Learning. The capacity

of the technology to overcome temporal and spatial constraints has obvious synergies with the need to learn at a time, place and rate determined by individual requirements rather than by formal structures.

Proactive ICT

The ICT environment supporting the Lifelong Learning should be proactive in the sense that it should react autonomously according to the current user's context (his current environment, his skills, previous experience and habitudes) and not just wait for her/his demand.

Transparent ICT

The ICT should be transparent from the user's point of view. It should for example not present additional overload and feedback without time delays. Its use should be intuitive and natural.

ICT for interaction

Aside from the obvious advantages in implementing a flexible 'any time, anywhere' approach to learning, there are more subtle benefits to be derived from online educational environments. The fact that electronically mediated communication is qualitatively different in a number of respects from face to face interactions (Dowling 2000A), (Dowling 2000B) does not necessarily suggest that it is any less effective in facilitating learning. When we consider the primacy of electronic communication both in the workplace and in the personal lives of today's students, this is an extremely 'natural' medium for them in relation both to the acquisition of information and to their preferred mode of social interactivity.

Online communication may not 'replicate' its face to face equivalent, but it is becoming the interactive medium of choice particularly for many young people, who embrace with enthusiasm qualities such as speed of response, unstructured access, and the immediate plunge to the core of meaning characteristic of SMS messages. This latter mode of interaction has recently been reported as apparently overtaking email in popularity. "More than 40 per cent of people aged 15 or older in Europe's three biggest economies use short messaging service (SMS) on cellular handsets, while 30 per cent use computer email, says research company GartnerG2" (McLuskey 2002). Such

a shift in preferred mode of interaction for both social purposes and in the workplace may mount even greater challenges to the educators of the future as they strive to maintain 'relevance' to their students of all ages and to the world in which they will live and work.

Student control

In addition to 'relevance', computer mediated educational environments have a number of other potential advantages in relation to learning at different stages of life. Factors which may encourage particular students to participate more freely in the social negotiations characteristic of knowledge construction include a degree of anonymity and of student control over the persona presented to the rest of the group. In the absence of a number of social 'markers', including indicators of age, some students may feel more able to participate actively in discussion. The ability to opt in or out of discussion, or to interact outside the constraints of 'real time' environments, can also provide the more diffident or reflective student with the temporal 'space' needed in order to contribute a considered response.

In the literature of pedagogy much is made of the notion of the 'reflective practitioner'. Are the needs of the 'reflective learner' as well catered for, particularly in face to face learning environments? In terms of Lifelong Learning, one can conjecture that such flexibility might be of particular value, for instance, to the complex situation of the more mature learner who is bringing a great deal of prior knowledge to the learning of sophisticated material.

The ability to operate within one's own time frames can also be helpful not just to students but to the teacher in responding to their communications, as can the capacity to communicate as appropriate with either a selected group or with an individual. The ability to structure pedagogical communication in this more 'targeted' way is significantly enhanced in many online environments, and would be particularly beneficial when dealing with student cohorts of mixed ages and prior experience (Dowling 2004A).

ICT services

ICT should provide a technical environment for Lifelong Learning and enable the changes. ICT is a channel for information and educational resources. The ICT services include (Go & Weert 2004):

- "Personal communication (finding and interacting with resources, organisations and people),
- Organisation of activities (planning, scheduling, monitoring),
- Information management (organising, storing, creating and sharing of information),
- Organisation of team and community learning (group work).
- Navigation systems (mobility guidance; business and leisure travel)".

With respect to online learning a great deal of this is conducted through the medium of software 'shells' – programs which enable teachers or instructors with little expertise to readily insert their course materials into predetermined structures. Most of these products include provision for course schedules, course materials, links to appropriate websites, testing of students' skills and knowledge, different types of record keeping and, very importantly, a range of options for facilitating communication. Typically these features might include areas for students to publish information about themselves, email capability, bulletin boards, chat facilities and so on. The types of communication facilitated would normally encompass teacher-to-student-group, teacher-to-individual-student, student-to-teacher and student-to-student, in both synchronous and asynchronous modes. In more general discussion of online communication it is customary to also distinguish between 'public' modes of interaction such as bulletin boards and contributions to email lists or 'open' chat environments, and 'private' one-on-one exchanges such as individually addressed email messages which clearly fulfil a different purpose.

Digital versus face-to-face

How do these opportunities for person-to-person interaction compare with those available in the face-to-face classroom? Traditional classroom organisation favours the teacher-to-student-group model, with some provision for communication between the teacher and an individual student although, when this takes place within the very public space of the physical classroom, it generally suffers to a considerable degree from a lack of privacy and confidentiality. In addition, with the rest of the class physically and often quite intrusively present, the teacher is unlikely to be able to concentrate his or her entire attention on the individual student. Traditional classrooms also incorporate some potential for student-to-teacher communication, although again this could rarely be classed as 'private' or individual communication in the usual sense. While student-to-student communication is facilitated in many face-to-face classrooms, often through

organisational structures such as 'group work', there are generally severe limitations imposed on the time and place at which this type of interaction is permitted. Opportunities for un-mandated discussion between students do occur, but often the necessarily furtive nature of such communication diminishes its potential contribution to learning.

By contrast, the variety of modes of communication available within most online learning environments provides flexibly for a range of different types of interaction to be undertaken. In a recent evaluation of courses offered in a combination of face-to-face and online modes, it was noted by this author that students and teachers like reported that they appreciated the ease with which communication could be facilitated both privately between individuals and between members of different sub-groups of the class identified for particular purposes.

Handheld devices

More extreme facilitation of 'any place, any time' learning might well occur not through the traditional computer interface, but through the medium of portable handheld devices such as are currently coming on the market. Many of these already have the ability to combine auditory and visual data, including video representations of the speaker, with textual information. Furthermore they operate in a wireless environment, unencumbered by the need to be 'plugged in' (Multisilta 2003). While traditionalists might balk at the idea of delivering instruction by means of a device that permits such a small amount of information to be visible at a time, it should be acknowledged that many young people now conduct much of the important 'business' of their lives through the medium of text messaging. As reported recently, "More than 40 per cent of people aged 15 or older in Europe's three biggest economies use short messaging service (SMS) on cellular handsets, while 30 per cent use computer email, says research company GartnerG2" (McLuskey 2002). The recent expansion of Instant Messaging (IM), a computer-based application already extremely popular in the business world, into the mobile phone environment, introduces a further element with the potential to change the way in which we interact for work, leisure and also study.

Software agents

Another area rich in potential for encouraging interactivity within online learning environments is the use of software agents, computer programs

possessing varying degrees of 'intelligence', autonomy and personification, as participants in the social interactions that mediate learning (Dowling 2002). The roles that can be undertaken by these electronic constructs are rich and varied. Many of them, such as information retrieval and record keeping, incorporate a minimal 'social' component at best. Others, however, are specifically designed so as to enhance both the quantity and the quality of the interactions taking place within the online environment (Dowling 2004B).

ICT policy framework

According to the World Bank "ICTs can facilitate learning by doing (through computer simulations, for example). They can vastly increase the information resources available to learners, thereby changing the relationship between teacher and student. They can facilitate collaborative learning and provide rapid feedback to learners.

These outcomes do not emerge simply by introducing computers into the learning setting, however. An appropriate policy framework is needed in which ICTs are used to tackle educational problems, significant investment is made in training teachers and managers to change their knowledge and behavior, qualified technicians and support staff are available, and funding for maintenance, access to the Internet, and upgrading is sustainable. These conditions are rarely met, especially in developing countries." (World Bank 2002B; xi-xii).

Educational innovation leads the way; ICT follows

The starting-point is always education, students' learning, the learning process. Organisations have their own individual student population and professional field and realise their education in their own way. There is diversity between educational programmes also because there are differences in the phase of ICT development in the professional field and in the programme. The phase of development determines the approach which is chosen for the further use of ICT. Programmes in an earlier phase of development will focus attention mainly on bringing knowledge and use of ICT up to a basic level. Those in advance do not need to be held back by those further behind; programmes which for a variety of reasons may find themselves in an earlier phase (compared to others) do not need to be rushed by the innovators (but as far as possible supported by them). (Hogeschool van Utrecht Position Paper, Hezemans & Ritzen 2004B).

eReadiness

The extent to which ICT can play a role in educational situations, is limited by the level of eReadiness. It has to be taken into account that 'e-Readiness' not only depends on availability of technology, but also on other factors. A white paper from the Economist Intelligence Unit in co-operation with IBM (http://www.eiu.com) defines E-readiness as the extent to which a country's business environment is conducive to Internet-based opportunities. E-readiness factors include:

- Connectivity and technology infrastructure
- Business environment
- Consumer and business adoption
- Legal and policy environment
- Social and cultural infrastructure
- Supporting e-services

These same factors apply to individual (educational) organisations.

NEED FOR CHANGE AND INNOVATION

Need for change

The following is quoted from the Hogeschool van Utrecht (University for professional education) Position Paper (Hezemans & Ritzen 2004B).

"Continual change"

Continual change in education is not optional but obligatory. The workforce which is needed is changing: knowledge workers. Social developments are taking place which compel the university to make changes in the education it offers. ICT often plays an essential, but also obvious role in this. Education has to face a seemingly chaotic world; gradual and continual change will allow education to move from the chaotic to the more structured and evaluated.).

Change in student population

The student population (target group) is changing into lifelong learners. Business and institutions in the professional field served by the university require knowledge workers whose main task is to acquire and process facts and information. They work together in (often multidisciplinary) teams. A large measure of independence and responsibility is expected of them. ICT is of great importance: in office equipment and communication tools, but also in field-specific ICT applications.

Change in programme and organisation

The study programme and its organisation are changing from supply-based to demand-based. Institutions for higher education are developing from supply-based into demand-based organisations. This applies not only to the educational process itself, but also to the way education is organised, the administrative and managerial organisation. The manner of work normally adopted outside the university is brought into the university and applied to the learning and working process. Changes are needed to come to flexible (in) formal recognition of acquired skills and knowledge (e-certificates?), any time, anywhere, taking account of the fact that knowledge is incremental, but also 'decremental (forgetting)'.

A shift is taking place from the designing and implementing of curricula and courses to the organisation and facilitating of learning processes: students become the owners of their own programme, not the university. In initial education students acquire competencies which enable them to function as starting professionals and they will continue to develop these and other competencies while working and living, for the rest of their lives. The programme is arranged so that the student can actively acquire these competencies together with others. Learning takes place along a personal learning path, an individual course of studies. The students are responsible for their own learning process. They share in decisions about how and where their education will be realised. All kinds of processes have to arranged differently: both formal (systems of monitoring student progress, registration systems, funding systems for public and private money) as well as informal (the atmosphere, methodology, styles and roles). As in the professional field, ICT facilitates organisation and the exchange of information.

Changing role of the teacher

The tutor's role is changing: from the transmission of knowledge to the organisation of learning processes. This sort of learning demands new forms of supervision and assessment.. The tutor's role becomes that of coach in a shared learning process and an expert to be called on when needed. The task of the tutor is to facilitate the learning process and to assess students. Students record their progress in a digital portfolio. ICT resources are a basic requirement for communication between tutors and students and among students, as well as for finding, acquiring and processing the necessary information. As in businesses and institutions increasing use is made of GroupWare applications, including digital learning environments."

Competitive necessity

In conclusion it can be said that social developments compel the need for change. The University of Professional Education Utrecht will have to increase the trend towards more individualisation and flexibility. The university will have to strive towards diversification in target groups, more combination of learning and working, and more assignments commissioned from the field. And these ambitions will have to be realised in a cost effective manner.

In some fields this could lead to competitive advantage. But above all it is simply a necessity for continuing to operate in a fast-changing education market where slowly but surely more and more international players are coming into the field. In these terms, it is not so much a matter of competitive advantage, but of competitive necessity." (Hezemans & Ritzen 2004B).

Gradual change in stages

The following is based on (IFIP ICT and Higher Education, Buettner et al. 2004). ICT related change in higher education shows four typical stages in the development of the situation in a particular institution. The stages are:

1. Emerging,
2. Applying,
3. Integrating,
4. Transforming.

1. Emerging

Here the higher education institution is in the beginning stages of ICT development. The institution begins to purchase some equipment and software. In this initial phase, administrators and teachers are just starting to explore the possibilities and consequences of adding ICT for institution management and the curriculum. The institution is still firmly grounded in traditional, teacher-centred practice. In this stage an ICT-curriculum is indicated that increases the basic skills and awareness of the uses of ICT. This curriculum assists movement to the next approach (Applying) if so desired.

2. Applying

In the institution a new understanding of the contribution of ICT to learning has developed. Administrators and teachers use ICT for tasks that are carried out in institution management and in the curriculum. Teachers largely dominate the learning environment. The institution's best choice is for an ICT-curriculum that increases the use of ICT in various subject areas with specific tools and software. This curriculum assists movement to the next approach (Integrating) if so desired.

3. Integrating

In this stage the institution has a range of technologies both in laboratories, classrooms and administrative offices. The institutional staff explores new ways in which ICT changes their personal productivity and professional practice. The ICT-curriculum begins to merge subject areas to reflect real-world applications.

4. Transforming

In this stage the institution has used ICT to creatively rethink and renew institutional organisation. ICT becomes an integral though invisible part of daily personal productivity and professional practice. The focus of the curriculum is now learner-centred and integrates subject areas in real-world applications. ICT is taught as subject area at the professional level and incorporated into all vocational areas. The institution has become a centre of Lifelong Learning for the (professional) community.

Implementation method needed

Implementation of lasting change is a complex process that should be supported by an implementation method, for example the implementation model (Dekker 2002) that is being used at the University of Amsterdam. It consists of six steps:

1. Orientation;
2. Describing the current situation;
3. Determining the ambitions;
4. Determining the interventions and activities;
5. Carry out the interventions and activities;
6. Evaluation.

The first step of orientation actually raises awareness within the department of what it is they want to do: for example implementing an electronic learning environment. Attention is paid to technical and financial issues, to gaining commitment from both management and academic staff, organising the support and staff development and planning the strategy for the implementation process. In step 2 a quick scan in which all relevant information about the department in relation to ICT in education is collected can be used to describe the current situation.

The third step is one of the most difficult steps in the implementation model: determining the ambitions. Or, in other words, describing the goals and developing a vision: why do you want to implement an electronic learning environment department-wide? One of the methods that is used in this step in the implementation model is a method in which scenarios are developed to develop a vision. In these scenarios a specific future use of the learning environment is described, with consideration for the users and the context of the use of the environment. The scenario makes both the future and the expectations of this future tangible.

Implementing change

The experience so far (Fisser 2004) with this implementation model that is being used at the University of Amsterdam, shows that it is most important that starting-point is the faculty or department itself. The faculty or department must be the owner of the project and not another group, such as an expertise group in a central university unit. This leads to more commitment and awareness in the faculty or department. But it also raises questions about the responsibilities and roles of the persons within the faculty and the responsibilities and roles of the learning technologists of the

central support unit. Who should carry out which parts of the model? When does the faculty need the support and advice of the central support unit? And, does it need this support and advice?

The knowledge that has been build up at this moment suggests that the orientation stage (step 1 in the model) requires someone from outside the faculty, someone who asks questions and thereby raising awareness about the actual problems. Also, guidance in the process of developing the vision and the strategy is usually appreciated by the faculty managers. Carrying out interventions and activities seems to be something that faculties and departments prefer to do themselves, but with monitoring (at some distance) by the learning technologists from the central support unit. The same is true for the evaluation part of the model. Probably the responsibilities and roles of the persons within the faculty and those of the learning technologists of the central support unit will differ between projects, but this is something that should be taken into account during the first step of the model.

Also account has to be taken of managers perceived lack of time: for example, three meetings are found too much to schedule in the day-to-day activities. Also, the preparation that is required before each meeting is seen as useful, but has no priority in relation to the regular tasks of the manager.

Sustainable change

When looking at the changes that Lifelong Learning requires in educational institutions, we should bear in mind how change processes take place from the organisational theory point of view. Mihnev and Nikolov (2004) have stressed the following characteristics, summarizing from Clarck's work (Clarck 1983; pp.202, 209-212):

1. Research universities are inner-directed – first to their research interests, and then, only secondary to the interests of their students and "customers";
2. Teaching colleges and Higher Education institutions have different orientations;
3. When students are abundant universities tend to follow the internal staff desires and place teaching and services on a take-it-or-leave-it base;
4. When students or resources are in short supply, institutions tend to think more about what attracts students and are more responsive to the external needs;
5. When a new university structure appears (structural change) it tends to appear on a base of diversification of a discipline (birth of a new sub-discipline), which tends to immediately identify its own distinguished field of specialised study. Interdisciplinary or cross-curricular structures

are neither favoured nor highly regarded by the under-structures (this is not generally the case with the institution management level). Such structures tend to be the first "victims" to be sacrificed in hard times, thus being in unstable position unless managing in time to take root in the individual institution system of beliefs. See also (Bridges 2000; pp.44-48)

6. Change frequently occurs as a result of an intersystem perspective (international transfer is a major route of change);
7. The change, which is translated into prestige and honour for the group as well as the individual, encourages the under-structure clusters to seek and to maintain high rank in the direction of that change."

The above research findings can be of help when designing and implementing sustainable Lifelong Learning.

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Keynote: New Higher Education for Lifelong Learning

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Abstract: Economical, societal and cultural developments in industrialized countries push for educational innovation with Information and Communication Technology (ICT) as an important enabling factor. Moving from industrial to knowledge intensive economies there is a need for *modern professionals*, knowledge workers with new qualifications. For the modern professional, lifelong working is identical with lifelong learning; the modern professional is a *learning professional.* Innovation is the driving force in a knowledge intensive economy and for innovation new knowledge is needed. The modern professional therefore is a *knowledge creating professional.* Also businesses and organisations need new strategic *business-knowledge* to be able cope with demands from a rapidly changing environment. Modern organisations are therefore *learning organisations.* Higher Education, as a breeding place of *modern professionals,* needs to redefine its role. The more so, because a new generation of students is in the making: the media generation. A new educational paradigm of the *learning organisation* may serve both initial phase, and lifelong learning students. *Situation based learning environments* may be the materialisation of this new paradigm.

Key words: economic perspective, innovation, knowledge creation, learning organisation, learning teams, Lifelong Learning, modern professional, situation based learning, virtual learning organisation

CHANGES IN OUR ENVIRONMENT

In rich countries the working and living environment is changing. Take for example The Netherlands, a European country with more than 16,000,000 inhabitants and a gross national product of 430,000,000,000 Euro. In this small country the economical, social, cultural and political environments are changing.

Economical environment

Demand for knowledge workers

In the Netherlands there is a trend towards knowledge intensive production and service providing, called 'knowledge economy'. Take air transport as an example. Amsterdam airport is a major hub which rates high with travellers because of its clever logistics. Schiphol airport's logistical knowledge has become an export product, providing added value. The 'knowledge economy' raises a demand for knowledge workers. The Dutch social-economic advisory board to the government, for example, expects a shortage of 200,000 higher educated workers in 2003 developing into an expected shortage of 400,000 in 2007 (SER 1999).

Working and learning melt together

To keep up with developments in a knowledge intensive economy (knowledge) workers need to adapt continuously to new developments: they are in a process of Lifelong Learning. "In the old economy, the basic competences of the industrial worker, bricklayer, or bus driver were relatively stable. True, you might have applied these competencies to different situations, such as different construction sites, but the learning component of your labour was small. In the new economy, the learning component of work becomes huge. ..... Think about your own work. Work and learning overlap for a massive component of the workforce." (Tapscott 1996, p. 198)

Knowledge creation at the work place

Innovation is the driving force in a knowledge intensive economy. To be able to innovate businesses and organisations need *business-knowledge*,

supporting decisions to act in their markets. Part of this *business-knowledge* may be imported from elsewhere, but the strategic part has to be created in house. Knowledge creation is becoming a normal part of the work of knowledge workers. "In the knowledge economy the term knowledge was used originally to denote scientific knowledge. However, partly under the influence of Information and Communication Technology the concept of knowledge is broadening: knowledge, wherever it is stored, becomes available. Knowledge in the heads of or hands of workers can be codified; tacit knowledge can be a commercially valuable asset" (WRR 2002, p. 22; author's translation). Mass distribution of ICT and the Internet seem to contribute towards the development of new knowledge and new attitudes towards knowledge. The concept of knowledge has been extended from purely theoretical knowledge (old knowledge) to knowledge that is also more practice-oriented (new knowledge). (WRR 2002)

Knowledge has an expiration date

Knowledge can in many cases be compared with fish: before you know it, it is not fresh anymore. And when the time between creation and expiration date is short, traditional knowledge transfer loses value. Fresh knowledge has to be applied *Just in Time* and traditional knowledge transfer needs time. And knowledge not only has to be fresh, it also has to have a *Just Fit.* There is just no time to make knowledge fit, when it is loosing its freshness so quickly. Knowledge creation and sharing of knowledge therefore have to be organised in non-traditional ways. In the knowledge economy it is *business as usual* because *loosing time is loosing money.* And therefore knowledge creation and knowledge sharing have to be done flexibly in time and place: which flexibility is made possible by Information and Communication Technology?

Social environment

An 'enterprising' society

Long term developments lead to fundamental changes in economic activities and put more weight on unique human qualities such as knowledge creation. Robotic type of work is taken over by automates. 'Human capital' is becoming more and more important and allows workers more freedom in giving form to their work commitments. Supported by Information and Communication Technology they become more and more responsible for all

dimensions of their work. This contributes to the 'wholeness' of working life. "More and more people give meaning to their lives in paid professional work. The reason for this is the changing character of work. By and by an 'enterprising' society of dynamic professionals is developing." (Beek 1998; author's translation)

Children are busy as bees

Dynamic professionals are a busy lot, always organising and doing things in parallel (being parent, working, relaxing). Wealth and growing importance of the individual lead to 'we want it now', 'we want it flexible' and 'we want a personal fit'. Waiting is stupid. We want money dispensed now, we now want to book our air ticket for the next day, just as a hired car and travel insurance. "Kids live a very busy life; who do you think they copy this from?" says an extensive advertising campaign in the Netherlands trying to point out that young people have no time for playing anymore.

Integration of ICT

Information and Communication Technology is integrating quickly in the Netherlands. The distribution of ICT over the population is rather even and shows no clear boundaries. Particular groups, such as older people, single women, lower educated people and low income people less often have a computer or an Internet connection. However the connectivity rate among all groups is growing so quickly that no insurmountable differences are expected (WRR 2002, p. 68).

Cultural environment

'Zap'-culture

Just as electricity in the past, the integration of Information and Communication Technology (ICT), gives rise to profound changes in our culture. Television has promoted a 'zap'-culture, now intensified by ICT. Small *chunks* of information or entertainment together constitute the mosaic of our cultural experiences, a blip-culture. The penetration of the mobile phone certainly has contributed. The Short Message Service (SMS) has enriched our cultural life with a new form of writing (Table 1).

Table 1. SMS writings

SMS words	*Meaning*	SMS emoticons	*Meaning*	SMS figures	*Meaning*
Cu	*See you*	:-)	*Just joking*	>^00^<	*Cat*
Id	*Idea*	:-))	*Great laugh*	|_|>	*Cup of coffee*
-Id	*No idea*	:-<	*A bit sad*	(\0/)	*Angel in flight*
W8	*Wait*	:-(	*Very sad*	<*}}}}}<>	*Fish*
		>:-(	*Angry*		

Virtual communities and cultures

Information and Communication Technology (ICT) allows the creation of a virtual reality: "a world without limits where the frontier between fact and fiction is fuzzy. The more senses are involved the more real this Virtual Reality is. Here digitalisation is the 'most extreme' form of abstraction. It is learning by experience (but there is a risk involved). It enables money and time efficient creativity." (Weert & Munro 2003; p. 78). Video and Internet games, with their sub-cultures of players, integrate in our culture. "Internet is transforming the social interaction among different age groups in society in all countries." (Weert & Munro 2003; p. 77). Granddad and Grandma surf the World Wide Web looking for their cross words puzzle and may be part of a 'community' of cross words fans. "As we have more control, and more isolation and exclusion, we expect to be able to create our own cultures, finding like-minded people in a community, or to establish our own identity and community of interest to the exclusion of others. These communities and cultures can be virtual, but have a very real physical impact." (Kendall et al. 2004).

Globalisation as natural phenomenon

In the 'Rise of the West' McNeill shows how cultures have influenced one another in all phases of world history. Important economic, social and cultural changes have developed through contact with strangers with new and unfamiliar skills. "A corollary of this proposition is that centers of high skill (i.e. civilizations) tend to upset their neighbours by exposing them to attractive novelties. Less-skilled peoples round about are then impelled to try make these novelties their own … Yet such efforts provoke a painful ambivalence between the drive to imitate and an equally fervent desire to preserve the customs and institutions that distinguish the would-be borrowers from the corruptions and injustices that also inherent in civilised life." (McNeill 1991; p. xvi)

McNeill argues that many civilisations which originally where separate entities, have melted together in a new cosmopolitan civilisation, starting 2500 BC in the Middle-East. "This assumes a new dimension when, with the improvement of communication, diverse civilisations begin to impinge one another more and more often and in increasingly urgent ways, since under these circumstances the autonomy and independence of the separate civilisations begins to shrink, an a new cosmopolitan entity – what Wallerstein calls a world system – may start to take over as the key factor in further historical development." (McNeill 1991; p. xxi) Globalisation therefore is a natural phenomenon.

Political environment

The Lisbon declaration, issued after the extraordinary European Council (2000), showed that the transition to a knowledge intensive society is high on the political agenda. The scale of current economic and social change, the rapid transition to a knowledge-based society and demographic pressures resulting from an ageing population in the industrialised countries are all challenges which demand political attention and a new approach to education and training. This is illustrated by the high priority given to Lifelong Learning in the context of these challenges by meetings of the European Council. These meetings resulted in the communication of the mandate of the Feira European Council. In this communication (Memorandum of Lifelong Learning) *Lifelong learning* is defined as: *"all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competence, within a personal, civic, social and/or employment-related perspective."* (Kendall et al. 2004).

A NEW TYPE OF PROFESSIONAL

Knowledge workers

Innovation is the driving force in knowledge intensive economies. Therefore the economic focus is on knowledge work: new application of existing knowledge and knowledge creation. Knowledge application and knowledge creation are normal parts of the work of modern professionals. The modern professional is a knowledge worker.

Work of the knowledge worker is organised in non-traditional ways. The aim is to satisfy demand-driven markets and the organisation of work is

geared towards teamwork, flexibility and quality. Information and Communication Technology (ICT) is omnipresent and empowers the individual to act as expert in many areas. ICT also offers flexibility of time and place in support of teamwork. Work is result oriented and the professionals are accountable on results: team and organisation form a meritocracy.

These new professionals give meaning to their lives through their work. They continually engage in new challenges and learn on the job. They therefore need other skills than in the 'old fashioned' Tayloristic economy. Social-communicative and social-normative skills and competences (*soft skills* or *people skills*) are needed to be able to function adequately in teams and cooperate with colleagues: communication skills, empathy, team player skills. Self-direction and autonomy require initiative, pro-activity, flexibility and risk taking of professionals. (WRR 2002, p. 148) Another of these new qualifications is dealing with a professional environment characterized by fast change. For the modern professional life long working is identical with life long learning; the modern professional is a learning professional.

A NEW TYPE OF ORGANISATION

The Learning Organisation

To keep up with demands and competition innovative businesses and organisations have to create new operational knowledge in their domain: how to do better and how to offer new products and/or services. In a learning organisation work is organised in non-traditional ways and professionals work in a different way. A shift can be observed from organisational structures suited for efficient, standard, large-scale throughput (Tayloristic, old economy) to structures that facilitate flexible, custom-tailored, small scale, high quality production or servicing (networked, new economy). These new organisational structures aim to satisfy a personal, demand-driven market and are reflected in organisational concepts such as "Just In Time". The new structures are geared towards teamwork, flexibility and quality. Information and Communication Technology (ICT) is omnipresent and empowers the individual to act as expert in many areas. ICT also offers flexibility in time and place in support of teamwork.

Virtual Learning Organisation

For flexibility much, but not all, of the work in a learning organisation is distributed in time and place. This requires new ways of work organisation and ICT-integration: the *Virtual Learning Organisation.* In 'Organisations going virtual' (Metselaar1999) the following typology is presented:

a. Internal virtual organisation;
b. Virtual organisation;
c. Dynamic virtual organisation;
d. Web enterprise or agile organisation.

The last type of ICT-supported organisation (d) is a temporary network of experts working in a specific field or on a specific topic, "...a spatially dispersed and temporarily flexible cultural community, the reproduction of which is dependent upon learning and innovation of its constituents. Knowledge management and the sharing of information among partners are essential elements for an agile organisation". (Metselaar 1999; p. 204)

Knowledge management and information sharing are on the one hand integrated in the primary work processes that are organised in a result oriented way. On the other hand *Communities of Practice* play a role. The agile organisation therefore is a *double-knitted organisation* (McDermott 1999). ICT-support is a necessary, but not a sufficient condition for successful knowledge management and information sharing: these two processes have to be organised. Von Krogh, Ichijo and Noanaka give guidelines on how to organise knowledge creation in *communities.* (Krogh 2000)

A NEW TYPE OF STUDENT

Homo Zappiens

A new generation of students is presently knocking at higher education doors: the *media generation.*(Veen 2002) Wim Veen characterises this media generation as 'Homo Zappiens', in contrast with 'Homo Sapiens'. This media generation has been raised with the remote control of the TV, a computer mouse or a game stick in one hand, and the mobile phone in the other. From early morning till late at night this generation is playing computer games looking for *fun* and *kicks,* changing the rules of the game whenever they feel like it. For this generation school is a meeting place, not a learning place. From the teachers' perspective these students are not able to concentrate for very long, being over-active and showing no discipline, nor

respect (Veen 2002). However, on closer inspection this media generation can be seen to have new competencies:

- Multi-dimensional scanning
  Research by Wim Veen reveals that the media generation is able to absorb text, sound, movement, colour and image at the same time and integrate discontinuous information. For example the boy who is zapping from one television channel to the other and still able to reconstruct the plot of a soap running on one of the channels.
- Multi-tasking
  The media generation is able to do several tasks at the same time and in a non-sequential way. A media generation girl is doing her home work, at the same time talking on the mobile phone, surfing the World Wide Web and listening to music.

Living is learning

The media generation is more or less in continuous (digital) communication. New information is applied to meet the challenges of a game or a life of *fun* and *kicks.* Parents or education are not necessarily the source of this information: the media generation has its own digital network of 'experts' (*communities*). Routine is not appreciated; everything has to be new and challenging. Every thing should be an 'experience': for the media generation living is learning and school more a meeting place than a place to learn. They may not always learn what their parents would like them to learn, but learning they do. And what they learn is immediately applied in real or virtual life.

'NEW EDUCATION'

Higher Education as Virtual learning organisation

Higher education is facing two challenges:

1. It has to educate the *media generation* of students,
2. It has to educate starting *modern professionals,* who are operating in *learning organisations.*

"Particularly traditional education is not capable of accommodating ever increasing numbers of learners and learning needs at an affordable cost. Large scale introduction of Information and Communication Technology (ICT) to automate traditional education (the textbook, the classroom and the

teacher) will not bring the solution." (Visser 1999, p. 2) A new educational paradigm is needed in which the higher education learning/working environment for students closely resembles the future working/learning environment of the students. Higher education itself will have to be organised as a virtual learning organisation. "Universities, and other learning institutions, are in need of redefining themselves in much more fundamental ways than by simply continuing their old practices by modern means. The production of knowledge has become a highly networked and increasingly fluid phenomenon. Universities play a role in it, but are no longer the exclusive or even major players. They are in need of continually repositioning themselves. Gibbons refers to the value-added inherent in the creativity to configure knowledge and resources over and over again. These networks of knowledge production are likely to comprise more than just the academic community."(Visser 1999, p. 4) Higher education then is "...a spatially dispersed and temporarily flexible cultural community, the reproduction of which is dependent upon learning and innovation of its constituents. Knowledge management and the sharing of information among partners are essential elements for this organisation". (Metselaarl999, p. 204)

Learning as professional: creative learning

Students have to learn to develop professional competence. Here an informal, operational definition of competence is used: the ability to solve a 'worth-while' problem with a 'proper' result, following a 'proper' method. This is for example what we expect of a competent medical doctor. Problems have a *context* and the professional has a role in this *context.*

Professional learning situations therefore can be characterised by:

- the context,
- the professional role to be performed,
- Problem identification and result specification,
- Working method
- Criteria for the quality of the working process and for the quality of the result (criteria for what is 'proper'),
- Validation, establishing that the working process has been done in the 'proper' way and that the result is the 'proper' result,
- Critical reflection, learning how to do better.

Table 2. Contrasting views of learning (Duffy 2001)

	Constructivism view	Acquisition view
Learning is:	Organic Continual reorganization Invention	Cumulative Discovery (finding what is known)
Knowledge is:	A **construction**	An **acquisition**
Coach-apprentice relation is:	Mutual respect for views Ability to converse	Transfer of coach's expertise
Assessment is:	Ability to use knowledge	Mastery of content

Learning as professional implies a paradigm change from 'acquisition view' to 'constructivism view' as presented by Duffy (Table 2). In the new learning/working situation the student is a starting *modern professional,* a knowledge worker who combines learning, working and knowledge creation. (Weert 2002) Let us denote this type of learning/working situation as *Situation based learning situation.* In this learning situation *Validation* is the essential element to ensure quality and *Critical reflection* the essential element to ensure learning.

EXAMPLE: VIRTUAL ENVIRONMENTAL CONSULTANCY AGENCY

A Higher Education example of a *Virtual learning organisation* in which students learn as creative *modern professionals* is the "Virtual Environmental Consultancy Agency" (VECA), described in (Ivens 2002). This student consultancy agency (see Figure 1.) was first started in 2000 by the Open University of the Netherlands in co-operation with Maastricht University. It was further developed in 2001 and is currently operating in the context of the Dutch Digital University. It is based on earlier experiences within the Open University of the Netherlands with the concept of 'Virtual Company'. The VECA is mediated via a computer network. It combines the flexibility of distance learning with integration of learning and working.

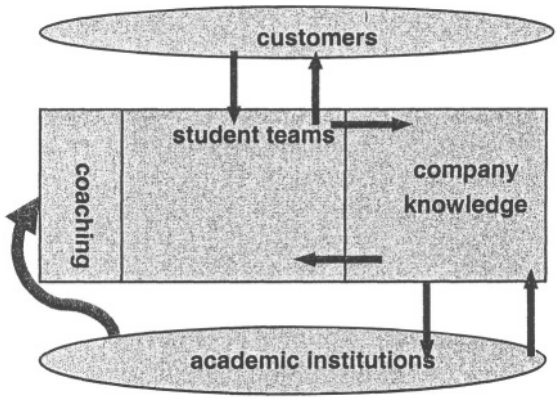

Figure 1. Virtual Environmental Consultancy Agency (Ivens 2002)

Within the VECA, all processes are dominated by the concept of *competence learning*: learn how to complete professional tasks by integrating complexes of knowledge, skills and attitudes. This implies that before the start-up an exhaustive inventory has to be made of the competencies required. The resulting *competence map* is pivotal because it acts as a frame of reference for all processes involved: it limits the range of products and services rendered, and defines what can be learned by the students.

In running a VECA one can distinguish three main phases: the preparatory phase, the actual working period en the final assessment.

Preparation

During the preparation phase potential orders are acquired from external clients. These orders are mapped into a competence map, first of all to decide whether they will be accepted or not.

Furthermore, students have to be recruited. Competence counsellors, who are members of the educational staff, diagnose new students against the competence map. Identified gaps in competence constitute the student's career plan. The career plan is subsequently used as the starting point for assigning sensible tasks to the students.

The working period

The work starts with a plenary face-to-face introductory meeting. Thereafter project teams start carrying out their work. An extensive system is established that monitors and assesses students' (in) competencies. It includes traditional teacher controlled evaluation (co-assessment) procedures as well as methods for self- and peer-assessment by the students themselves. The latter are used to assess the individual's informal knowledge and functioning. The working period is concluded with a final face-to-face meeting where results are presented to the external clients and all members (students and teachers) of the VECA.

Final assessment

All documents produced in the course of a student's career, for example results of assessments and results produced for customers, are collected in a personal portfolio which forms the basis of establishing and formalising performance levels. By asking the customers to assess the merit of the final result an external assessment of the student's work is made. This is also incorporated into the portfolio. Collectively these assessments contain a reflection on the effectiveness and quality of the entire learning environment, including the teaching. Based on the portfolio the examiner establishes a final mark for each individual student.

Table 3. Prototyping approach to 'New Education'

Prototyping situation	Student responsible for	Way of working	Student role (Duffy 2001)	Teacher role
Assignment based (traditional)	Execution Validation	Prescribed	Reproductive (Know What)	Presenter Assessor
Task based	Planning execution Validation Reflection	Adaptive	Executive (Know How)	Task designer Coach (Assessor)
Problem based	Choice of method Planning Execution Validation Reflection	Problem dependent	Tactical (Know Why)	Problem designer Coach (Assessor)

Prototyping situation	Student responsible for	Way of working	Student role (Duffy 2001)	Teacher role
Situation based	Choice of problem Choice of method Planning Execution Validation Reflection	Situation dependent	Strategic (Care Why)	Quality process designer Consultant Coach (Assessor)

Discussion

The VECA learning environment in an example of a *Situation based learning environment* that is fairly authentic. Student influence on the process is however limited. *Validation* as a means to let students control quality is integrated in the process. There is intake assessment, but only with respect to student competencies and their relation to the Competence Map; students are not involved in the project selection. The students create a Personal Development Plan themselves, but the teaching staff decide on the project, on the role of the student and on competencies to be developed. Authenticity here could be better. There is on-going *validation* of and *critical reflection* on process and intermediate results. An external expert is involved in the final assessment, mainly to assess the final result and its presentation, but also to assess customer management.

The *virtual learning organisation* VECA could also easily be used in a lifelong learning context involving professionals who want to update existing competencies or acquire new ones.

A PROTOTYPING APPROACH TO 'NEW EDUCATION'

Redefinition of Higher Education is a complex process of change. It is virtually impossible to create *Situation based learning environments* in which students learn/work as starting *modern professionals,* from scratch.

A prototyping approach as presented in Table 3 (Weert 2001) may offer an effective learning environment for both higher education institutions and students. The prototypes allow students to develop a *career* towards starting *modern professional,* moving from a reproductive to a strategic role. At the same time Higher Education teachers can develop a career from presenter of

knowledge (acquisition view) to consultant/coach. And the Higher Education organisation can develop a career towards a *virtual learning organisation.*

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Examples and advantages of Continuous Education by means of Videoconference Technologies

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Abstract: The paper presents some examples of continuous education and training of Slovenian teachers that use or teach computer technology in the Slovenian elementary and secondary schools. The underlying research was granted by the Slovenian Ministry of Science, Education and Sport. The first example explains organizational and technological details, problems and advantages of videoconference supported summer schools. The second experience is based on periodic tutorials, scheduled on local TV and accompanied by videoconference supported workshops for the same learning community.

Key words: internet, Lifelong Learning, teacher training, videoconferencing

INTRODUCTION

One of the projects of the Slovenian Ministry of Science and Education is dedicated to computer literacy in Slovenian schools. Part of the project focused on the problems of continuing education for teachers who are required, every year, to participate in various seminars and workshops.

The Faculty of Computer and Information Science, University of Ljubljana plays as a specific role as an educational and R&D institution that follows the trends of the information technologies. It acts as a disseminator of the acquired knowledge to other members of the educational community

and also to the teachers of elementary and secondary schools that should implement computer supported solutions in their everyday activities.

The obvious ways for such dissemination are seminars and workshops that are organized in a classical way with regular presentations in classrooms. In the last years some other more advanced ways of such education were investigated.

Every year the members of the faculty organize on behalf of the Slovenian Ministry of Education so called Summer school for teachers and some selected scholars. This event is mainly dedicated to new Information technologies in education. The participants are mostly Slovenian teachers. The summer school is organized as a workshop consisting of interesting presentations and practical hands-on work in computer supported classrooms.

In the past years the attention was focused into Internet compliant technologies and into the conceptual learning of sciences, supported by these technologies. The participants gained the first experience in using and creating hypertext materials supported by advanced Java, 3D graphics and video examples. The first steps into videoconferencing technology were also accomplished. In the first years the summer school was limited to several tens of participants

In the Year 1999 we introduced a decentralized approach supported by means of ISDN multipoint videoconferencing technology. Eleven different Slovenian cities were interconnected into a single virtual classroom with more than 230 participants following the lectures without travelling to a common location. The basic idea was to interconnect the participating locations to common videoconference lectures given by some experts, and to combine these lectures with accompanied hands-on experience within the computer supported classrooms at each location. The whole system is represented in Figure 1.

The effective interaction between all the participants in the spatially distributed community required several technological and organisational problems have to be solved before and during such events.

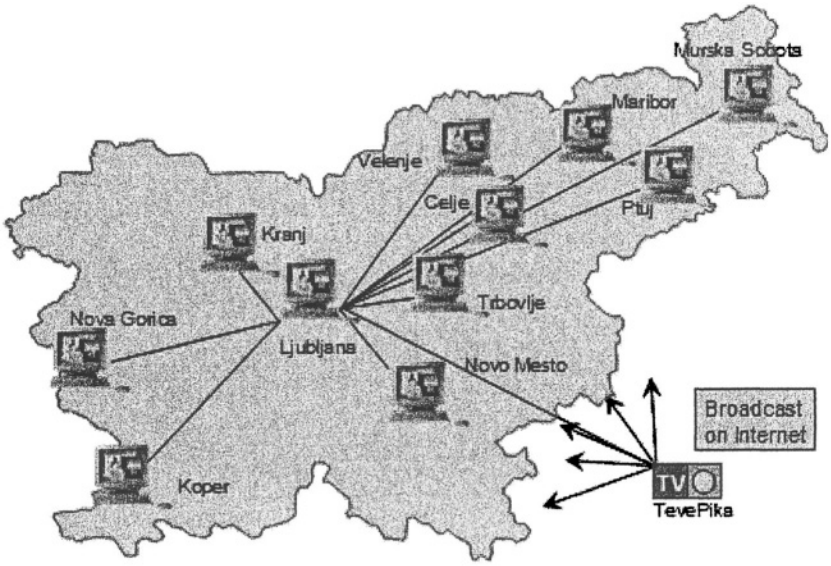

Figure 1. **The interconnected virtual classroom in Slovenia**

TECHNOLOGICAL DETAILS

First of all several computer classrooms in the involved Slovenian schools were equipped with videoconference computers that permitted the interconnection through ISDN. Every videoconference computer was equipped with the particular hardware and software that permitted 2 video inputs and ISDN or IP connection towards the central Multipoint Communication unit (MCU). One video input was connected to the required video camera; the second video input was used for the connection to a presenter's computer (usually a notebook). The multilateral cooperation of these videoconference points was enabled through the multipoint communication unit located in the capital city of Slovenia- Ljubljana. All classrooms were also equipped with multimedia projectors.

A particular attention was paid to the videoconference point at the Faculty of Computer and Information Science which was organized according to its central role. In the first years practically all lectures were given from this point. The lecturers have had the possibility to connect their personal notebooks to the videoconference system by means of appropriate SVGA to video converters. At the time of the first the summer school only

the central location at the faculty had such facility. In the following years every location was equipped with such converters and therefore the lecturing was enabled from other locations according to the scheduled time-table.

The guidelines from more experienced sites suggested involving not more than 4 videoconference points. In our case we decided to connect first 8 and later 11 locations. This represented a risk in the case of the communication problems. Therefore we decided to double the technology with the support of the local TV station. A parallel videoconference point–to-point interconnection with this station was established. The whole event was broadcasted on the local cable TV and also as streaming video on Internet. Such approach gives us the needed backup link in the case of communication problems and enables also an individual follow of the tutorials on domestic computers by means of usual browsers and with Real Player plug-in.

The complexity of the technological infrastructure and the crucial role of the faculty required more staff involved in the support. At each moment at least 4 people were active in the videoconference. Besides the lecturer the second important function was the moderator who supervised the timing of the presentations and monitored the feedback from other sites.

The additional interaction possibilities were achieved by the establishment of an internet portal dedicated to the summer school. The participants had the possibility to send to the lecturers their remarks, questions and links to the accomplished assignments by e-mail.

ORGANISATIONAL DETAILS

The implemented technological infrastructure permitted multipoint collaboration between the involved videoconference points. However, the first experiments lead to the conclusion that a more structured approach should be used. Every lecture had 2 distinct phases: presentation and discussion. In the first phase every lecturer had 40 minutes for his presentation. After that the discussion phase was started and up to 3-4 remote locations had the possibility to ask questions. The technology of multipoint permitted even more active locations but in order to avoid chaotic discussion on one side and too long turnaround the number of interacting videoconference points was limited to 3-4.

From the logistic point of view each videoconference site a local administrator supervised its infrastructure. All administrators were prepared through several preliminary technical videoconference sessions before the official opening of the school. They also received a CD with instructional

materials that permitted them the establishment of the same working environment in their local computer classrooms.

From the organizational point of view one of the problems is immediate, real-time interaction between administrators of the involved videoconference points. In the first year the cellular phones were used for such interaction. In addition to this, in the following summer schools we established a parallel communication system that was used by videoconference administrators but it was transparent to the regular participants. We implemented classical simple internet chat between the administrators. They had in such a way the possibility of immediate reports concerning the technological problems (mostly with bad sound).

In order to give to the participants the feeling of a well organized school a Web portal was established with all data concerning the organization of the school and links to instructional materials.

A particular care was paid to the quality of presentation materials since the quality of streamed video image requires bright and large fonts on possibly dark background. Unfortunately not all lectures followed the prepared PowerPoint templates and guidelines.

Considering the problem of the possible communication failure some lectures were prepared in advance with the technology of interactive video on demand. In such a way a complete tutorial dedicated to the 3D graphics was prepared. Typically each lecture was composed by a PowerPoint presentation with various video clips and combined by lecturer's talk and video. The characteristics of such lectures are that they are much more intensive and personalized since each participant can stop, step back, and skip parts of the interactive streamed materials according to his own previous experience and knowledge. The advantage of such tutorials is also high resolution of presentations, much better than with videoconferencing, combined with video clips. However, according to the guidelines, each lecture should be no longer than 10-15 minutes.

Remarks were that this technology can act as a complement to the regular lectures but it cannot be a good substitution for live presentations because there is missing immediate live feedback from the instructor's side.

ENGAGEMENT OF THE PARTICIPANTS

The participants had the possibility to follow the videoconference lectures and to put the questions to the instructor in various ways:

- Giving the questions by regular e-mail. In fact the moderator located near the lecturer continuously monitored the incoming e-mail and forwarded it

to the lecturer. The lecturer could decide to answer immediately or to postpone the answer after his presentation.

- Asking for attention: The moderator annotated the requests for questions and enabled the connection with the corresponding remote locations immediately after the presentation.

Part of the participants' activities was the accomplishment of their individual assignments. At the beginning of the summer school every participant received a CD with the corresponding courseware. The contents mainly consisted of the additional didactic stuff and some software tools that were required to solve the assignments. They were able to do this in the local computer equipped classrooms and had the support given by local administrators. Besides this they were motivated to ask some additional questions to the experts by means of regular e-mail. The experts had also the possibility to see and assess the assignments accomplished by the individual participants.

For this purpose, each involved location established a local Web page, which was linked to the central portal of the school. The basic idea of these local Web pages was decentralized broadcasting of the solutions of the domestic assignments, prepared by the participants.

At the end of the every summer school the expectations and the reality of this event were analyzed and suggestions for further improvement were given. The best solutions of the assignments, prepared by the participants were also presented by means of the videoconference.

ANALYSIS AND REMARKS

After the first summer school one of the observations was that there were too many lectures (one week, at least 5 hours per day) and the participants did not have enough time for their assignments. But such intensity of videoconference lecturing was also problematic from the lecturers' and organisational point of view. We concluded that in the future we should limit the lecturing to 3, in any case not more than 4 hours per day and give more time to hands-on experience.

One conclusion of this event was also that the technological infrastructure was too complex. One reason was also doubling of the communication technology. In fact more than 30 people worked in the background of the summer school. We concluded that it should be simplified. However a communication backup is needed in any case because of the possible communication problems and of the large number of participants, dispersed in different cities. In the worst case the local

administrators should be able to activate some substituting activities in the local classrooms.

Another remark was that only the central point (faculty) had the possibility of giving lectures accompanied with didactic materials from personal computers (notebooks). According to this observation now all videoconference sites are equipped with converters which permit the connection of a separate teacher's computer to the videoconference computer.

Another conclusion was that the multipoint concept is maybe attractive with its interaction possibilities but is not adequate since it could lead to chaotic problems because of too many locations involved. In any case the experience show that the lectures should not be interrupted at any moment and it was better to give to participants the permission for questions only on request, approved by the conference moderator. This means that instead of multipoint is better to use multicast or sometimes even broadcast concept.

Certainly the success of the summer school was represented by the involvement of more than 230 participants from different cities without the need of their travel and accommodation. Despite the distance between them they really acted as a virtual classroom. The technology also permitted the remote involvement of experts without the need of their travel to the central location.

EXPERIENCE WITH CONTINUING DISTANCE LEARNING

The learning community participating in the experimental phase of summer school consisted of secondary and elementary school teachers who should get or refresh their basic knowledge of computer literacy and multimedia technologies. In the teaching and learning process several experienced teachers of computer engineering were included. At least one such teacher was present at each location. Their role was to help their colleagues on particular sites during the practical hands on workshops that followed the lectures.

The success of the first videoconference summer school encouraged the involved partners to activate one experimental school organized on distance learning concepts. Instead of a single, one-week long seminar, the planned school had to last several months and had to be more focused on particular topics. The idea was to try a new concept of continuing distance learning. The already mentioned communication technologies were used for distance lecturing and for additional explanations during the additionally introduced

domestic assignments. The first experimental course was dedicated to the Java programming language.

In order to permit better interaction and to give more time for domestic assignments the following didactic scenario was used, with the lectures limited to 30 minutes per week and broadcast through the local cable TV and the Internet. The broadcast of each lecture was repeated 3 times, once in the afternoon and 2 times in the late evening.

Again, a Web portal was dedicated to the experimental school, which contained links to the tutorial used during the lecturing, with some links pointed to the additional didactic materials. The "Program" page contained the structure and schedule of the course. The "Videoconference points" page contained useful contact information concerning all involved locations (e-mail addresses of local administrators, links to local Web servers). The "Assignment" page was dynamically updated every week, with the definition of the particular exercises for the participants and, with the delay interval of 1 week, the possible solutions of these exercises. The "Didactic materials" page contained the link to the hypertext lessons used by the lecturer, links to some interesting Web pages on Internet and links to some useful downloadable software tools.

Once per month a virtual, Videoconference supported workshop was organized when the participants obtained a new assignment that integrated the already acquired knowledge, and providing an opportunity when they could also ask the lecturer for any additional information. The basic idea was again that they could use the computer facilities at their classrooms during such workshop and share their experience between them. In addition they could interact with lecturer by means of usual Internet services.

In order to permit as much as possible the same working conditions for all participants regardless of their location a separate working meeting of all local administrators and the lecturer was organized before each Videoconference workshop. All administrators obtained a CD with instructors' didactic material enabling them to prepare each local computer classroom with the same didactic tools. This approach also permitted them to act locally in the case of communication problems.

A separate CD was prepared for each registered participant. This CD contained the hypertext lessons which were used by the lecturer during his performance. The CD contained also some accompanying useful didactic material.

CONCLUSIONS

Both experiments, the first videoconference supported summer school and the experimental introduction of continuing education supported by communication technologies had some common characteristics. First of all the behaviour of the participants is just to follow the lectures and not to use the combined videoconferencing and Internet communication technologies for immediate feedback with the lecturer. Therefore such lectures had more broadcasting than interacting character. The participants preferred to interact with the teacher in the days following such lecture by means of usual Internet services, mostly e-mail. Most of the participants also preferred to work on their assignments alone at home and to interact with the lecturer after, and not during the periodic videoconference.

Another interesting experience was using the public services of the local TV station. The limit of 30 minutes per lecture opens for the lecturer new challenges because their explanation should be more efficient, compact and at the same time attractive because it is usually followed also by some less experienced listeners. This is even more difficult in the case that the lectures are "on line" and no corrections are possible as this is the case of "playback". From the technological point of view practically all didactic materials had to be adapted considering the guidelines how to use colours and fonts (big and simple fonts, bright and cold colours on black background) in order to guarantee a better readability on TV.

One of the side effects of such lecturing are well prepared didactic materials which are recorded and can be published on video-servers for repeated training seminars.

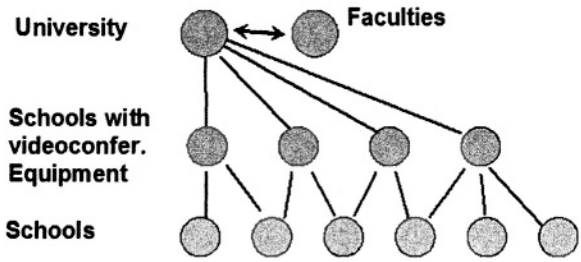

Figure 2. **Model of the learning community**

Another positive side effect of this experience was the increased link and communication between participating teachers and professors and other

experts at the university. The personal communication between participants and university lecturers often continues also after such events. In fact we obtained the model of the learning community represented on the figure 2. At the top of this community are involved faculties, on the second level are the schools equipped with videoconference technology whose personnel can also act as co-organizers and multipliers in the case of repeated seminars and workshops. On the third level are the elementary and secondary school teachers from various schools, interested in the continuous refinement of their knowledge and skills.

The videoconferencing technology also influenced the participating schools in such a way that they use the same technological infrastructure in some informal contacts between themselves. It is also planned that such videoconference systems will be installed in the buildings of Slovenian Ministry of education and that it will be used in the case of its periodic interaction with the directors of the elementary and secondary schools.

The achieved experience and the following analysis lead to the conclusion that this kind of education should remain traditional. One of the primary reasons is that the participants do not have to spend money and time for travelling. In fact they can join one of the nearest videoconference points which are established overall the country on the basis of the regional level. This approach is also appropriate for short lectures or presentations lasting just a couple of hours. This is particular useful for knowledge-refreshment seminars that are a never ending story in the field of information and communication technologies and their application. In the near future this type of education will continue with periodic videoconference seminars accompanied with hands on workshops. Further development of this activity will be in a more structured and focused organization of videoconference based seminars which should consider the preliminary knowledge of the involved participants and their personal skills and interest.

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Developing ICT-rich lifelong learning opportunities through EU-projects

DECTUG case study 1997-2003

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Abstract: The article presents DECTUG experiences since 1997 in the subject of Distance Education and Lifelong Learning. The main tasks of DECTUG are creating access to study materials, corresponding lessons scripts and communication environment using LAN (Local Area network), MAN (Metropolitan Area Network) and WAN (Wide Area Network) facilities. Distance education course modules are mainly prepared by the international teams working in EU projects. Example courses developed under Phare Multi-country Programme in Distance Education, Leonardo da Vinci and Socrates Programmes are presented. The opportunity for offering the developed courses for lifelong learners is discussed and example failure factors are presented.

Key words: distance education, European Union projects, Lifelong Learning, sustainable development, virtual learning organisation

DECTUG - WHAT IS IT ALL ABOUT

The Distance Education Centre at Gdansk University of Technology (DECTUG) is a special unit dedicated to the development and delivery of courses offered in Open and Distance Learning (ODL) mode. It was established by the Rector of the University on 30th April 1997 with support from EU funds (Phare Multi-country Programme for Distance Education, 1998-1999). The main objective of the Distance Education Centre is to give

the access for the University's students and staff to Internet study materials, correspondence lessons, scripts and communication environments. DECTUG is responsible for developing distance education course modules and adaptation of existing European Union distance education course modules for local delivery. The courses delivered by DECTUG are mainly Internet based. Course materials are published on the Web and students and tutors communicate by e-mails or through newsgroups. Students come both from inside and outside the University, including students from partner institutions and independent people willing to take part in courses. Most of the DECTUG staff consists of people that are contracted for specific tasks, they are not full time employees, and their responsibilities cover mainly management and technical support. Course preparation and tutoring is done by subject experts hired only for the duration of the given course. Comprehensive details about DECTUG are available in English at URL: http://www.dec.pg.gda.pl/dec/index.phtml?id=index_en

DECTUG IN PHARE PROJECTS (1998-2000)

The objective of the first pillar of the Phare Multi-country Programme for Distance Education (Grabowska 2000 A) was to support the establishment of distance education infrastructures in the Phare partner countries. It was an organisationally, administratively and technologically complex and complicated task to achieve this objective and it was possible only because of the huge effort invested by the participating institutions in the Phare countries.

It included three main, closely inter-related and inter-dependent, sub-projects, 1) the establishment of National Centres for Distance and National Contact Points in each country; 2) the establishment of 40 regional Phare ODL Study Centres (or distance education study centres), with state of the art equipment and networks to be used for development and delivery of ODL courses, and ODL reference libraries; 3) the building-up of ODL expertise and know-how within the National Centres for Distance Education and within the Phare ODL Study Centres and their host institutions.

The background of the project is based on the European Union initiative and co-operation managed by the European Training Foundation (ETF) in Italy (http://www.etf.eu.int/). The project was co-ordinated by the Programme Co-ordination Unit (PCU) in Hungary. Overall indicative budget was about 15 M-EUR (Pilot + Follow-up).

The project started in 1993-94 with the launch of a pilot project, preceded by a feasibility study, and later on a massive follow-up project was accepted by the European Commission.The three phases of the project supported

concept developed in early 1990s, followed by a pilot phase (1994-1996), and further follow-up (1996-2000). Implementation of the follow-up programme was the most significant phase and it covered three main streams. The infrastructure development supported the consolidation of the National Contact Point networks, and establishing and equipping of 40 ODL Study Centres with associated human resources development. This supported local, regional and trans-national course development with a European studies programme. The overall programme enabled strategy development for information and communication technologies, ODL markets, legislation, accreditation and quality assurance.

In terms of national policies, the most comprehensive initiative was the establishment, in the early 1990's, of 15 distance education centres. These facilities were located within a network of 50 local Continuing Education Centres, which mainly provide vocational and basic education to adults, including unemployed people seeking re-training. Three of these Continuing Education Centres are hosting Phare ODL Study Centres (Zielona Gora, Bytom, Krosno), with five located within universities (Gdansk, Kielce, Krakow, Nowy Sacz, Warszawa). A national database of distance education study centres was established by DECTUG. Several course packages were developed by Phare ODL Study Centres in Poland. The Centre in Nowy Sacz offers 5 courses in 'Operations Research', 'Internet and Intranet', 'Basic Finance', 'Investment' and 'Computer Networks'. The Centre in Krakow developed courses in mathematics and physics. Gdansk (DECTUG) being an Authorised Autodesk Training Centre offers 'AutoCAD for beginners in ODL mode'. Throughout the four years of the Phare Multi-country Programme, DECTUG was involved in eight pilot projects dedicated to development and delivery of Distance Learning Modules.

Finally the Phare ODL Study Centres have developed active links and partnerships with other European ODL organisations. Most Centres are members of EDEN (European Distance and E-Learning Network). Bilateral partnerships include organisations in the United Kingdom, Finland, France, USA and others.

DECTUG IN OTHER EU PROJECTS (1999-2005)

After finishing PHARE projects a new perspective for continuation distance and lifelong learning activities appeared when Poland was accepted as a formal partner in the Leonardo da Vinci and Socrates. Since 1998 DECTUG has been involved in five Leonardo da Vinci programs (Grabowska 2003) and three Socrates projects. Since 2003 DECTUG is also a partner of Research Framework Programme 5 - Centre for Urban

Construction and Rehabilitation: Technology Transfer, Research and Education (CURE).

EXAMPLE PROJECTS AND EXAMPLE COURSES

The purpose of the **NEPOLD** project developed by Helsinki University of Technology, DIPOLI and Technical University of Gdansk, Distance Education Centre cluster was to adapt the English for Environmental Awareness (EEA) Course. This course was originally developed in Finland.

Most of the course material is available on the course WWW pages. The course participants are required to write three different types of papers (an argumentative and an analytical text plus a report). The dedicated WBT platform Web was developed for the course delivery. The participants can take part in the video conference. The learners' motivation for the course is based on the study credits (ECTS 3) they obtain towards their final diplomas.

To date, only 8 students have taken part in the course, the possible reasons are a lack of promotion and English teachers willing to work online.

TeleCAD - Teleworkers Training for CAD Systems Users project consisted of developing a dedicated platform on the Internet for project developers (for management purpose, exchanging ideas, developing the project contents, monitoring the results) and a training methodology for teleworkers working with CAD systems. To support the teleworkers a dedicated internet platform was developed with electronic-based teaching materials (CD-ROM), special guides for tutors and learners in English and in national languages. Example courses were delivered for teleworkers working with CAD systems for different target groups (university students in Poland, post secondary students in Italy, young workers in Finland and Greece).The AutoCAD handbook (online, CD) is constantly updated (Klosowski P., Grabowska A. 2002).

MDEC- Multimedia Distance English Courses for Polish Users in Legal, Banking and Finance, Science and Technology, and Safety Training Sectors with Elements of European Union Regulations and Standards fostered the development of methods of self-training at the workplace, including open and distance learning and training, in particular to facilitate access to continuing vocational training. The supporting activities were oriented at developing linguistic skills as part of vocational training. These courses were planned to be used for teaching students at universities, in continuing education institutions and should have been disseminated into other groups

of users. The project was based on advanced ICT technology (WWW, e-mail, multimedia).

The final products of this project were planned to consist of a software system for Distance Education to provide a package of six multimedia specialised English course modules placed on the web. The courses include General English; Legal English; Banking English; Internet Technology; Science and Technology; Occupational Safety.

The courses are designed for university students to be used, in the first phase, as an addition to traditional courses and in the long term included in the curriculum. At the moment the courses are not available from DECTUG server and they are not used by the project promoter. The possible reason is integration of the learning modules with Learning Management System.

AYTEM - Accompanying a Young Teacher into Educational Market by Distance Course Mode project was intended to provide young and old teachers with training, allowing them to improve their methods based on new ideas and experiences of colleagues from different parts of their countries and the world. The project provided course materials for teachers and a platform the course delivery. Tutors' training in partner countries was also one of the project objectives. There were 10 partners organisations from 6 countries involved in the project development.

The educational CD ROM was developed and Web Based Training environment Luvit is recommended for course delivery. No Polish implementation has been done as yet.

LinguaWeb – for Small and Medium Enterprises project was aimed to foster co-operation between small and medium businesses based in different regions of Europe. This could have been achieved by providing the interested companies with information about the local culture, society and language. The project implemented and validated a LinguaWeb Service providing information about local/regional language variants and authentic samples, with authentic multimedia documents from local/regional business, society and culture-related communication contexts, and demonstration modules for business, society and culture-embedded language learning extensions.

In the lifetime of the project, the development and evaluation of a prototype in 4 languages (English, German, Irish and Polish) involving "chamber of commerce" type institutions in Germany, Ireland and Poland was planned. Nowadays, LinguaWeb addresses the communication and language training needs of SMEs in European business contexts.

PROMETHEUS was aimed to prepare modules for teachers and other educational staff from different educational institutions. The modules cover the necessary information in order to be able to work as managers of European projects.

In the project the following training modules were developed to cover: Aspects of European Integration; the Use of New Information and Communication Technologies in European Project Preparation; and the Co-ordination and Management of European Projects.

The project's target groups are schoolteachers; heads of schools; potential project co-ordinators at schools; students in higher education; and educational staff and professionals responsible for in-service teacher training.

Meeting of Generations project's goal was to develop the teaching and learning methods for education for seniors in order to exchange of media and social competence between the generations.

The planned outputs were focused on four areas with the development of curricula/concepts for the preparation of student teachers; workshops with the seniors in places with a social and communicative atmosphere for the "Meeting of Generations"; a seniors' web-service for online-studying; and a training-manual for the dissemination of the concept, available in all languages of the partners. Seniors are the target group for the project because they have been neglected in further education for media competence. The changing demographic structure of Europe means this target group is is increasing in number. Furthermore, seniors nowadays are more actively involved in society than they used to a few years back. In the project two pilot courses were offered, one face to face mode and the second one in mixed mode (online and face to face). DECTUG plans to offer the course for university teachers (50+) to enable their working as virtual teachers.

BEST PRACTICE - PROMOTING AND IMPLEMENTING LLL IN ONGOING PROJECTS

While the courses are developed the next step is to make them sustainable. New projects MISSION, EMDEL, CURE are practically oriented to this issue.

For example **MISSION** (Multi-country Integrated System Support for Improved ODL Networking, Socrates - Minerva) project aims to strengthen the links between the CEE PHARE ODL Centres - recently established by the support of the PHARE Multi-Country Programme for Distance

Education. At the same time it aims to improve the effectiveness and long-term stability of collaboration between EuroStudy Centres (coordinated by European Association of Distance Teaching Universities - EADTU) and PHARE ODL Centres. As a more generic objective, it focuses on enhancing the awareness of ODL as the most effective, innovative and flexible methodology for supporting the European dimension of Life-Long Learning.

The typical beneficiaries of the MISSION project are expected to be: HRD policy makers and decision makers, ODL providers, course developers, ICT application developers, management staff and academics of universities working in dual/mixed mode education systems, staff developers and advisers, evaluators, distance learners all over Europe.

Establishing a central, multi-lingual (13 languages) WEB portal and electronic network based on ICT (e-newsletter, discussion groups, course catalogue, staff development and mentoring, etc.) is a core activity of the project. In addition to the advanced electronic tools and resources that will be available for a global audience, specific staff development programmes for ODL Centres and strategic plans for the sustainability of ODL networking in Europe will also be major outcomes.

The project **EMDEL** (European Model for Distance Education and Learning) is a 'Valorisation Project' funded by the Leonardo da Vinci Programme. EMDEL intends to valorise the results of other distance learning and e-learning projects carried out earlier within the framework of European Community initiatives. Starting from these results and the 'good practices' tested, the main goal of the EMDEL project is the creation of a European E-learning System through a process of cooperation among partner institutions and the enlargement towards new organizations.

The project's objectives will be achieved through activities and products which are planned for the three-year period 2001-2004, including the production of an on-line Catalogue 'Showcase of Distance Learning Modules' to provide trainers' and managers' of distance learning systems with information about the distance learning modules on offer in the marketplace, requirements for their utilization, and opportunities for the exchange and on-line of the best products whichever server they sit on. To support sharing, a software programme for the assessment of customer satisfaction and quality of the products will be provided.

The project aims to allow the utilisation of distance training products in their original language to a person living in a partner country without any post production. The result will provide services of support locally and on line (in the original language) thanks to the presence of local tutors. Dissemination, will be the through the presentation of the realisation model of a European Teletraining Network demonstrating the concrete possibilities

of construction, starting from an existent distance training system based locally but with trans-national connections.

The main objective of the **CURE** project (Centre for Urban Construction and Rehabilitation: Technology Transfer, Research and Education, 2002-2005) is to promote the aspects related to urban construction and rehabilitation by conducting technology transfer, research and education activities. One of the major objectives of the CURE project is to teach the methods related to sustainable urban construction and rehabilitation.

Among several innovative features planned, the most challenging one is the extensive use of distance education (in English and Polish languages) based on modern information and communication technologies (ICT). DECTUG is responsible for the technical support, online tutors' training and also for online course preparation and delivery. At the first stage the course will be offered in English for Environmental Awareness; TeleCAD - Teleworkers training for CAD systems users; and Ethics online. These courses will be implemented in two work packages offering International PhD and Postgraduate studies.

Finally DECTUG has been involved in teacher training since 2000. Three editions of postgraduate studies have been offered, with communication among students is partly based on the Internet. BSCW (Basic Support for Cooperative Work) system is used to support interactions between student and student or student and teacher, providing a number of benefits; decreasing the sense of isolation (belonging to group) and increasing flexibility (ability to adapt to new conditions), variety (variety of opinions and experiences), communication experience and practice; as well as enabling a variety of pedagogy (collaborative and co-operative exercises) and providing the opportunity for teachers to work in groups while preparing their diploma work. Finally a collection of their work is presented on the Internet. On the basis of previous experiences there is an idea to start a new project in the Consortium of Virtual Technical University. Up till now only one subject (Virtual Classes and Distance Education) was supported by the Internet. A new project will develop a new curricula based on distance mode.

Table 1. Project outcomes

Acronym	Co-funding	Type of materials	Communi-cation	Certificates/ Accreditation	Comments
EEA	PHARE	Online	Bulletin Board, E-mail, Video conference via ISDN	Gdansk University of Technology	Fee is required, only 8 participants
TeleCAD	Leonardo da Vinci	Online CD Printed	Forum, Internal e-mail, Phone, fax, F2F	Autodesk	Fee is required for certification. More than 1000 users
MDEC	Leonardo da Vinci	Online	Forum, Chat, E-mail	N/Y	Not available
AYTEM	Leonardo da Vinci	CD Online	Luvit	N/Y	Not available
LinguaWeb	Leonardo da Vinci	Online	Bulletin Board, E-mail	N/Y	Free access
Prometheus	Socrates Commenius	Online	E-mail	N/Y	Not available for public yet
Meeting of Generations	Socrates Grundtvig	Face to face Online	E-mail, Board, Chat	N/Y	Not available for public yet

SUMMARY

It should be stressed that only a few projects have been successful. What are the reasons of failure then? The answer is complex but we consider lack of learners' needs analysis; lack of copyright agreement; lack of reliable and user friendly LMS platform; no pilot course delivery; no evaluation after piloting; no updated materials to be the major reasons

General conclusions regarding projects, courses and sustainability issues are collected in the Table 1. It should be stressed that only the TeleCAD course is constantly used and updated (Klosowski, Grabowska 2002). Among more than 1000 users, mainly students from Civil Engineering Department, there is a group of 77 lifelong learners awarded Autodesk certificates. Looking at potential lifelong learners (Grabowska 2001 B) the following groups require further consideration in course and project design: handicapped people; people staying at home; people in rural areas; working

people. With our experience in EU projects we expect engineers and teachers to be major ICT enabled lifelong learners.

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A holistic and strategic approach to support and promote Lifelong Learning, networking activities and regional learning

An EU project under the R3L initiative

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Abstract: This paper describes an EU project within the R3L initiative. The project idea is based on the experiences of 7 participating regions, all with experience of regional work within Lifelong Learning. The main objective of this project is to develop - through inter-regional co-operation and exchange of experiences - policy recommendations, supported by a number of good practice examples, showing working methods and tools. To support the development work 5 thematic networks have been created, dealing with the themes: Lifelong Learning and Competence Councils; Lifelong Learning and ICT; Lifelong Learning and entrepreneurship; How to support Lifelong Learning by making training easily accessible for all people; and Lifelong Learning, equal opportunities and quality of working life. Within each theme, a regional analysis will be carried through, which will focus on the actors or stakeholders, who are active within the field and the activities they carry out within lifelong learning.

Key words: competence councils, economic growth, equal opportunities, inter-regional cooperation, learning region, policy development

BACKGROUND

Successive European Councils, notably those in Lisbon and Feira (2000), Stockholm (2001) and Barcelona (2002), have acknowledged lifelong learning as a key factor in ensuring economic competitiveness and prosperity, active citizenship, social cohesion and the fulfilment of individual personal aspirations. It is the guiding principle underlying the common objectives of the education systems and policy agreed on by the Education Council for the coming decade, and an important contributor to local and regional development throughout the European Union.

Transforming the concept of lifelong learning into concrete reality will require the mobilisation of all players involved in ascertaining learning needs, opening up learning opportunities for people of all ages, ensuring the quality of education and training provision, and making sure that people are given credit for their knowledge and skills acquired. To this end, closer cooperation and partnership must be encouraged between the decision-makers and administrative authorities, the many different providers of formal and education and training, organisations with a non-formal learning dimension in the social and cultural field, associations and NGOs, the social partners, and first and foremost the citizens themselves.

The R3L initiative was set up on the basis of these statements, and was launched as a European Commission call for proposals in July 2002. The purpose of the initiative is the further development of good practice on issues relating to the learning region and to encourage a fruitful trans-national sharing and exchange of this experience. Furthermore, it aims at promoting the development of European networks between learning regions as a means of placing European cooperation in the lifelong learning field on a more durable and sustainable footing. Seven regions from Europe got together to develop a common project, and this paper describes the project, which started in May 2003, and will run until September 2004.

AIMS OF THE PROJECT

Objectives

The main objective of this project is to create more holistic understanding of lifelong learning than the regional activities can offer through inter regional co-operation and exchange of experiences, developing policy recommendations, supported by a number of good practice examples on working methods and tools. The project will illustrate in practical terms how regions can work in a more co-ordinated, structured, strategic and holistic

way, with LLL as an important and strategic factor in regional development. The objective is for the region to become a sustainable and well-functioning learning region.

The policy recommendations will touch upon three main questions, which are:

- How LLL can be an instrument as to support economic growth in a learning region;
- How the learning region can support LLL in the best way;
- How learning regions can measure the performance of their support within LLL and how they can ensure the quality of the learning region as such.

On a longer-term perspective, the project seeks to improve the quality of lifelong learning in regions making it more accessible for the individual. Hence, groups of citizens from the regions, such as unemployed, semi-skilled and unskilled workers, people in danger of being excluded from the labour market, senior people, people with no ICT knowledge, potential entrepreneurs, etc. will be the target groups on the individual level.

Innovation in the project

The participating regions all have experience that the LLL regional learning and networking activity is not sufficiently strategic, coordinated and holistic. Therefore, the innovative part of the project is to give these regions practical tools to adopt a more strategic approach in their development work, which can be integrated within the overall regional development.

Some of the participating regions have neither international networks nor regional networks within different themes of LLL, and some of the regions have regional networks but not international ones. What is common for all partners in the project, though, is that they want to develop a system of thematic networks as it is described in this paper, so this project serves as an important catalyst and motivator for the regions to establish these networks.

For the partners in the project it is important and innovative to bring regional partners together in a project which does not focus on funding, or on cross-sector competition within education. This project focuses on co-operation, dialogue and networking and the development of the regions as a whole. The many regional organisations taking part in the project can therefore benefit from comparing and drawing upon practice with other European regions.

Project idea

The project idea is based on three main horizontal themes, which are:

1. LLL and the promotion of economic growth;
2. Support Services for LLL in the region;
3. Measuring the performance and ensuring the quality of the learning region.

The three themes of the project serve as the fundamental and general questions that regions have to consider when they want to develop a learning region in a qualified way.

In addition to these themes, the project is divided into five vertical or thematic networks. The work within the vertical/thematic networks will support the overall work with the policy recommendations. They are the areas where the partners' specific qualifications will be exploited and where the participating regions have specific interest. The vertical networks are the following:

1. How do Competence Councils support LLL and regional learning?
2. How can ICT support and promote LLL and ensure SME and personal development?
3. How does LLL support entrepreneurship in the region and how can LLL ensure the development of sustainable SMEs?
4. How to support lifelong learning by making training easily accessible for the people?
5. How does LLL support equal opportunities in working life and in the society in general?

The work carried out in the thematic networks will describe and analyse the regional situation in terms of regional stakeholders, activities, regional development results and best practice examples. This work should serve as an input to the work in the horizontal network, where the main objective will be to transform the thematic and regional experiences into a set of general policy recommendations. These principles should be applicable on a European level and useful for all regions in Europe, not only for the 7 regions participating in this project. The project idea is shown in Figure 1. (The abbreviations in brackets refer to countries responsible for each topic).

We believe that this project construction is the best for an inter-regional project. It reflects a true European way of working with global and strategic recommendations on a European level. In addition it takes into account the regional interests and diversities, which are respected and developed in an individual way. This ensures all regions contribute to a better and diversified understanding of the issue.

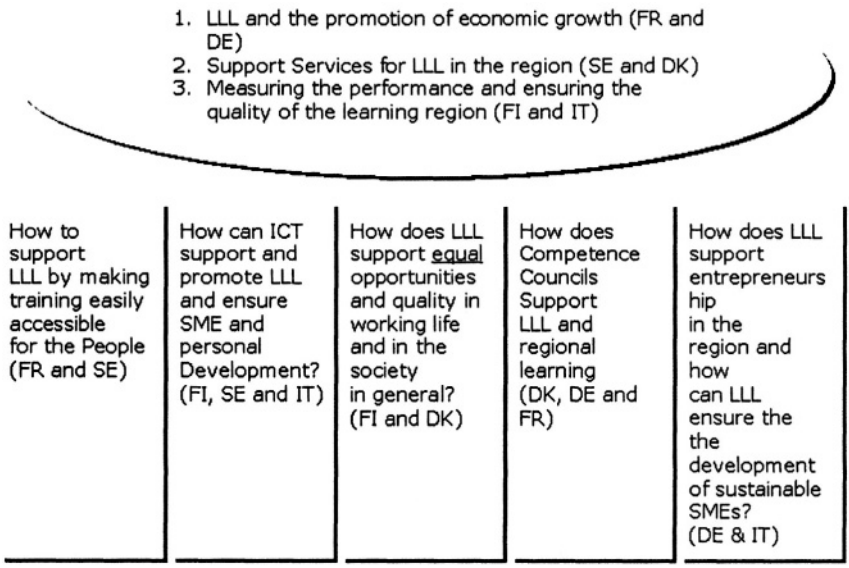

Figure 1. The project idea

Target groups

The target groups can be divided into three levels, political/regional administration, organisational and individual level. The groups correspond to the themes described in Figure 1. The horizontal themes will target the politicians and/or the regional administration as they will implement the policy recommendations in their work.

The thematic networks will consist of stakeholders from the regions, such as educational institutions, chambers of commerce, labour market institutions, social partners and business development centres, who at the same time will be the target groups on the organisational level, as they are the organisations, which work within LLL and will be influenced by the future policy recommendations. The expected impact for these target groups will be that working with the political decision makers will be easier due to their better understanding and more holistic and strategic view of LLL. This will hopefully leave more room for the actors and stakeholders to develop new initiatives and offer qualitative LLL, to a broad spectre of the citizens.

Description of consortium

The project started in May 2003 in London and will be finished in September 2004. There are seven participating regions in this project: South Denmark, Rhône-Alpes, West Finland, Stuttgart, Lombardia, East Sweden and Dorset. All the participating regions have experience of regional LLL work not being seen in a holistic and strategic way, and there is not a fundamental understanding of how LLL is important for the overall regional development.

Project coordinator

EU Vest – TIC is a regional business development centre, which is established in 1997 as a public partnership institution (I/S) and is a co-operation between the county and the municipalities in the county of Ribe - located on the west coast of Jutland in Denmark. EU Vest - TIC is a public non-profit organisation with the overall objective of promoting innovation and growth within the regional business community, and all our income is used for activities and services for the SMEs in the region. EU Vest – TIC develop and implement projects together with a broad range of organisations in the region, in the role as lead partner, international co-ordinator or external evaluator.

South Denmark Region

South Denmark Region (Ribe County and South Jutland County) has until recently been a region with one of the highest growth rates in Denmark, but unfortunately this growth has not been focused on sectors within 'The New Economy'. The region has established regional Competence Councils to put education and training on the political agenda, carrying through specific activities and projects so as to raise the education level from one of the lowest in Denmark.

The region has established competence centres within important growth sectors, and established networks of contact points for entrepreneurs. The project 'Ribe County – the Learning Region in West Denmark', established in December 2000 has given EU Vest – TIC practical knowledge of how to motivate networks, collect various information form regional stakeholders, and transform this into regional oriented needs, political strategies, practical activities and projects, which correspond to the needs of the region.

Stuttgart

The Stuttgart region initiated the study group for 'Job Market and Employment Politics' with representatives from the continuing education and qualification sector to agree and coordinate job-market and governmental employment policy initiatives, and to initiate and promote new projects to enhance the exchange of information and experiences.

The R3L project will enrich the regional work with experiences from European partners' providing new impetus and experience from other member regions, thereby transferring their experiences onto a larger scale to assist the learning effect of the network at the regional level.

Rhône-Alpes

In the project Rhône-Alpes will co-operate closely with the region of Midi-Pyrenees, because the two regions have similar challenges as mountain regions, and therefore have special needs in terms of reaching less accessible and sparsely populated areas. Moreover, the two regions have already co-operated in several development projects to 1) introduce people to ICT, 2) develop new training offers and 3) make training easily accessible by creating new public access places.

The Rhône-Alpes and the Midi-Pyrenees regions will benefit through this project from the knowledge in other regions and other organisations, which have substantial experience with the use of ICT strengthening other thematic networking activities within and outside the regions.

Lombardy

The region of Lombardy has for some years established many initiatives to promote Lifelong Learning on both a regional and local level, focused on the needs of further training and education of women and senior people, with or without work. In their work with Lifelong Learning, the Lombardy region has put an emphasis on the integration between instructor and professional training and the 'hands-on' experience within the world of work.

The R3L project will support Lombardy's work in establishing new regional thematic networks with public and private stakeholders. The region has not had inter-regional activities within this field before.

Pori

In the Satakunta and Pori region the concept has been actively promoted since 2002, when a new national research programme "Life as Learning" was launched by the Academy of Finland. The regional council of Satakunta and the city of Pori are actively looking for networking on the international level to strengthen the development of SMEs, ICT and training. The R3L project will promote such development bringing the various actors together. The active partners include the Pori unit of Tampere University of Technology (TUT Pori), providing education, research and product development in technical sciences and business science. The other local coordinator, Summer University of Western Finland, actively promotes the issues of equality. The Satakunta / Pori region will bring a substantial IT knowledge and a specific knowledge about co-operation between universities and SMEs.

East Sweden

For the R3L project the EAST SWEDEN Association and its members (County Council and the thirteen municipalities) have established a partnership with Linkoping University, Competence and Learning Centre, Distance Learning Office and the County Library. East Sweden is looking for ways to motivate its citizens to be engaged in higher education and employment as well as in specific working skills qualifications, developing learning methods to serve companies in their need for a skilled and competent workforce, as well as accessibility regarding upper secondary schools. The R3L project will be beneficial because East Sweden wants to try untraditional thinking within this project.

Dorset

During 2001, the Learning and Skills Council contracted The Enterprise Connection to install and manage a broadband infrastructure for Internet access for over 30 Community Learning and Information Centres in Dorset. This service, in a highly rural area, is one of the first of its kind in the UK, providing access to lifelong education and development for adult learners. The lead partner from Dorset, The Enterprise Connection, has substantial experience within ICT facilities as an instrument for promoting Lifelong Learning, and this experience will be fully exploited in the R3L project.

EVALUATION

Internal and external evaluation

For each horizontal and vertical theme, two partners will be responsible for the outcome of the work. Each partner will form a regional and thematic network and produce a regional analysis within each field, but the two partners who are responsible will have the overall responsibility to collect all material from the partners and draw up common conclusions, in the form of case studies, focusing on best practice examples, which show working methods and practical tools.

All partners have produced a 'Regional Snapshot' at the beginning of the project, and it is the intention that the regions at the end of the project will have to look back on this snapshot and evaluate where and how the region has changed through the activities of the project.

We believe that the best way to test and evaluate the product and output of the project, is to let other regions look at and try out the products, and give objective feedback, as these regions have not participated in the development work. Hence, we have established a co-operation with another R3L project so that the two projects can give feedback to each other's products.

Feedback from the European Commission

The project application received feedback by two expert evaluators of the European Commission who commended the project on its strong planning, with clear objectives, clear role for each partner and in its combination of overall horizontal themes and specific vertical themes. Additionally, the project design with five different thematic mini-projects carried out to gather necessary information from different resources appearing to reflect a deep understanding of what is needed to establish sound policy recommendations.

CONCLUSION

This R3L project, which is implemented by 7 European regions, has received excellent feedback from the European Commission, and if the objectives are reached, namely to form practical policy recommendations in how to create and manage learning regions and activities within Lifelong Learning, it will be a useful tool for many regions in Europe.

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Schools as Lifelong Learning institutions and the role of Information Technology

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Abstract: In this paper we focus on the role schools should play in lifelong learning and on the use of IT in school environment. We report on some activities in these directions taken in Polish schools and in the Polish education system in general.

Key words: formal learning, informal learning, Lifelong Learning, non-formal learning, school, student, teacher

INTRODUCTION

The declarations of the European Council show that the transformation to the knowledge society is very high on the political agenda. The knowledge-based economy relies mainly on the use of information and knowledge rather than physical power and on the application of technology rather than on the simple production of goods. In consequence, society expects new knowledge, skills and competences from citizens and for them to be self-motivated to pursue their own personal and professional development throughout life. Lifelong learning is the most important and promising way to empower citizens to meet these demands.

In the Commission of the European Communities Memorandum on Lifelong Learning (2000, 2001), lifelong learning is defined as *all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competences, within a personal, civic, social and/or employment-related perspective.* Therefore, lifelong learning is not limited to an economic outlook and learning opportunities for adults, its objectives include active citizenship, social inclusion and personal fulfilment and realisation of individual needs. In the Memorandum's implementation, emphasis is put on the centrality of learner, equal opportunity, and learning needs. Such an approach to teaching and learning requires education institutions to become more learner-oriented than program (or curriculum or institution)-centred.

There are three main categories of learning activity, which are not entirely separate worlds of education:

- **formal learning** takes place in schools, universities, training institutions and leads to diplomas or recognized qualifications;
- **non-formal learning** takes place alongside the formal systems and usually does not lead to formal certification; it may be provided in the workplace, through group and organization activities; it complements formal systems; it stands outside formal institutions;
- **informal learning** – it takes place in everyday life, not necessarily intentionally, e.g. from family members, friends, community members and also through media channels (radio, TV, films, etc)

Lifelong learning places new demands on all types of learning activity and educational institutions, in particular on schools who must work in close cooperation with each other. Information based learning directed by teachers teaching in schools should be gradually replaced by a new type of learning, which promotes creativity, collaboration, and knowledge construction and application. Traditional education systems must become more open and flexible, so that learners can design individual learning strategies, suitable to their interests and needs. Learning what is taught in traditional education should be transformed to effective learning of what people need and are interested in.

INFORMATION TECHNOLOGY

Information technology (IT) plays an important role in lifelong learning due to its great potential for innovation in learning and in teaching methods, educational tools and environments. IT skills (i.e. digital literacy) are among the new basic skills identified in the Lisbon European Council conclusions as those required for active participation in the knowledge society and

economy. IT provides a technical environment for lifelong learning (a channel for information and education resources) which can easily adopt changes. The main features of IT in the context of lifelong learning include:

- Flexibility with regard to time and place – an **anytime and anywhere** approach to learning, online learning environments, distance education;
- Flexibility with regard to content, e.g. computer and web mediated environments in workplaces, schools, homes and communities;
- Easy access to information and people, to ideas and solutions to problems, to new developments;
- The change of education from supply (of information and knowledge) to demand (just in time, just fit) approach;
- Person-to-person communication and interaction, synchronous and asynchronous; also interaction with web resources;
- Learning by doing, for instance through computer modelling and simulation, e-learning in distance education;
- A new organisation of learning, e.g. planning individual and group learning, management of information;
- A major component in merging personal, work, private, and leisure activities.

In this paper we focus mainly on the role schools should play in lifelong learning and on the use of IT in the school environment for that purpose. The role of students' and teachers' are considered. We report on some activities in these directions taken in Polish schools and in the Polish education system in general. For this paper the school is understood as a primary and secondary formal education institution, with some consideration of the extension to tertiary education.

SCHOOLS AS LIFELONG LEARNING INSTITUTIONS

The school is the most important formal learning institution to all actors of the education system: students, teachers and local communities including parents, local policy makers, and local governments. The school is responsible for the general education of all young people up to age 18-19. Quite often students spent at least 12 years in the school system plus 3-5 years in a tertiary institution. For many people it is about 20% of their lifetime. Schools are spending public money and using public resources which society therefore expects schools to be a partner in implementing changes, especially providing a solid foundation for further learning.

The formal education system should provide access to basic skills and moreover develop a learning culture. Instead of only working as an instructional institution, teaching according to specific programmes within a

given time period, schools should be adapted to accommodate modular programs, non-sequential learning, open and distance education and self-directed learning programmes.

As noted in the European Communities Memorandum on Lifelong Learning (2000), the results of formal (school) learning do not last a lifetime; high quality basic education for all is the essential foundation. Students should learn how to learn and developing a positive attitude towards learning. People do not want to continue learning if their experiences in school was unsuccessful and negative, if they have been rather discouraged to learn because of, for instance, comparatively poor achievements.

As suggested in European Communities Memorandum on Lifelong Learning (2000), key message 6, lifelong learning opportunities should be provided as close to learners as possible, in their own communities, since learning happens locally. The World Bank (2002) calls for schools to be turned into multi-purpose local lifelong learning centres, linked to the Internet and accessible to people of all ages.

In fact, especially in the early stages of IT development, schools are often the main public learning institutions for local communities (not only for students), and they remain such for many learners when they finish school and stay with the same community. At the later stages of IT development schools may become e-learning institutions for local communities.

The IT environment in schools may provide up-dated information, offering opportunities for all students and members of a local community to learn, and to take part in decision making actively participating in everyday life of community. This is of great value to those who never leave the community, for instance disabled people.

The school, as a formal learning institution, should support lifelong learning at least in the following aspects:

- **Preparation of students to become lifelong learners** focusing on the learner to meet their personal learning needs; school should become more learner-centred than curriculum oriented; students should be prepared in school for expected changes to come in: learning environment, (information) technology, local community, environment, job market, society.
- **Lifelong learning workplace for teachers** where schools are learning institutions for teachers and other staff members, a place of their professional development.
- **Lifelong learning partner,** and in many cases learning centre for the local community; local schools know best expectations of citizens, their needs; schools can provide cost effective learning service to local communities.

– **IT delivery centre and window to the global village** where rapid developments in IT influence changes in almost all areas of personal and professional life, especially in personal and institutional learning.

The programmes and organization of education are changing from supplying content and instruction to students to delivering what they really demand, based on motivation for farther development. This new approach starts to influence design, implementation and organization of curricula and what is going on in the classrooms. In high school, when students think about their professional career, they start to build their own programme, which is used to develop their way through tertiary education and leads to the workplace. Learning takes place along an individual personalised path. Step by step students become responsible for their own learning process; it becomes the source of their motivation.

Learning is changing – a major shift is towards user-oriented learning and encouraging students to become active learners, by improving existing practice and developing new approaches to take advantage of the opportunities offered by IT. The aims of learning extend to the creation of a learning culture, elements of personal style in learning, variety of forms and delivery of learning. Formal educational institutions such as schools are key learning environments for new ideas and practice.

For pedagogical and technical issues related to this new role of educational institutions we refer to the Position Paper on Lifelong Learning (Kendall et al. 2004). Some implementation issues are discussed also in the next sections.

Students

With regard to lifelong learning and the use of IT students should learn in school how to:

– Learn and use IT in improving their lifelong learning style and outcomes;
– Adopt changes, brought especially by rapid development of IT;
– Make sense and use of vast amount of information, today available in the net.

The eLearning initiative (Commission of the European Communities, 2000) has set the target that by 2003 all students leaving school should be digitally literate. This means digital inclusion, as opposite to digital divide – students will be able to access resources that are (sometimes only) digitally available and also use methods, techniques, and environments related to digital resources.

If all students at a certain level have the same opportunity for learning then potentially there is a chance that any knowledge gap and digital divide

between them will decrease (e.g., it applies to IT in Polish schools). Then one of the goals in the learning which follows should be not to increase these threats.

Self-motivation is the driving force in lifelong learning, preparing students in schools for years to come. Students should be encouraged to take an active role in the learning process. One cannot expect such attitudes in the case of socially excluded students who cannot motivate themselves and cannot be motivated, also in the case of students excluded (by teachers or by parents) from further education because of insufficient achievement. In such cases lifelong learning is the right way to combat exclusion from society, school and learning in general. Learning process should lead to positive actions among students and motivate them to learn more in school and later.

Information technology changes so quickly that one has to be very active in accommodating changes in the technology. People working in IT-related fields are always learning about new hardware and software, new programming methodology, communication standards, etc. A new emerging skill is to prepare other people, including school students, to become lifelong learners of IT.

A new challenge to schools is how to stop changes in the so called media (zap) generation of students, to make them interested in the future, motivated for learning, prepared for lifelong learning, and encouraged to co-operate with other students, family members, and the local community.

The most important issue in lifelong learning is learning how to learn. Training students in this direction should begin as early in the formal education as possible. Individual and group projects are very promising methods of working towards developing such skills. Schools are the right places to begin with students' team work and knowledge creation.

Teachers

The role of school teachers, with regard to lifelong learning is twofold:

- They are lifelong learners themselves to develop their own professional knowledge;
- Developing their students as lifelong learners.

These two fields of activities need different skills and competencies.

Professional development of teachers is not a part of their everyday work, since a classroom, as a working place, contributes only a little to teachers' learning. They need an extra time and effort to learn something new.

To be prepared for lifelong learning and to promote lifelong learning to students teachers should:

- Be pedagogically literate in lifelong learning and know its role in changing the learning environment;
- Know how to promote and integrate innovations in learning;
- Be competent in using IT to support and manage learning process.

Moreover, in learner-centred environments, teachers become guides, mentors, mediators, who mainly help and support learners. Learners take charge of their own learning. There is also change in teachers' role when they are separated from their students by time and distance; Polish schools are still very traditional, in teaching and organizing learning and teaching.

In understanding and using IT in teaching and learning, and in education in general, schools, teachers, students go through four stages (UNESCO 2002): first they discover general functions and use of IT tools (emerging stage), second they learn how to use IT in different subjects (applying stage), then they learn how to recognise situations in which IT could be helpful in solving (real world) problems and how to choose appropriate methods and tools of IT (integrating stage), and finally IT becomes integral part of the professional practice in school (transformation stage). In fact, the fourth stage is the most important to lifelong learning – instruction is learner-centred, subjects are integrated with themselves and with real-world applications, and school becomes a centre of lifelong learning, also for local community.

These stages are very important to the teachers' personal preparation and professional practice with the use of IT: first they become IT literate (awareness stage), second, they begin to apply IT in their subjects, then different teachers begin to integrate and overlap different subjects, and finally they are able to design lessons on larger real-world projects using IT tools, methods, resources.

There are many teachers for whom information technology is still a frightening component of school today. Some of them have got some experience in IT, but they still feel incompetent. There is a natural move to an IT competent profession (Samways 2004), which needs constant support in all respects; technical, software, training, and status.

Teachers as lifelong learners often take part in in-service training in tertiary educational institutions. To ensure expected outcomes, they should be linked to on-going professional development in their workplace (i.e. in schools), to interest groups (e.g. on particular teaching subjects), to professional associations (which may be dispersed), and to their local communities. Quite often however teachers have no time to leave their workplace and students, so the most convenient arrangement is learning at their own workplace.

With regards to technology, the optimal vision of education is to combine the best practice of human and machine (e-learning) teaching and providing access to non-local instruction and resources. There is a good message to teachers – it is not advised to eliminate human relationship from teaching and learning environments (Sharda 2003).

SCHOOLS IN POLAND AND LIFELONG LEARNING

There are a number of examples of good practice, projects and initiatives that advance putting lifelong learning into practice in school, among teachers and in local communities in Poland. We shortly describe them here.

Formal education starts in Poland at the age of 7 (from 2004 it will be moved down to 6). The formal school system at primary and secondary levels consists of three stages:

- Primary school – 1-6 grades (age 7 to 13);
- Middle school (in Polish: gimnazjum) – 7-9 grades (from 13 to 16);
- High school – 10-12 grades (to 13 in certain vocational schools) – (from 16 to 19).

Information technology (IT) as a separate subject is taught in:

- 4-6 Grades, for at least 2 hours per week for one year;
- Middle school, for at least 2 hours per week for one year;
- High school, for at least 2 hours per week for one year.

Moreover, in high schools students may choose informatics as a special subject and take final examination (matura in Polish) in that subject.

The term *informatics* is used in the sense of computer science and the term *information technology* has recently been accepted in education in the sense of applications of informatics. For short, informatics deals with producing new products connected with computers (hardware, software, ideas, theories, etc.) and IT is on using informatics (computer related) products.

Today, the subject in primary and middle schools is still called informatics, but it will be changed for information technology in 2-3 years, since its curriculum is in fact on how to use information technology across curriculum in different subjects and applications.

The national project "Internet laboratory in every middle school", initiated in 1998, provided a solid technical basis for IT education in middle schools in Poland; today all middle schools are equipped with at least 10 PCs and additional equipment. In 2001, a similar project was launched, "Internet laboratory in every high school" with 15 PCs for a computer laboratory and 5 PCs for a multimedia laboratory connected with a school library.

The European eLearning initiative set the target that by 2003 all students leaving school should be digitally literate. In Poland, this target has been met since 2002 by all students leaving middle school, when they are 16 years of age and will be met by graduates from high schools by 2005.

Students

In school, students learn to adapt to changes in IT, and to use and make sense of the vast amounts of information on the internet as they are included in the IT curriculum for different levels of education in Polish schools. Students have separate classes on IT in primary, middle and high schools, so they learn how to adapt to changes in the technology for 9 years of formal education.

Moreover in high schools, lessons on IT are connected to special subjects chosen by students and one of the curriculum goals is to start students preparing their own personal IT environments which then can be used by them in continuing education.

It is still not obvious to students and to teachers in schools, that lifelong learning starts at the very beginning of formal education in primary schools, and tertiary education, learning at a workplace, and adult education are just next stages of lifelong learning, based on the foundation laid down at the beginning of education.

Teachers

All teachers are prepared in IT and lifelong learning opportunities in this area, fitting into different levels of competence in IT, with all teachers in schools in Poland fitting into the following categories:

- Teachers of separate informatics subjects (under different names: informatics, information technology, computerisation, etc);
- Teachers of all other subjects, who use and integrate IT with different areas of education;
- School IT co-ordinators.

The Standards for Information Technology and Informatics in Teacher Preparation (Syslo 2003) determine what teachers in different groups should know about and be able to do with the information technology (and informatics).

The position (function) of school IT co-ordinator was introduced to schools in Poland by the author in 1998. He (or she) is supposed to be a teacher of the separate subject on IT or informatics and moreover he/she:

- Leads the continuous self-learning of IT of all teachers in the school; therefore a school IT co-ordinator is responsible for building the professional learning of IT into the workplace (school).
- Guides other teachers how to introduce IT to particular subjects and then integrates the technology with different subjects; in the beginning he/she may even help other teachers with the technology in the classroom.
- Promotes and co-ordinates all changes in the school which involve IT and its use in education and school management.

As mentioned above, the classroom, as a working place, contributes only a little to teachers' learning, so they have to find an extra time for their personal development: on the other hand, learning should happen locally. With respect to technology, school IT co-ordinators are to help other teachers in everyday working and learning in schools.

Higher (tertiary) education institutions are major resources for teachers' professional development. They offer post-graduate in-service courses and training to different interest groups of teachers, in IT and in other subjects. The standards (Syslo 2003) serve as guidelines for accreditation of such courses and are used by the National Accreditation Board of Higher Education Institutions for that purpose (the author is a member of the Board).

Finally, let us mention recent initiatives and projects related to professional development of teachers in IT, which contribute to lifelong learning picture of the education system in Poland, in which the author is involved (Syslo 1998-2003):

1. In 2000, **Association of IT Teachers** (AITT) has been founded by a group of school IT co-ordinators. The Association:
   - By removing or diminishing geographical and psychological barriers, brings learners closer together at local conferences and workshops, organized all over the country in local communities or in schools;
   - Contributes to organization of local learning centres for students and teachers;
   - Promotes continuous education, in particular lifelong learning of teachers,
   - Promotes examples of good practice from classrooms in other classrooms;
   - Helps in providing access to IT for disabled students in their homes; in general, puts special emphasis on special education
2. **Post-graduate in-service courses** (350 hours of instruction) **for school IT co-ordinators** are organized by University of Wrocław and sponsored by local governments in Wrocław and in the region of Lower Silesia.
3. **Educational Forum for Information Society** was founded in 2003 to co-ordinate and organizes continuous in-service training in IT for

teachers from the region of Lower Silesia. The Forum will provide the infrastructure to access lifelong learning for teachers and will prepare projects for structural grants from the EU.

4. The Association (together with other parties) has applied to **the World Bank** for grant aid to train almost 10 000 teachers and education managers from rural areas in seven regions in Poland in the use of IT in education.

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Distance Education and Lifelong Learning

A Brazilian time-honored study case approach

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Abstract: This paper presents some considerations on the theoretical position concerning the use of technology for continued education and two case studies. The first one reports a distance post-graduation course to qualify teachers who work in grade school and high school to prepare them for the use of information technologies in their classes. The second one reports the distance teaching project, based on open source software, created for people that have no access to regular classes. Both are activities at UFRGS - Federal University of Rio Grande do Sul, Brazil.

Key words: distance learning, Lifelong Learning, pedagogical model, technological model,

INTRODUCTION

Computer Science, along with Psychology and Education, have been improving computational tools for individualized teaching, with new approaches to and perspectives of the deployment of computer science in education, influenced for the past 15 to 20 years, by the advances in cognitive science. As a consequence of this influence, education has been more focused on learning rather than teaching. Knowledge is now considered as something socially built through action, communication, and the student's consideration. Education based on technology, known as e-learning (Rosemberg 2001), and distance education, in its present state, applies very well to this educational concept.

Educational institutions and other organizations began to use computational tools as an instrument to implement educational projects of distance learning, aiming not only for the improvement of so-called conventional teaching, but also for projects in lifelong learning. Very often these organizations tended to use the already available technological resources to insert new resources without an adequate pedagogical project.

The use of technology in educational projects offers several advantages, such as, greater interactivity between students and teachers; the creation of multidisciplinary teams and virtual dynamics; the cutting of operational costs; and more. However, inserting this type of system may result in all sorts of challenges. As technologies become more and more complex, demanding a greater effort for its insertion, the evaluation of its impact becomes indispensable not only when it is drawn from technological and financial aspects, but also when it considers aspects linked to the organization and its capacity to accept and support the changes due to a new technological reality.

According to Rosemberg (2001), the simple use of technological resources without an appropriate pedagogical project, and without the proper adequacy of the organization, results generally in excessive static and directive teaching environments. From this comes the necessity to establish implantation models for learning environment projects with an adequate pedagogical proposal and the correct use of disposable technology to better fit the objectives of each organization.

In order to be integrated and keep their employment in the 21st century, individuals need to develop a succession of capacities such as self-administration, organization of their own work, assumption of responsibilities, learning on their own, working in teams, and generally developing a flexible and adaptable approach to solve new problems and face new tasks. They would also need to prepare for technological innovations and its pedagogical consequences. In this way, continued education has an important role in the dissemination of the technological culture, in the development of communication skills, and in the unfolding of a capacity to work with a method.

With the new technologies there is hope to produce better teaching with more quality and cultural relevance to the people, granting a new knowledge level to those whom the traditional structures of the teaching system did not convey to higher schooling levels.

This paper presents some considerations on the theoretical position concerning the use of technology for continued education and presents two case studies as actions for continued studies at UFRGS - Federal University of Rio Grande do Sul, Brazil.

IN SEARCH OF A PEDAGOGICAL MODEL

The educational activity proposed for a computational environment (to be used in distance education) should not sustain errors from traditional teaching. We should keep in mind the peculiarities of distance education, mainly when it comes to the nature of its objectives and the characteristics of its clients, constituted mostly by young people or adults in a distributed establishment.

Traditional Education depends upon the teacher: it is he who speaks, explains, acts and takes decisions, determines what should be learned, establishes the learning rhythm, the study schedules and the disciplinary rules.

For a long time it was believed that the human being attained the maximum of his intelligence at the age of thirteen, and that the mental age of the average person was settled at this time. Lifelong education come into view during the second half of the twentieth century from the study of adult psychology and the adaptation of teaching methods to meet the people's reality. Lifelong education was considered necessary due to the complexity of life in contemporary society, by the great sum of lifelong understanding, the constant change of social environments and the possibility of self improvement for the rest of one's life. (Mizukami, 1977)

In Jean Piaget's books, we may find some important studies to form a guiding example on how to employ methodologies in the development of human resources. We can synthesise the Constructive-Cognitive approach with Piaget's main theory such that a person is considered as an open system in a successive re-structuring process that searches for a final stage, yet never entirely achieved. In this context, knowledge is considered as a continuous construction characterised by the formation of new structures that did not exist before in the individual, consequently human knowledge is essentially active.

The educational process, according to the theory of development and knowledge, has an important role as it provokes unbalanced situations for the students in the level of development in which they are found, in a way that a progressive construction of notions and operations becomes possible while the individual at the same time lives intensively each step of his development.

The compatible teaching with the Piaget's theory (1977) has to be based on analysis, research, investigation, and the resolution of the student's problems. This matter differs from the behaviourist approach.

According to Mizukami (1977) there is no pedagogical model in Piaget's theory, it is an 'understanding' theory. Nevertheless, some basic

presuppositions may stand out that are fit for planning teaching/learning situations, based on constructivism.

- The action of the individual is the centre of process, essentially based on investigation;
- Teamwork acquires theoretical consistency;
- Teaching material and environment must be challenging and promote the motivation for investigation;
- The use of audio-visual resources is not sufficient to develop operating activities. The experiences should not be done to the students, but by them;
- Programmed teaching leads to learning, but not creating;
- An individualized teaching method is coherent if there is respect for its own rhythm, way of action and creation for the student, involving programs, techniques and schedules, sufficiently flexible and adaptable to the student's conditions.

In the same way as Piaget's constructivism, the argument on information processing deals with the conception of mental representation, with a primary study purpose which is the genesis, the development and transformation of these representations (Eysenck and Keane 1994) and (Simon 1981). The cognitive psychology of the information processing differs in some constructivism points, although it involves some presupposed basics, such as the idea that an agent acts upon his thoughts, emotions, and feelings, just like the emphasis given to the scientific method as an object of study, neglected by psychoanalysis and by behaviourists.

Cognitive psychology appeared in the mid-sixties, considered as a post-behaviourist psychology by its empirical, theoretical, methodological and scientific ways, which it inherited from behaviourism, although yet opposing behaviourism in the sense that it does not restrict the studies to the stimulate/answer, stimulus/response model. Researchers in this area have developed methods of systematic behaviour observation in their search for the construction of axiomatic models. This experimental foundation and even the construction of computational simulations have brought the area close to artificial intelligence (A.I.), which also studies how mental processes occur and what kind of architecture can support them.

Human beings at this moment are seen as information receiver, transmitter, and dealer organisms and, therefore, they have processes that present specific characteristics, easy to be explained. In this stream of psychology, the human being is identified as an active person in his environment and has an auto-regulation mechanism (cybernetics) and also a shortage in these mechanisms and in those of information treatment. The assumed task by the cognitive psychologist then becomes that of an

ecological character: it has to discover the cognitive function of the individuals with the intention of improving their abilities.

According to (Eysenck and Keane 1994), cognitive psychology is concerned with the processing of information and includes a variety of processes, such as attention, perception, learning and memory.

Although both cognitive matters (constructivism and information processing) compete in their view of mental representations, assuming just two constitutive atoms of the mind. The research differs when it comes to the constructivism taking on the existence of primitive cognitive structures, which change within a previously defined plan of logical structures that appear in a progressive sequence during human development, while the information processing matter believes that there is no previously defined, genetic, logical structure.

Another divergence concerns the impetrated analysis level on both matters. The attempts on explaining the information processing matter are microscopic, searching for the processes and the mental strategies of the subjects to configure the representation of the world that surrounds them. The constructivist is macroscopic in its analysis checking on the results on interactions between the proper cognitive structures on the individuals development phase and each ones own reality. Both matters provide important subsidies for the conception of computational teaching environments once they become, in a sense, the individuals' main instrument of action as a student with his surroundings.

As observed, the question on the psycho-pedagogical principles is quite complex and makes it difficult to prescribe an ideal solution that may be applied to each and every subject matter, and each particular situation. It may be a student or a teacher that directs the usage or implementation of a computational teaching tool.

IN SEARCH OF TECHNOLOGICAL MODEL

With the evolution of computer science in education, the computational teaching environments have become an excellent alternative for distance learning. The present state of art of the web and multimedia has improved the development of teaching environments based on client-server architectures. In a special way, the popularisation of the Internet, and the development and standardization of protocols and services, makes it quite attractive for the distance learning popularity.

The main idea about distance education is the development of environments and of methodologies that are favourable for remote learning, that is, that one or more students may go through learning experiences in a

different location from where the environment and instructional resources are found. This architecture configures an excellent alternative solution for Distance Learning.

The distributed environments for learning make available to the student all the multimedia resources frequently found in the traditional teaching environments with an adequate speed and quality performance, bringing in the advantage that the system may take hold of resources that are not materially available for their tools.

The learning systems based on the web are a perfect alternative for distance learning by the fact of placing pedagogical contents available to several students, also making learning opportunities possible to a bigger number of people. (Sherry 1981)

Analysing several Distance Learning tools like:

- http://www.hera.nied.unicamp.br~teleduc;
- http://www.psico.ufrgs.br/lec;
- http://www.eduweb.com.br/aulanet;
- http://www.equitext.pgie.ufrgs.br/;
- http://www.learningspace.org/;
- http://www.webct.com.

In this paper we discuss two case studies using TELEDUC an open source free licensed learning environment, and LEARNING SPACE, a commercial learning environment. These kinds of learning environment use to be limited from the flexibility and adaptability point of view and did not suitably consider the most modern learning matters in a constructivist sense. Research, in this matter, turns towards three great courses:

- The use of adaptive WWW pages that makes use of a method to modify the contents of the pages to adapt them to the student's attitudes.
- the use of WWW systems based on the traditional architecture of Intelligent Tutors (ITS) (Vicari 2003), (Giraffa and Vicari 1999) with a WWW interface, including sometimes collaborative learning mechanisms (Schwartz et al. 2001).
- The architectures that make use of intelligent agents (Silveria and Vicari 1999).

The most recent advances in the field of 'Intelligent Learning Environments' have proposed the use of 'A. I'. techniques using architectures based on agent societies (multi-agent systems). The introduction of the A.I. techniques in these environments has the purpose of favouring modelling mechanisms of the learning process and the representation of the students' cognitive state.

The principles of multi-agent systems have shown adequate potential for the development of computational learning tools, due to the fact that, because of their nature, the teaching and learning problem can be

approached in a cooperative manner. Learning environments based on multi-agent architectures make it possible to support the development of more interactive and adaptable systems in an even more vigorous way and with lower costs, making them more attractive and efficient from a pedagogical point of view.

CASE STUDIES

Next follows the presentation of two experiments carried out in Continuous Education projects. These distinct experiments were selected due to the fact that we believe that both have certain singularities that are relevant for this paper.

Post-Graduation course for teachers' qualification

This course lasted from October 2000 to May 2002. Its aim was to qualify grade school and high school teachers in the use of information technologies in their classes. 68 students from Brazil, Uruguay and Argentina took part in this course.

The student's profile verification resulted in the following: 67 students have a computer at home, but only 14 were connected to the Web. 65% of the students were familiar with the English language. 69% of the students were well aware of the use of text editors, and 55% used to be regular users of on-line systems. During the first week of the course there were meetings where the students were assembled at UFRGS to develop activities with the objective of training them on the use of computational resources.

Throughout the semester, each discipline had asynchronous and synchronous activities. The latter was done by using video conference facilities (for small groups), video streaming and chat tools. The supporting environment Learning Space was used to aid the asynchronous activities and a Web server, where each student had his own working space and organized his own web portfolio. In each discipline, the students took the aid of a monitor (PhD students from UFRGS) that supported the study process and attended the students in their needs to use computational tools.

Results

After the end of the theoretical and practical classes, the students developed their final work under the orientation of a teacher. From the 68 students that began the course, 56 concluded it successfully.

At the end of each stage there was an evaluation of the course. The evaluation involved teachers, monitors and students, and concluded that the course obtained its intended goals. Teachers, monitors and students all came to the conclusion that the experience was positive, attributing a relevant portion of responsibility due to the success of prompt reactions and response to the help requests and consultations by the students that received an answer in less than four hours.

Because the students used to work in professional activities during the course time, it was suggested that in the next editions there would be a reduction of the weekly burden of activities and the disciplines would be organized in three trimesters. It was also suggested that the number of classmates should be reduced.

Table 1.Students answers about different items.

Query	Rate
Contents adequacy to the course	6,74
Contents	5,97
Material quantity	7,06
Discussion opportunity	5,25
Contents integration	6,84
Video transmission technology used in course	4,63
Other technologies like e-mail, chat or WWW server used in course	5,92
Utility of the material of this course in the future	4,78
How much did you learn in this course	8.47
How much did you like this course	8,42
How much effort did you place in this course	8,55
How valuable was this course for you	8,40

An evaluation questionnaire was distributed to the students where it was requested a rating from zero to ten for each indicator. Their answers can be seen in Table1.

Table 2 presents the results of another evaluation that points out the schedule load, its distribution and the period of the course, as the rate of answers of all three factors came out as regular (3,82).

Table 2.Course general evaluation.

Query	Rate
Curriculum	4,38
Discipline sequence	4,24
Schedule load of the course	3,65
Schedule load distribution between disciplines	3,49
Course period	3,51
Duration and distribution of weekly encounters	3,97
Number of students that attended the course	4,03

Very Good - 5, Good - 4, Regular - 3, Unsatisfied - 2, and No Condition to Evaluate - 1

The proposal of the next course will try to settle difficulties distributing the schedule load in three trimesters and previously announce the synchronous activity timetable.

SisWeb project

The SisWeb project consists of the development and attendance of a special course based on the TELEDUC web learning environment in the Centro Estadual de Ensino Supletivo (CEES) in Cruz Alta (Brazil) for the graduation programs known as *non-formal learning courses.*

The non-formal learning aims to render the opportunity favourable for young and old people to conclude their studies (in grade school and high school) through alternative educational systems. As long as the student is considered capable in all disciplines, which compose grade school and/or high school, he or she receives certification and can carry out with his or her studies.

The CEES in partnership with the Cultural and Educational County Offices along with local companies reach out to several towns in the state of Rio Grande do Sul. The CEES during 1999, graduated 201 grade school students and 259 high school students, being that around 1,250 students now benefit from this project.

The course material for SisWeb project was elaborated by Biology and Math teachers from UNICRUZ – Universidade de Cruz Alta, which participated in the elaboration of the presentation contents and models of this experiment with UFRGS.

The course is performed through educational modules and consists of 16 modules with at least one test per module. The student should obtain an average of 8.0 to pass in the module, which enables him to go on to the next.

Two classes for each discipline were used for the tests. One using the SisWeb learning environment while the others the traditional teaching,

attending the equivalent of ten-hour classes in the SisWeb. The 14 Biology students had their performance compared with 16 night-attending students that frequented traditional classes. In the same way, 12 daytime math students used the system and had their performance compared with 20 night students (as we can see, the number of students per class cannot be the same).

Results

The attained results with the SisWeb through tests, just the same for both classes, are as shown in Table 3.

Table 3. Students evaluation results

Class	Evaluated students	Average
T7 – morning (with SisWeb)	14	82,80
T7 – night (no SisWeb)	16	87,50
T7 – afternoon (with SisWeb)	19	80,79
T7 – night (no SisWeb)	20	85,62

The attained information revealed a better performance, as much as in Biology as in Math, among the students that studied with a constant support of a teacher. But some factors contributed to that result, such as:

- Greater frequency of night time students than daytime students;
- Lack of previous know-how on handling a computer;
- Only ten computers were available in each computer lab.

The main difficulties found in the use of the teaching system lies in the computer's domain, due to the fact that many students had little knowledge on how to deal with computers got in the classes way and consequently the learning. Other negative factors were the lack of space where three students had to use one computer together. Despite these problems, it verified the students' enthusiasm with the idea of working with a computer to learn, having in mind their curiosity and the possibility of being in contact with new technologies.

This study show us that for the utilization of a distance learning system, it is necessary for the users' to have good knowledge about the computer, which would increase the production and exploitation of a tool. In this second experiment, the students were not familiar with computers.

CONCLUSIONS

The idea of self-learning is more crucial for distance education than in conventional teaching, where the interactions between teachers and students and among students promote permanent motivation. The students' success in distance education really depends on self-motivation.

The problems generated by the separation in time require differentiated attention. Strictly, the problems caused by the separation in space can be easily overcome through efficient personal simultaneous communication systems or differentiated between the students, tutors and teachers, and among the students themselves.

The first great challenge to be faced by the institutions refers more to an affective-associate matters instead of the contents or methods. Contact and interaction strategies with students become more relevant: monitors providing prompt answers, teachers acting in a synchronous way and motivated students are indispensable conditions for success in a course.

Many students encounter difficulties in reaching the autonomous demands in their learning, time management, planning and self-direction set by the autonomous learning. Distance education will succeed when it involves interaction/interactivity between teachers and students, between students and the learning environments, and among the students. As for the statistical results as shown above, we intend to verify both case studies with a bigger number of students during 2003.

ACKNOWLEDGEMENTS

The projects described here, were sponsored by FAPERGS and CNPq. We also thank SisWeb and the Espie team.

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Evaluating electronic learning environments from a Lifelong Learning perspective

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Abstract: For many educators and indeed for many learners, ICT appears to hold the key to the successful implementation of Lifelong Learning. The capacity of the technology to overcome temporal and spatial constraints has obvious synergies with the need to learn at a time, place and rate determined by individual requirements rather than by formal structures. This paper examines the extent to which the quality of electronic environments designed specifically for this type of learning should be judged according to the same criteria and parameters that we customarily use in evaluating face-to-face teaching.

Key words: agents, computer-mediated communication, evaluation, face-to-face, Information and Communication Technology, knowledge, learning environment, Lifelong Learning, online learning, online teaching, quality, social construction

INTRODUCTION

The quest for greater accountability in education on the part both of its consumers and of those responsible for its funding, has led to an increased emphasis in many countries on a range of processes and procedures which come under the general heading of 'quality assurance'. This is often seen as particularly important in relation to determining the status of online learning environments in comparison to their face-to-face equivalents. Given the wide range of criteria against which educational endeavours might

potentially be benchmarked, the quest for standards against which 'quality' can be assessed is mounting a significant challenge to researchers. For example, acknowledging the fact that, "Evaluation … has become increasingly important in the current quality-driven context of higher education" Oliver et al (1995; p. 199) attempt to chart a course through the complexities of qualitative and quantitative methodologies, formative and summative evaluation and so on, by means of the compilation of an evaluation 'toolkit'. This has been designed to assist the researcher in considering and choosing from a wide range of optional approaches to the evaluation and ultimate comparison of different types of learning environments. While such initiatives are undoubtedly helpful, there remain a number of unanswered questions concerning the notion of equivalence both of process and of outcome between face-to-face and online learning environments.

Firstly, we need to clarify the extent to which the criteria used in evaluating face-to-face learning environments are appropriate for use in electronic contexts. Secondly, given the potential importance of online learning to strategies that might facilitate a community orientation towards Lifelong Learning, we need to consider whether the fostering in students of skills appropriate to Lifelong Learning necessitates broader changes in our conception of what constitutes a 'quality' learning environment, whether face-to-face or computer mediated.

EQUIVALENCE AND QUALITY

To many educators, a key aspect of quality in the provision of online learning is the degree to which the experience of the learner mirrors, in as many respects as possible, that provided by the face-to-face classroom. In addition to the provision of interactivity, great store is often placed on the creation of an interface featuring clearly identifiable metaphorical equivalents of elements of physically existing educational institutions, such as libraries, meeting rooms and student lounges. The justification for this is frequently framed in terms of equity of provision to all students which, it is suggested, can best be achieved through the highest possible degree of replication of experience between the different modes of course offering. In a recent discussion between this author and staff engaged in the translation of a unit of study from face-to-face to electronic mode, it was argued that this derives from the 'fact' that the face-to-face learning experience encompasses the accumulated wisdom of decades of research into educational practice, and is therefore a model which should be faithfully followed. Further, it was felt that a high degree of apparent replication of the

face to face environment would ensure favourable judgments from quality assurance bodies. (Dowling 2002).

Several interesting and important questions derive from a consideration of these claims, including the issue of whether or not the characteristics of traditional face-to-face classrooms are the most appropriate to foster in learning environments designed to meet the needs of the Lifelong Learner.

Identifying and measuring equivalence

While the educators mentioned above placed great importance on apparent equivalence of process, and were concerned to map this equivalence as faithfully as possible from the 'ideal' represented by traditional learning environments onto their electronic counterparts, it can be argued that this is in part an artefact of their personal lack of familiarity with electronic environments. For increasing numbers of students, accustomed to electronically mediated interaction in many aspects of their lives, the attempted replication of traditional learning environments may not, in fact, facilitate their learning. Rather, it may represent a failure to capitalise on the information-seeking and communicative skills that they are accustomed to exercising in other contexts, including the contemporary workplace, and that are likely to be of increasing importance in terms of a Lifelong Learning scenario emphasising the processes rather than the content of learning. Further, there is an abundance of research indicating that electronic interactions should not be regarded as the precise equivalents of their face-to-face counterparts (Dowling 2000), (Dowling 2000A). This suggests that notions of replication, in addition to being undesirable, might also be basically unachievable.

If replication of the outward processes of face-to-face teaching is not an appropriate measure of equivalence of quality, what are the alternatives? In practical terms, the ultimate measure of equivalence as recognised informally by most stakeholders lies in comparability of outcomes. Do the students studying online perform as creditably on identifiable measures of learning, most often interpreted as a fairly traditional range of 'content' and context-specific 'skills', as their more traditionally educated peers? It can be argued that this approach is somewhat naïve, and fails to take cognisance of subtle distinctions in the types of learning taking place within the different contexts. Nevertheless, for many students, parents and employers it represents the 'bottom line'.

Perhaps the greatest weakness of this point of view is its failure to take into account the students' performance in those 'social' and 'process oriented' aspects of learning and performance such as participation,

negotiation and collaboration that figure so strongly in the contemporary rhetoric of both education and the workplace. In addition there is often insufficient consideration paid to their ability to apply generic problem solving skills to novel content, and the capacity to interact effectively with online material and information is for the most part ignored. Outcomes such as these are arguably of greater relevance to Lifelong Learning than is the acquisition of domain-specific skills and content knowledge. Interestingly, they are also aspects of the quality of the learning experience that can be far more readily measured and evaluated in relation to online environments than face-to-face. Further, it can be argued that, within these contexts, they can be even more readily and effectively assessed than more traditional learning outcomes. Benigno and Trentin (2000), for instance, identify the two particularly significant aspects of evaluation of online courses as being the evaluation of learning and the evaluation of the participants' performance or participation within the course. In so claiming, they acknowledge the richness of data available for undertaking the latter task by comparison with what exists for more traditional modes of pedagogy while lamenting that, by contrast, "Verifying learning is a difficult task" (p. 263). However, while the online environment undoubtedly provides a rich resource of data for measuring processes of interaction both with information and with other participants in the learning process, we lack evidence at this stage concerning the degree to which these apparently more generic outcomes are actually transferable to off-line environments.

Even if they are not fully comparable or transferable, we may still wish to acknowledge that developing skills in interacting and learning online is of value in itself, particularly given the obvious synergies between these capabilities and the needs of the Lifelong Learner. If this is the case, then we need to further consider the relationship between equivalence and quality in evaluating online environments.

Socially mediated learning in the face-to-face and electronic classroom

If face-to-face and electronic learning environments cannot sensibly be regarded as equivalent, are there characteristics of each that can make a special contribution to the development of generic, transferable skills relevant to Lifelong Learning within a social context?

The assumption that traditional face-to-face learning environments provide the most effective model of interaction is easy to challenge in a number of respects, although we need to guard against perceiving these contexts solely from the perspective of the teacher. At university level, for instance, the mass lecture is clearly intended to provide little opportunity for

interactivity beyond the one-way delivery of information from the lecturer to the student. In many of these contexts, however, there is actually a great deal of other communication going on through such means as whispered conversation, note-passing and, in recent times, text messaging. As is the case with more legitimate forms of interactivity within educational environments, some of these exchanges are concerned with the course content, while others are not. This is a form of social and intellectual engagement which, although un-mandated, can nevertheless have desirable pedagogical consequences, and may indeed particularly suit the learning styles of some students.

The guided interactions characteristic of smaller scale face to face classrooms typical of a school, or a tutorial, are the more usual models for the interactive components of online learning environments. Both on and offline, these incorporate the potential for facilitation or direction by the teacher, for the exercise of some control over participation, and for the monitoring of interactions.

Students participating in a recent evaluation of a unit taught in mixed mode by this author revealed some interesting perspectives on classroom interactivity. Not surprisingly, a number of them felt that they did not always experience face-to-face learning environments as being highly interactive. Interestingly though, while some regretted this, others claimed that it suited them very well, and that they felt that they learned more 'efficiently' in minimally interactive settings such as large lectures.

Others acknowledged the interactivity of the face-to-face classroom, but stated that it was not their preferred way of learning. A number of these students identified the potential for less obligatory interactivity as being an attractive feature of online environments. One specifically lamented the fact that participation in discussion groups had recently been made mandatory in a particular online class (Dowling 2002A). There are clear links to be made between these observations and the concerns raised in the Position Paper on Lifelong Learning regarding the 'lone wolf' learner (Kendall., et al. 2002).

These tensions between accommodating the preferred learning styles of students and insisting that they undertake their learning through activities that we believe to be beneficial to them in the longer term are not new. They are, however, moving closer to the forefront of pedagogical concerns as we focus increasingly on equipping students with 'meta' learning skills appropriate to the concept of Lifelong Learning, rather than concentrating primarily on the acquisition of short term skills and content knowledge. While we might argue that certain students would benefit from being relieved of the burden of relentless interactivity in the classroom, these are perhaps the very students who need to learn to engage in social and collaborative learning in the interests of their future employability.

WHAT SPECIAL CONTRIBUTION MIGHT ELECTRONICALLY MEDIATED LEARNING ENVIRONMENTS MAKE TO LIFELONG LEARNING?

Aside from the more obvious advantages in implementing a flexible 'any time, anywhere' approach to learning, there are more subtle benefits to be derived from online educational environments. The fact that electronically mediated communication is qualitatively different in a number of respects from face to face interactions (Dowling 2000) and (Dowling 2000A) does not necessarily suggest that it is any less effective in facilitating learning. Indeed, as argued earlier, when we consider the primacy of electronic communication both in the workplace and in the personal lives of today's students, this is an extremely 'natural' medium for them in relation both to the acquisition of information and to their preferred mode of social interactivity. Online communication may not 'replicate' its face to face equivalent, but it is becoming the interactive medium of choice particularly for many young people, who embrace with enthusiasm qualities such as speed of response, unstructured access, and the immediate plunge to the core of meaning characteristic of SMS messages. This latter mode of interaction has recently been reported as apparently overtaking email in popularity. "More than 40 per cent of people aged 15 or older in Europe's three biggest economies use short messaging service (SMS) on cellular handsets, while 30 per cent use computer email, says research company GartnerG2" (McLuskey 2002). Such a shift in preferred mode of interaction for both social purposes and in the workplace may mount even greater challenges to the educators of the future as they strive to maintain 'relevance' to their students of all ages and to the world in which they will live, work and continue to learn.

In addition to 'relevance', computer mediated educational environments have a number of other potential advantages in relation to learning at different stages of life. Factors which may encourage particular students to participate more freely in the social negotiations characteristic of knowledge construction include a degree of anonymity and of student control over the persona presented to the rest of the group. In the absence of a number of social 'markers', including indicators of age, some students may feel more able to participate actively in discussion. The ability to opt in or out of discussion, or to interact outside the constraints of 'real time' environments, can also provide the more diffident or reflective student with the temporal 'space' needed in order to contribute a considered response. In the literature of pedagogy much is made of the notion of the 'reflective practitioner'. Are the needs of the 'reflective learner' as well catered for, particularly in face to face learning environments? In terms of Lifelong Learning, one can conjecture that such flexibility might be of particular value, for instance, to

the complex situation of the more mature learner who is bringing a great deal of prior knowledge to the learning of sophisticated material.

The ability to operate within one's own time frames can also be helpful not just to students but to the teacher in responding to their communications, as can the capacity to communicate as appropriate with either a selected group or with an individual. The ability to structure pedagogical communication in this more 'targeted' way is significantly enhanced in many online environments, and would be particularly beneficial when dealing with student cohorts of mixed ages and prior experience, as is likely to be the case in situations addressing Lifelong Learning needs.

IDENTIFYING QUALITY OUTCOMES ESSENTIAL TO LIFELONG LEARNING

In considering the evaluation of learning environments from a Lifelong Learning perspective, a tension can sometimes be identified between the acquisition of generically applicable learning skills and the need for 'just-in-time' learning of domain-specific skills and content. This can be partially resolved by acknowledging the former as being a desirable pre-condition for the latter, which suggests that, in the early stages of learning, the evaluation of quality outcomes should focus most strongly on students learning 'how to learn', rather than on 'what they learn'. It must be recognised, however, that this is a rather gross simplification of a complex situation.

As noted earlier in this paper, the evaluation of 'process' outcomes is more easily achieved in an online situation due to the capacity for monitoring and recording details of the various forms of interaction that take place both between participants and between learners and the course materials. The irony of this is that, while we may believe that such outcomes are particularly important for younger students, there are also grounds for believing that online environments are suited to more mature students, with younger students gaining special benefit from the support of a face-to-face situation. While detailed discussion of this dilemma is beyond the scope of this paper, it is worth noting in the context of previous discussion that educators in pursuit of data evaluating the efficacy of different educational environments should be wary of equating the outcome most amenable to detailed measurement with the 'best' outcome for the student. In the long term it is clear that both the acquisition of meta-skills and provision for 'just-in-time' learning are key aspects of an overall educational strategy designed for Lifelong Learning.

CONCLUSION

The evaluation of electronic learning environments from a Lifelong Learning Perspective is a task fraught with complexity. While some issues derive from intrinsic 'differences' between electronically mediated and face-to-face social interaction, others relate to changes in preferred modes of communication both in the workplace and in the broader community. Further challenges are mounted by consideration of differences in the learning styles favoured by individuals, and the degree to which these should be accommodated in the best long term interests of learners and of their communities. Additional questions can be raised in relation to the appropriateness of different modes of pedagogical interaction for learners of different ages, and also to how we should best strike a balance between satisfying the two very different imperatives of 'learning how to learn' and the 'just-in-time' acquisition of new knowledge and skills.

These considerations suggest that there are strong arguments for resisting the temptation to evaluate online learning according to the same criteria as those used in face-to-face situations. Further, if an orientation towards Lifelong Learning is to be taken seriously, we may need to articulate different priorities for evaluation of appropriate outcomes of online as well as face-to-face learning according to the ages and stages of individual learners.

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Training the educational manager

Lifelong Learning in practice

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Abstract: The University of Amsterdam has been implementing and supporting Blackboard as the electronic learning environment for the whole university. Implementing this environment has been centred around three pillars: technology, communication and didactics. These three pillars have proved to be important in this large-scale project in which both the faculties and a central support unit of the university were (and still are) involved. This article focuses on the didactics of the project and describes several products and methods from the University of Amsterdam and the Digital University, which have been used at the university to realise practical support for the useful application of an electronic learning environment in education and an effective strategy to accomplish this.

Key words: didactics, higher education, implementation, Information and Communication Technology, learning environment, professional development, management, strategy, training

INTRODUCTION

The University of Amsterdam (UvA) has approximately 22.000 students and 3800 academic staff members. It is one of the largest universities in the Netherlands and until recently was regarded as one of the most traditional universities with regard to the use of ICT in education. This changed in 2000 when the implementation of a university-wide electronic learning environment started, based on experiences of enthusiastic and innovative teachers in the years before. This article gives a short overview of the

process of implementing Blackboard as the standard electronic environment for the university, a process in which an awareness that not only is the technology behind an electronic learning environment extremely important, but also the communication about and the didactics underpinning the electronic learning environment. The training that was developed at the university to emphasize the importance of the didactics of an electronic learning environment and the experiences with the training is described in more detail.

THE ELECTRONIC LEARNING ENVIRONMENT

In the 90's several faculties and departments of the UvA started experimenting with the possibilities of computer-assisted learning and gradually this developed to the use of Internet in education. In general this experimenting with Internet consisted of self-developed websites, some discussion boards and the use of e-mail as a communication tool. With the arrival of more enhanced systems for group work and the first electronic learning environments the interest in the use of learning technology increased even further.

During the monthly meetings of the ICT coordinators in the faculties the issue of using an electronic learning environment was discussed in detail. In order to avoid each faculty buying its own learning environment with the accompanying hard- and software it was decided that there should be a centrally supported electronic learning environment, accessible for all staff members, support by a central support unit. The central computing services unit of the university, the unit that among other things provides the faculties and departments with hard- and software, Internet connectivity and all the additional services and support, adopted this. The concrete responsibility for the implementation and support of the electronic learning environment Blackboard was put in the hands of the department of ICT in Education, the expertise group within the central computing services unit. This department consists of learning technologists with a focus on both the technique and the didactics of ICT in education. This group started in February 2001 with their ambitious project, to implement Blackboard as the university-wide electronic learning environment.

THE THREE-PILLAR MODEL: TECHNOLOGY, COMMUNICATION AND DIDACTICS

Implementing a university-wide electronic learning environment involves many aspects, actors and organisational issues (Fisser, 2001). Therefore it was decided that in order to assure success the process of implementation required a project-based approach with a focus on technology, communication and didactics. A project was initiated and organised around these three pillars (Benneker et al., 2001).

Technology

The general goal of the technology-pillar within the project was to guarantee the technical continuity. This comprises the maintenance and management of the hard- and software, exploring the developments with regard to integration of educational technologies, monitoring important developments in the learning technology-market, sharing experiences in relation to technique and technology with other universities and integrating the electronic learning environment with other systems of the university.

Communication

The communication-pillar of the project related primarily to the creation of awareness of the possibilities of an electronic learning environment, getting commitment of teachers and educational managers to start using the environment in education, and to stimulate the effective use of the learning environment. Furthermore, the communication-pillar provided information for all actors involved (instructors and managers, but also technical and educational support persons) about the functionality of the system, possible changes in software versions, etc. Finally, communication was provided about the products that were developed in the didactics-pillar of the project.

Didactics

The primary goal of the didactics-pillar was the staff development of the academic staff and an implementation model supporting educational managers in relation to the implementation process of the learning environment in the curriculum.

The staff development part of the didactics-pillar was aimed at teachers and had a focus on issues such as the way an electronic learning environment can be used in specific educational settings and how learning material can be

made electronic and interactive. This with the idea that the didactical issues behind these issues is the centre of attention, not the technology.

Products that were developed in this respect were tailor-made workshops and discussions with the teachers. Most of these courses are directly related to the electronic learning environment Blackboard itself, such as the Blackboard Basics training, a hands-on training in which the teacher learns about the functionalities of the system and has the possibility to work with the system for several hours. Next to the Basics training, Didactics training was developed, aimed at the effective use of an electronic learning environment: not the functionalities of the system, but the educational design of the teachers' course is the central focus point. Based on the design of the course the academic staff learn how to use the electronic learning system as an effective tool to support education. The Blackboard Didactics training is a general training that can be adapted for specific needs (tailor-made training).

The main product that was developed for the educational managers and the ICT support persons is the "ICT in Education Implementation Model". This model can been used to support the implementation of the electronic learning environment on a department- or faculty-wide basis.

THE IMPLEMENTATION MODEL

The implementation model (Dekker, 2002) that was developed within the didactics-pillar consists of six steps:

1. Orientation
2. Describing the current situation
3. Determining the ambitions
4. Determining the interventions and activities
5. Carry out the interventions and activities
6. Evaluation

The first step of orientation is to raise the awareness within the department of what it is they want to do when implementing an electronic learning environment. Attention is paid to technical and financial issues, to gaining commitment from both management and academic staff, organising the support and staff development and planning the strategy for the implementation process. In step 2 a quick scan in which all relevant information about the department in relation to ICT in education is collected to describe the current situation.

The third step is one of the most difficult steps in the implementation model; determining the ambitions. Or, in other words, describing the goals and developing a vision; why do you want to implement an electronic learning environment department-wide? In this step in the implementation

model one of the methods used is the development of scenarios to develop a vision. In these scenarios a specific future use of the learning environment is described, with consideration for the users and the context of the use of the environment. The scenario makes both the future and the expectations of this future tangible.

Based on the vision and ambition of the faculty of department a set of interventions and activities is determined. This is the actual plan for the implementation of the learning environment. The interventions and activities are aimed at creating commitment, communication about the process of the project, staff development for those involved, optimising support for the staff, increasing the involvement of the staff and continuing development and maintenance of the vision.

Evaluation, step 6 in the model, is not only carried out at the end of the project, but is an ongoing process. Based on experiences the project planning and content could be adapted to fit the specific needs of the faculty/department or its academic staff.

TRAINING THE MANAGER

The implementation model is just a support-instrument for the educational manager and his or her support staff. The educational managers at the university expressed their interest in a just-in-time training about strategies with regard to implementing an electronic learning environment or more general with regard to implementing ICT in education. This training was developed in a project of the Digital University consortium of which the University of Amsterdam is one of the members.

The role of the Digital University

The Digital University is a consortium of ten universities in The Netherlands. It focuses on the development and application of digital educational products and knowledge for higher education (Digital University, 2002). Important issues for The Digital University are a changing demand for education, combining working and learning, permanent education, the role of e-learning and the need for cooperation.

The Digital University aims to set up a relevant knowledge network, share expertise and, last but not least, share the financial burden of innovation. The projects of the Digital University can be divided in five programs:

- Digital testing, assessments and digital portfolio;
- Digital educational tools: tasks and resources;

- Learning and coaching from a distance: dual, virtual and international;
- Build up and disseminate expertise;
- Electronic Learning environments (standardization and interoperability).

Within the program of building and disseminating expertise several training programmes are developed. One of these programmes was aimed at educational managers. The programme was developed and tested by several partners of the Digital University consortium, including the University of Amsterdam.

Just-in-time training

The idea behind the training programme that was developed for the educational managers was that it should be a 'just-in-time' training. This meant that the course had to be developed in such a way that it was general enough to make a tailor-made training programme whenever a group of educational managers in a specific situation needed the training.

The goal of the training was to support the managers in making their vision on ICT in education explicit, to formulate goals and define a strategy to achieve these goals. The training consisted of three half-day meetings in which each of these components were discussed. The managers had to prepare the meetings beforehand in small groups using the electronic learning environment Blackboard. For each meeting an expert trainer was invited to give a small lecture about the subject and to answer the questions of the managers.

EXPERIENCES

Since the products of the didactics-pillar are made available we can see that there is a huge difference in both the need for and awareness of the availability of these products.

The Blackboard Didactics training is one of the most successful products. The content is evaluated as high-quality. It is however somewhat disappointing that the Blackboard Didactics training seems to be less interesting for academic staff then was expected. Especially if you consider that both the academic staff and the educational management have expressed their interest in this course many times. It seems that budget-cuts, the introduction of the Bachelor-Master system at the university and other changes in education have led to "tiredness" to do new things, including staff development. The participants in the Blackboard Didactics training have

evaluated the training as useful, so it will remain part of the staff development programme.

The implementation model on the other hand has gained much interest from both educational managers and support persons in the faculties and departments. But also persons from outside the university see the implementation model as a useful means to guide the implementation of an ICT-related innovation. Based on the experiences so far, there are some areas of attention that should be worked out in the near future in relation to the use of the model. Most important in this is the starting-point of the faculty or department itself, and not an organisation such as the expertise group in a central university unit, should be the owner of the project. This leads to more commitment and awareness in the faculty or department. But it also raises questions about the responsibilities and roles of the persons within the faculty and the responsibilities and roles of the learning technologists of the central support unit. Who should carry out which parts of the model? When does the faculty need the support and advice of the central support unit? And, does it need this support and advice?

The knowledge that has been build up at this moment suggests that the orientation stage (step 1 in the model) requires someone from outside the faculty, someone who asks questions and thereby raising awareness about the actual problems. Also, guidance in the process of developing the vision and the strategy is usually appreciated by the faculty managers. Carrying out interventions and activities seems to be something that faculties and departments prefer to do themselves, but with monitoring (at some distance) by the learning technologists from the central support unit. The same is true for the evaluation part of the model. Probably the responsibilities and roles of the persons within the faculty and those of the learning technologists of the central support unit will differ between projects, but this is something that should be taken into account during the first step of the model.

Unfortunately, the training for the educational managers was the least successful part of the products that were developed. The training was tested by offering it to a group of educational managers of three different universities. Although the training was evaluated as a high-quality training which was very useful, half of the participants did not finish the course and only participated in one or two of the three meetings. The main concern of the participants was lack of time: three meetings were too much to schedule in their day-to-day activities. Also, the preparation that was required before each meeting was seen as useful, but had no priority in relation to the regular tasks of the manager. The suggestion was made to make the training less time consuming: a one-day meeting with different kinds of documentation such as literature, check lists etc.

Based on these experiences a new programme is now under development, considering the suggestions made by the managers. The idea of the new programme is to offer two support methods for the managers: a checklist (based on the implementation plan as described before) and a consultancy trajectory. The checklist can be used as a preparatory activity to describe what the educational manager wants with ICT in education, establish the goals and how to get commitment from the academic staff. The consultancy will provide a trajectory in which the actual implementation of ICT in education will be carried out based on the outcomes of the checklist. The implementation will be realised by a working group consisting of members of the faculty and an external consultant.

CONCLUSIONS

This paper focused on the didactics (and more implicit on the communication) that is involved when implementing ICT in education, especially related to training and supporting educational managers. It seems that even though educational managers express a need for training, what they really want in practice is support. This support can be divided into two kinds of support: instruments/paper resources and human resources. The implementation model is a good example of a useful paper resource. It gives guidance in the steps to take when implementing a faculty-wide ICT-project. Next to a quick-scan methods are offered to think about and develop a vision and a strategy to accomplish the implementation. But these paper resources need human resources to carry out the implementation. Part of these human resources can be found in the faculty or department itself. The ICT-coordinator, teachers, support staff, etc. can carry out parts of the implementation process. For some parts of this process it can be useful to consider hiring external consultants or learning technologists.

Overall it can be said that educational managers have a busy schedule. They do not have the time for 'just another ICT-project'. The ICT application has to have an added value, it needs to be integrated in the curriculum or it has to serve a specific goal before the manager will give the implementation process priority. Supporting the educational manager with both paper and human resources, or more importantly, make him or her aware that he or she needs these resources is the next challenge.

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Regional knowledge networks for Lifelong Learning

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Abstract: Why are particular communities performing economically better in knowledge economies? Under conditions of intense global competition and complexity it seems that better performing communities enable their members to cultivate human talent: they enable their members to learn. This allows these learning communities to shift resources out of low-wage activities into higher value adding activities, thus providing continued prosperity. The basis of this seems to be a capacity to develop a competitive edge through the application of advanced technology, knowledge and service. From an employment perspective, there is a dangerous mismatch between what the knowledge economy needs of higher education and the "competences" the latter delivers. Lifelong learning provides a paradigm shift to "learning activity undertaken throughout life, with the aim of improving knowledge, skills and competence, within a personal, civic, social and/or employment-related perspective". It provides higher education with the imagination to perceive its future anew, with an engagement to redefine itself in alignment with agile learning communities. It enables learning communities, of which higher education is an integral part, to perform economically better.

Key words: community stakeholders, economic perspective, employment perspective, learning communities, partnership, triple helix

KNOWLEDGE INTENSIVE ECONOMIES

Innovation as driving force

During the past decade attention in literature given to knowledge has literally 'exploded'. The main reason for such interest is a major increase in the dynamics and complexity of the external environment in which organisations operate. Among the main causes are globalisation, the blurring of boundaries, technological advancement and de-regulation. It raises the issue: How to survive under conditions of 'hypercompetition? (D'Aveni 1994). The literature offers numerous concepts to achieve and sustain a competitive edge, including 'permanent innovation' (Janszen 2000), realisation of 'strategic fit' (Porter 1996) or 'one-to-one' marketing (Peppers & Rogers 1993). The aforementioned concepts differ considerably in terms of both background and content. However, in each of the three concepts knowledge is a central theme. Individuals and organisations that possess relevant knowledge are able to develop relationships and innovate faster than their rivals. Therefore, knowledge is increasingly recognised as the most important production factor.

The role and impact of ICT

Information and Communication Technology (ICT) is becoming a ubiquitous tool both in the work place and at home. "The penetration of ICT within society has far reaching consequences for the organisation of labour and the demands put on the workers. Just as other technological innovations have in the past, ICT influences commercial organisations in three ways: by product innovation, by innovation of the production process and by changes in the organisation of labour." (WRR 2002; p. 146; authors' translation). As part of their professional environment, workers will have to deal with generic ICT-tools, including e-mail, browser, text processor. But, also discipline specific tools, such as Mathematica and SPSS, or profession specific tools, such as a patient database. The salient ICT applications that impact almost everyone's life are:

- Personal communication (finding and interacting with resources, organisations and people);
- Organisation of activities (planning, scheduling, monitoring);
- Information management (organising, storing, creating and sharing of information);
- Organisation of team and community learning (group work);
- Navigation systems (mobility guidance; business and leisure travel).

A white paper from the Economist Intelligence Unit in co-operation with IBM (http://www.eiu.com) defines E-readiness as: the extent to which a country's business environment is conducive to Internet-based opportunities. E-readiness factors include:

- Connectivity and technology infrastructure
- Business environment
- Consumer and business adoption
- Legal and policy environment
- Social and cultural infrastructure
- Supporting e-services

Table 1. gives an overview of the e-readiness ranking 2002, showing a score for the USA, The Netherlands and the United Kingdom of more than 8 out of 10. This illustrates the fact that ICT plays a crucial role with regard to empowering people to express their creativity and supporting them to function in learning teams.

Table 1. **E-readiness ranking 2002**

Ranking 2002	Top Ten	Score (max: 10)	Ranking 2001
1	USA	8.41	1
2	Netherlands	8.40	10
3	United Kingdom	8.38	3
4a	Switzerland	8.32	11
4b	Sweden	8.32	6
5	Australia	8.30	2
6	Denmark	8.29	9
7	Germany	8.25	12
8	Canada	8.23	4
9	Finland	8.18	8
10a	Singapore	8.17	7
10b	Norway	8.17	5

The current technology on our desktop, in our homes and in learning communities provides a powerful toolbox that transcends traditional spatial boundaries. ICT implies being connected 'anytime' and 'anywhere', that is ICT affords access at work, both in the home and away-from-home and away-from-office. In summary, ICT has had fundamental consequences to our everyday lives.

Towards polyinclusion of work, learning and play

Bell's (1988) observation of "an extraordinary historical and sociological shift in the nature of markets from places to networks" is echoed by Tapscott's (1996; p. 198): "work and learning overlap for a massive component of the workforce" and the statement that "Cyberspace enables us to move ourselves to parallel worlds or in time", raising the issue of the digital divide. In particular, the digital divide poses the issue how to optimally unlock the potential of 'moving bodies' and 'connecting minds' to gain access to material space, information space, mind space, and social space (Go & van Fenema 2003), that affect both informal – and formal learning, and lead to patterns of polyinclusion. (Figure 1)

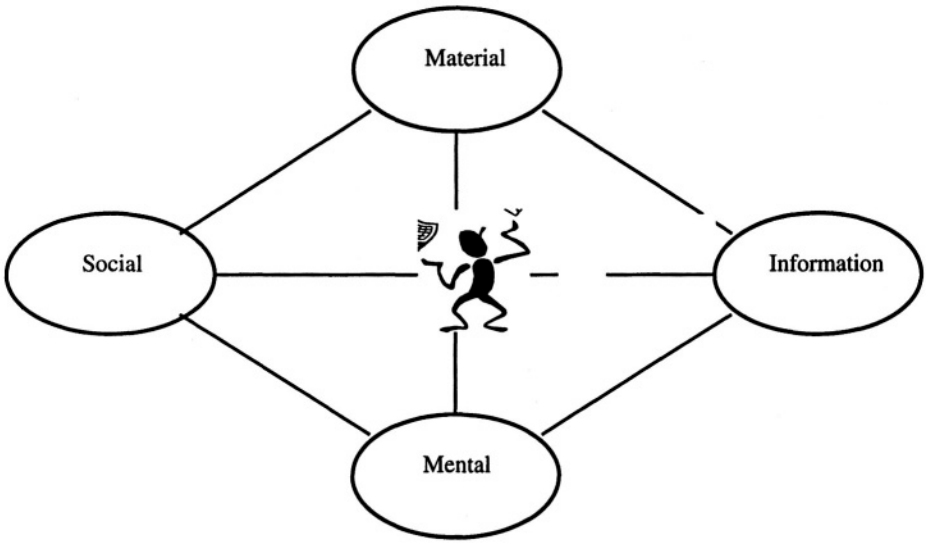

Figure 1. Patterns of polyinclusion in relation to individual learning pathways (Go & Van Fenema 2003)

Lifelong Learning

The emerging patterns of polyinclusion imply the need for integration on two levels. First, at the organisational level it requires the integration of economic, technical and social subsystems. Second, at the (national/regional) community level it requires the integration of cultural, political and economic subsystems (Lievegoed, 1969; p. 27). Patterns of polyinclusion within our society cause a discontinuity that (higher) education can hardly

respond to in isolation. First, the role and impact of technology has caused the exponential growth of knowledge management, mobile communications and the emergence of networks enhancing the employment perspective of those who are connected and resulting in a digital divide for those who lack the means and skills to be connected. Second, the scale of current economic change, particularly the rapid transition to a knowledge-based economy that is inextricably affected by globalisation and technological revolutions, is driving a 'business as unusual' scenario. Third, just as technological advancement is changing the way we work and learn so too are the attitudes of people as workers, consumers and citizens. This social revolution is occurring at a rapid rate and collides with a demographic time bomb epitomized by an aging population, that will affect both labour and consumer markets.

The European Council has decided that the present situation calls for the introduction of a new approach to education and training. It has resulted in the mandate of the Feira European Council and the Memorandum of Lifelong Learning defined as: *"all learning activity undertaken throughout life, with the aim of improving knowledge, skills competence, within a personal, civic, social and/or employment-related perspective."*

WHY ARE SOME LEARNING COMMUNITIES MORE VITAL?

From control to coordination of learning capacity

In knowledge intensive economies, driven by innovation, the organisation of work is shifting from a resource-based and labour intensive economy to one that is knowledge intensive and requiring new forms of organisation that surround production and work. (Steijn 2001). The traditional hierarchical Tayloristic organisation evolves into one of decision-making teams with the following characteristics: (Scheele 1999; pp. 96-97; Theeuwes 2000):

- Flat, with few hierarchical levels.
- Networked, with responsibilities delegated to self-supporting business units, self-controlling teams or autonomous task groups; control and accountability are organised through performance (output) and not by presence or activity (input).
- Close but flexible synchronisation between parts of the primary process, resulting in 'just in time' production (JIT) and lean organisations in

which minimal stock is kept and with flexible human resource management.
- Working anywhere and anytime, if needed (WRR 2002; p. 148).

Decision-making teams survive by learning from the different viewpoints of team-members and developing a shared perspective. Team learning presupposes social and communication skills (so-called soft skills or people skills), initiative and entrepreneurship, flexibility and reasoned risk-taking. (WRR 2002, p. 148) Furthermore, it implies a need to transform from the current emphasis on control within a single organisation to the coordination of interfacing between learning communities. Innovation is the driving force in the knowledge intensive economy. Organisations need 'business'-knowledge that direct and control their 'potential actions'. Knowledge creation can follow four patterns, but in this case requires 'articulation', that is how to transform tacit knowledge (Nonaka & Takeuchi 1995) residing with the knowledge workers into a "codified, commercially valuable asset." (WRR 2002; p. 22).

Knowledge creation in the Triple Helix

The importance of knowledge creation within interfacing learning communities calls for the "Making of European Learning Regions', that is regions that are able to create learning opportunities for all its members and transform themselves as a community, as opposed to component parts. Learning regions aim to foster structured collaboration between higher education, business and government resulting in 'cosmopolitan citizenship, informed about the best and most recent knowledge of the time.' (Postman, 1999; p. 82).

Individual learning pathways and learning organisations are significant components of the innovation process (Nonaka and Takeuchi 1995). Community learning affords both individuals and organisations the opportunity to explore, generate new knowledge and apply new knowledge systematically through innovation. It is assumed, that communication of information and knowledge between the various parties involved in the acquisition, generation, and application of new knowledge plays an essential role in the innovation process. Higher education can play a central role in the stages of the explication and transfer of social interaction and knowledge creation (Nonaka and Takeuchi 1995) within social networks designed to stimulate regional innovation.

Knowledge may be understood as the content of learning with behavioural outcomes that reflect the patterns of cognitive associations that have developed (Daft et al, 1984). Knowledge is the result of the interaction

between tacit (subjective) and codified (objective) components of knowledge. Tacit knowledge is embedded in specific relationships between a number of parties and transferable only within the specific network of interpersonal relationship that is based on commonly shared values at the local level. In contrast, codified knowledge is globally accessible because it is based on a set of assumptions that are commonly accepted independently from the specific membership of the parties'. (Ganzaroli 2002)

Knowledge creation can be interpreted as a four-stage process: socialisation, externalisation, combination, and internalisation. Value can be derived from the knowledge creation process if an organization has the capacity to transfer the potential value that resides within the organization into a value proposition that in turn is perceived external stakeholders to be of value.

Presently, the learning process still depends on tacit knowledge creation that is tied to trust creation, which in turn is derived from socialization and the internalisation of common values and experiences between members of a community of practice. (Nonaka and Takeuchi 1995)

The scientific approach

The present teaching of subject content puts the emphasis on the "know what", which resides in the model that knowledge is created from information which in its turn is generated from data. Knowledge, however, is part of a 'chain structure' designed to control the actions of the user and has a process oriented character. Higher education pays hardly any attention to enhancing "know how", "know why" and "care why" (Duffy 2001), which nowadays are becoming increasingly important. In contrast to the traditional scientific model, the action research model (Denzin 2000) aims to construct knowledge that is designed to lead to action, or reflection on actions. It rests on a methodical approach that is qualitative in nature and designed to make the process of knowledge creation, -applicability and knowledge validation transparent to the professional or scientific community. "Action Research aims to solve pertinent problems in given contexts through democratic inquiry in which professional researchers cooperate with local stakeholders to seek and enact solutions to problems of major importance to the stakeholders" (Greenwood 2000; p. 96). Action Research is characterized by (Greenwood 2000; p. 96):

- Inquiry in which stakeholders and researchers co - generate knowledge;
- Knowledge constructed in the inquiry leading to action or reflection on actions;
- Diversity in experience and capacity is seen as an enrichment of the process;

- A method to produce valid research results;
- As a context centred research tool, that is it aims to solve real-life problems within the stakeholder ('s) environment.

Credibility, validity and reliability in action research are measured by the willingness of local stakeholders to act on the research results, thereby risking their welfare on the "validity" of their ideas and the degree to which the outcomes meet their expectations." (Greenwood 2000; p. 96).

Higher education may apply action research to solve real-life problems within its stakeholder(s) environment. The operational nature of knowledge construction in the dominant scientific model can be linked to 'action research', in which constructed knowledge "leads to action, or reflection on action". As a method, action research can be validated, in part, through activity theory, which focuses on 'context centred' problem solving and comprises a tripartite structure in which the relationship between human agent and objects of environment is mediated by cultural means, tools and signs, (www.edu.helsinki.fi/activity/6a/htr). The application of activity theory is relevant because lifelong learning is concerned with: "all learning activity undertaken throughout life." Within an activity theoretical framework, diversity in learning experience and capacity is viewed as an enrichment of the process. It represents an inquiry in which stakeholders and researchers co-generate knowledge and produce valid research results.

Knowledge is co-generated by inquiring stakeholders and researchers (Kemmis and McTaggart 2000), who collect and transfer the information that people store in memory. The latter is a "culturally constructed, social activity" (Arnould, Price and Zinkham 2003; pp. 377-378). What knowledge people construct, "why, and with what effects are the central questions" that sense making is concerned with. Weick (1995; p. 4) refers to what investigators have made explicit namely, that sense making "is grounded in both individual and social activity" [...] a process in which individuals develop cognitive maps of their environment (p. 5) "about such things as placement of items into stimuli into frameworks, comprehending, redressing, surprise, constructing meaning, interacting in pursuit of mutual understanding, and patterning" (p. 6).

Currently, activity theory is evolving towards the development of "conceptual tools to understand dialogue, multiple perspectives and voices, and networks of interacting activity systems". This trend is also visible in the digital age, which changes the work and lifestyles as a consequence of emerging polyinclusion patterns. Such issues evoke a need amongst individuals for more flexible learning experiences.

NEW EDUCATION FOR LIFELONG LEARNING

Presently, the dominant command organisation seems to be giving way to people working within a community as the "creative source of innovation and enthusiasm for the achievement of a common goal" (Lievegoed 1991; p. 11). Therefore, an important challenge for higher education is "how to integrate successfully, the social subsystem with the economic- and technical subsystem?"

Innovation and learning capacity have driven knowledge economies to "a new limit beyond which they cannot evolve unless they develop a new structure that is based on the new paradigm of dialogue". Such dialogue cannot be achieved simply by maintaining the existing structure and adding human relations. Research into activity theory, indicates that any expansion should "include minimally two interacting activity systems" (www.edu.helsinki.fi/activity/6a/htr). Therefore, a "rethink of the current organizational structure" is required.

As a consequence of the global - local paradox a new education is emerging. In conclusion we shall examine its effects and implications for higher education.

Implications for Higher Education

At the global level, higher education (Blake & Go 2002) is affected, by the "international restructuring race" (Ruigrok & van Tulder 1995), within a borderless supply chain framework. That is, organizations are continuously engaged in competition with existing and new entries and the opportunities and the need for co-operation. Multiple stakeholders with diverse backgrounds, interests and aims have become involved in the design and delivery of curricula, including, corporations, business associations and non-governmental organisations (NGOs). The faster pace of knowledge creation, transfer and application, the dynamism of shifting relationships and increase in costs has a considerable impact on higher education. The emerging extended higher education network that is emerging within flexible, interfacing learning communities has its roots in ICT and the concept of lifelong learning.

At the local level, one of the salient characteristics of higher education institutions is that they typically serve a particular region. In order to be successful such institutions must create feelings of belonging and motivate students to attend the local higher educational institution. Despite the information age higher education is likely to become "more physically embedded in, and intellectually intertwined with, the community. Another way of saying this is that [higher] education will become more local."

(Ritzer 1998; p. 158) and integrated in the sense described by Lievegoed (1969) and further explored by Etzkowitz & Leydesdorff (2001) with reference to the Triple Helix, that is, the intertwining of higher education with industries and the government within partnerships.

How can the development of Triple Helix partnership under conditions of dynamic convergence and divergence create leverage for lifelong learning, both for individuals and communities? For higher education to achieve leverage for lifelong learning joint sense making is needed as practiced within decision-making teams, leading to a collective identity: Who are we? Where do we come from? Where are we going? Wenger (1998) distinguished three processes, which contribute to the formation of collective identity: (1) engagement; (2) imagination and (3) alignment. Each of these points deserves some further investigation.

Engagement to redefine Higher Education

Presently, higher education is largely unable to accommodate the higher expectations from higher education by society. It faces increasing numbers of learners and learning needs and rising capital and operating costs. The large scale automation of traditional education, including textbook, classroom and teacher, will not resolve the present problem." (Visser 1999; p. 2) "Universities, and other learning institutions, are in need of redefining themselves in much more fundamental ways than by simply continuing their old practices by modern means. The production of knowledge has become a highly networked and increasingly fluid phenomenon. Universities play a role in it, but are no longer the exclusive or even major players. They are in need of continually repositioning themselves. Gibbons refers to the value-added inherent in the "creativity to configure knowledge and resources over and over again". Such networks of knowledge production are likely to comprise more than just the academic community" (Visser 1999; p. 4) Engagement refers to processes designed to accomplish a sense of connectedness. The identification with a group comes about typically through face-to-face experiences. It may include processes such as the definition of common goals with partners; participation in network activities and social interactions; the production of recognizable symbols and the exchange of ideas to bring about a sense of community. The perceived collective identity should be carefully examined to comprehend both opportunities and limitations of development.

Imagining the future of Higher Education

Recent developments in international business and politics drive home the notion that local and global issues are inextricably intertwined. The future of higher education is therefore tied with the global-local paradox and therefore a subject of consequence and key agenda item. Scenarios and the reinterpretation of experiences and using such history to place and interpret the future in a different frame are part of the process of imagination. It affords people the opportunity to scan new situations, take risks, and develop connections and to position themselves in an alternate context. Through the extrapolation of one's own experiences, the identity of higher education can take on new dimensions. For example, through a scenario of educating modern professionals, who must become engaged in lifelong learning, students actually become a knowledge node or bridge between business, government and higher education. Through the application of Action Research methodology an open learning system can be created which, on the basis of a socialization process, supports the students' learning and tests the knowledge they develop in terms of quality and reliability. Subsequently, the knowledge thus acquired is integrated in the process of knowledge generation, knowledge development and knowledge application, or the articulation, leading to new combinations (Nonaka & Takeuchi 1995) that is an integral part of higher education.

Alignment of Higher Education within Agile Learning Community

Last but not least, processes such as convincing, inspiring, uniting and identifying boundaries of partnerships and the definition of visions are important for the coordination of decision making teams. Energy and activities have to fit within a broader organisational structure. Virtual learning organisations provide an extension of the work environment and therefore provide a fit with patterns of polyinclusion. The *Web enterprise of agile organization* (Metselaar & van Dael 1999) is an ICT-supported temporary network of experts working in a specific field or on a specific topic. "...a spatially dispersed and temporarily flexible cultural community, the reproduction of which is dependent upon learning and innovation of its constituents." (McLouhglin & Jackson 1997) Knowledge management and the sharing of information among partners are essential elements for an agile organisation. (Metselaar & van Dael 1999; p. 204)

ICT acts as a powerful enabler to develop partnerships, learning organisations, and learning communities between partners with different

characteristics such as business, universities and local government. But ICT is only one part of an economic subsystem that must be integrated with the cultural - and political subsystem at (national) community level (Lievegoed 1969; p. 27) in order to deliver the competences that society needs. In a knowledge driven network centric economy the vitality of (national) communities is determined by organisation that "makes for a maximum of flexibility" (Lievegoed 1969; p. 11) that helps to bridge the digital divide and affording both individuals and learning communities alike access to lifelong learning.

CONCLUSION

Successful learning communities appear to reside in the ability to create and sustain a learning culture; that is to enable human talent to develop a competitive edge through the application of advanced technology, knowledge and service. There is a dangerous gap between what the knowledge economy needs of higher education and the "competences" the latter delivers that can be bridged by lifelong learning, which builds on connectivity, knowledge and learning capacity, and is E-readiness enabled. Furthermore, successful learning communities seize the opportunity that partnership provides, resulting in a so-called triple helix that is a platform uniting higher education business and government to support the process of lifelong learning. Finally, successful learning communities understand that lifelong learning implies the need for engagement to redefine the tasks of all community stakeholders, but particularly higher education to bring about an image of a new higher education future, engagement to redefine and align higher education within agile learning communities.

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Community Based Learning

Developing the interface between formal and informal learning communities

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Abstract: This paper asserts that the natural starting point for any learning is an informal learning community with family, peers, elders, etc. With the need for socialisation and preparation for economic activity formal learning communities assert their role in the life of the learner. The convergence of formal and informal learning communities provides the basis for real lifelong learning, a process accelerated by the role of information and communications technologies removing traditional barriers to learning and empowering communities to take actions to meet their own short and long-term needs. Community based learning is integral to the sustainability of active citizenship which is itself being transformed through the increasing availability and accessibility of information and communications technology in all societies. The role of the school is changing; it is becoming extended, with a role at the heart of a learning, social and cultural community, for young and old.

Key words: citizenship, community learning, diaspora, extended school, learning communities, informal learning, people, partnership, self-organised

INTRODUCTION

It is easy to assert that the natural starting point for learning is the informal learning communities to which we all belong, whether it is with our family, peers or elders. Whether this is a baby learning from their mother, the older child listening to the stories told by their grandparents, children sharing their adventures with each other, listening to another person in their community, or indeed a community elder learning from a child: many of us would recognise such activities as taking place within childhood. The acknowledgement of such learning communities is helpful in considering the basis for community based learning, where an interface with formal learning can develop. However, it also needs to be acknowledged that for some families informal learning has a low priority, which inadequately prepares the child, and hence an earlier or more intensive interface with formal learning may be required with an increased role for community based learning. "Not all children have an equal chance to achieve their potential at school. Growing up in a family with financial difficulties is closely correlated with poor school attendance, poor literacy and low qualifications. Inadequate adult interest and involvement in children's development coupled with a lack of opportunities to learn at home lead to low expectations and lay the foundation for failure or underachievement in too many circumstances." (DfEE 1999; p.50).

It should not be assumed that the natural starting point of an informal learning community only applies to children, it can apply to anyone. In identifying such learning communities, it is possible to envisage social, economic, residential, knowledge and educational as well as familial communities, all of which are undergoing change, often as a result of the impact of new information and communications technology. "Visions of learning have been evolving, and informal learning communities and communities of practice have become important concepts that highlight the fact that learning is no longer happening in classrooms or through formal e-learning mechanisms. The 'Knowledge Economy' implies a far reaching transformation of the learning process." (Tremblay 2002) The way we visualise learning communities has also changed, as the Archbishop of Canterbury noted in 2000, "Increasingly we are not only citizens of the world but also citizens of the World Wide Web." Hence our experience of learning communities, whether formal, non-formal or informal has changed, hence the spaces and times in which community based learning can take place is also changing. Perhaps one of the advantages of informal learning is that activities are not mapped to a formal learning process or qualifications, and are often motivated by fun, or the sense of achievement that comes from completing a project.

INFORMAL LEARNING COMMUNITIES: A CHANGING ROLE FOR INFORMATION AND COMMUNICATIONS TECHNOLOGY

If we consider the impact of television and the internet on young children, and their family and carers, we will see considerable change. In the UK, the BBC has broadcast a children's television series called Teletubbies since 1997 which provides "...a foundation for learning in literacy, numeracy, social skills, story, movement, music and the wider world. It was a radical departure for pre-school television. And the website, packed with educational activities, receives over a million hits a week... In 1997 the BBC took educational programming out of the classroom and into the home. For the first time, children and their parents were viewing educational programmes together." (Dyke 1999) The BBC, as a public service broadcaster, was seeking to use its "...ability to reach very large numbers of people through its television and radio services ...to sell the new opportunities for education ...to play a major part in the learning revolution in the 21st century [and] if we don't, millions could be left without an education, and, as result, without a role and without a future." Dyke went on to talk about politicians use of the phrase 'learning revolution' and their desire to leave a legacy of change, not wanting to leave "...just the memory of a soundbite, then it must engage a very high proportion of the population." This change in the way in which learning is taking place is evident from other services which the BBC provide, such as the 'GCSE Bitesize' exam revision support service provided for 16 year old students which is an interactive, multimedia service used by 60% of the student cohort. Another service for adults in 'BBC Webwise' a free service to increase confidence and competence in using the web, providing an opportunity to explore, participate and learn, connecting to learning with the BBC. We may recognise similar provision from our own experience – the BBC is one such provider in the UK, changing the nature of mass public broadcasting services from one-to-many, to one-to-one, recognising, and "...one-to-one communication is perhaps the best and most natural basis of effective learning." (Dyke 1999) See www.bbc.co.uk

The learning communities created with the support of such provision, just like any other learning resource or opportunity, can be informal and of a short duration or can be longer term. However, we know that "...TV and computer games, or the peer group" (OECD 1999; p.14) are a powerful influence on young people, and the not so young, and is then likely to have an effect on the nature of learning communities, formal, non-formal and informal. With public and private sector organisations overtly supporting the

learning revolution, any boundary between formal and informal communities is increasingly indistinct.

The example of the BBC demonstrates what is being achieved when a large organisation decides to change its focus on education and seeks to develop its role as a mass public service broadcaster, to one that can support the individual and small communities. With the extension of their services using the internet and the world-wide web then it is possible to access differentiated supplementary materials which can be accessed at any time, anywhere. It is possible to support virtual learning communities who can further develop their learning with others with a similar interest.

Others organisations around the world have also taken this approach. For example, Sesame Street (USA) was established in 1968 as the Children's Television Workshop, a non profit educational organisation to help prepare children from low income families for school: and it has had a worldwide impact with some versions available in different language and cultural forms. See www.ctw.org

The reach of the BBC and Sesame Street has been local and global through the normal processes of the sale of television programmes, but they have also been able to extend global services with the creation of the web as the "...largest public space in human history." (Dearnley & Feather 2001) The provision of such web based services has grown with millions of web sites provided by individuals, interest groups and organisations which couldn't previously reach audiences and interact with communities of interest, whether formal or informal, through the traditional media with printing and television. We now see the convergence of broadcasting and digital interactivity: no longer is cost of distribution a major barrier, assuming access to the internet is available. Indeed, many organisations now exist to support communities and informal learning networks to utilise the web for communication, collaboration, celebration and support. Many of these organisations are community based and specifically provide an interface with the formal organisations of learning and other services.

COMMUNITY BASED LEARNING SUPPORT NETWORKS AND ACTIONS

With the growth of web based communities, or communities making use of the web, large and small scale support networks have been established, some by like minded people collaborating, sharing experiences and providing mutual support, others as formal actions by public, private and voluntary organisations. The support networks for community based enterprises emphasise support in creating local content to meet local

community needs and actions. A feature of informal community support can be its short-term and task focussed nature, rather than broadly based programmes of activity. The sharp focus supports the achievement of short-term goals, but it is likely that any systemic changes will occur when local groups collaborate, possibly under the umbrella of a larger organisation. Many examples of community support networks can be found around the world. A few examples are presented below to illustrate their difference in scale and links with other organizations:

- www.contentbank.org
  A web site designed to spur the development of needed online content for and by low-income communities. The Web site includes recommended web sites for health, education, jobs and housing; message boards; information and tools to develop local content; and Web-based tools that will read the text aloud or translate it into Spanish to ensure the content is accessible to many communities (a project of The Children's Partnership, USA).
- www.techpolicybank.org/clevelanddesc.html
  A city example showing leadership in addressing the digital divide Cleveland, USA is using a creative source of funding, its cable franchise renewal, to secure subsidies for community technology programs for youth and low-income communities.
- www.techpolicybank.org/cctpg.html
  After-school and community technology agendas for youth explores ways after-school leaders and community technology advocates can work together to equip youth with the technology skills they need to reap the benefits of a technology-oriented society (from the California Community Technology Policy Group).
- www.rosettalife.org
  Rosetta Life is particularly unique, working in three hospices and using the web to help people put their memories on line during creative arts workshops. They use the web as a platform for communication, self-expression, shared experience and lifelong learning for a client group that is often socially excluded.

Actions by local, national and supra-national governments and organisations can be initiated to provide the building blocks for community based learning, whether it is formal or informal. The UK government decided to create the People's Network, providing all public libraries with an ICT Learning Centre and high speed internet connection, with free public access by 2002 www.peoplesnetwork.gov.uk This free facility has provided over 4000 sites across the UK, complementing the existing role of the public library service in supporting local access to information and services,

generally staffed by local people with local interests, at the heart of many informal and formal communities of interest that are now extended by access to ICT. Recognising that not all communities had ready access to a library, and that disadvantaged individuals and communities may prefer a different sort of facility, a further 700 ICT Learning Centres have been established in the most disadvantaged communities, generally provided within the buildings owned and used by charitable and educational bodies. The UK Department for Education has also placed a requirement upon schools to provide community access to ICT, where practicable, which for many schools has presented a difficultly as they were not designed for open community access, resulting in limited initial opportunity, but with a changing public policy agenda increasing opportunities for access through schools – see below.

The intention of all these UK policy actions has been to ensure that an accessible and robust public and private ICT infrastructure is in place to support community based learning; moving learning from formal institutions to reach the learning, making accessible learning for all. "Social participation is essential for the successful development of ICT initiatives in education... the community must be able to participate in and benefit from an innovation process... Much effort must be expended in strategies that enable communities to take advantage of new technologies, so that local populations become fully acquainted with their potential." (OECD 2000; p.30) Such actions can of course be taken at an individual level and on a small scale. For example, why not let the computers used as a workstation during working hours are used to produce support the community group in the evening and at weekends. Once people have access to the technology, they will produce content, perhaps for themselves as excluded groups, reducing their reliance on seed corn projects that may revert to philanthropic gestures for particular groups rather than mainstreaming good practice. Social inclusion often appears to be something you do to people: what about people themselves leading their own inclusion with ICT: to provide access to new content and learning opportunities; to offer opportunities to create new opportunities, locally; to reduce barriers between provides of formal and informal learning opportunities; to support the blending of informal and learning opportunities; and to challenge existing views on what is the product of learning (or education).

FORMAL LEARNING COMMUNITIES

The impact of information and communications technology on formal learning institutions is considerable, whatever type of institution you

consider. This is in terms of the formal curriculum, management and pedagogy applied to traditional provision, or when you are considering the impact of e-learning in its many forms. The drivers on the formal learning communities tend to be driven by the demands of the funding body, whether from the public or private purse, with the "…most strident and compelling demand for more, and more efficient, education and training is without question driven by economic considerations, and by a desire to contain the cost of education and training. The need is also expressed for more education and training to address social equity issues and to combat social exclusion." (OECD 2001; p.7) In this paper, consideration will be given to the role of schools in extending provision to address social exclusion and equity issues, and their impact on learning.

In developing their policy responses to the need for lifelong learning, governments have at times to support what can at times be conflicting policy statements and action programmes. For example, on the UK Department for Education and Skills web site www.dfes.gov.uk the following statements are published, the first of which emphasises the economic imperatives and second, the social inclusion imperatives: they are not mutually exclusive, but do illustrate the tensions that can be apparent on differently funded public programmes.

Lifelong learning is the continuous development of skills, knowledge and understanding that are essential for employability and fulfilment. Increasingly, lifelong learning opportunities are aimed at everyone, not specific groups and cover many different opportunities for gaining skills and knowledge. These include apprenticeships, higher education, job-related training and access to ICT facilities.

The vision of Cybrarian is:

- To increase Internet usage throughout the UK;
- To help to develop basic skills among users;
- To provide easy access to information and knowledge services that will be of interest to target users (i.e. informal learning);
- To allow target users to become involved in the electronic community and, as a result, to engage more positively in modern society;
- The target users will be those who do not yet use the internet, and in particular, the socially excluded and disabled.

EXTENDING SCHOOLS

The school is generally a focal point within a residential community, where people come together, where generations meet, where new social and community bonds are established. "…the central organising point in our

society at the neighbourhood level is the school – elementary and secondary, as well as child development centres. Children could thus act as the fulcrum around which family, community, and the future worker (the child) are brought together in a system of interaction, blending instrumental goals (child-care, development and education) with expressive, emotional, and social interactions." (Carnoy 2001) With a strengthened community based role that extends beyond what is often seen as the traditional role of the school, the school is no longer isolated, but "Through the school, other social networks organised at the municipal level could come into contact with each other. [And] The development of electronic communications also offers the possibility of creating virtual communities, in a new form of spatial organisation…" (Carnoy 2001) However, in extending the role of schools, caution is often expressed about expecting schools to do everything, "…they must concentrate mainly on what they are better equipped to do than the rest of society…" (Aalst 2001) such as teaching basic skills; although the same report "*For the love of learning*" published by the Ontario Royal Commission on Learning in 1994, also called for a new alliance between the school and the community to form "…engines for transformation…" which included making schools the centres of physical networks. If schools are to be centres of physical and virtual communities then it will have be in ways that ensure the traditional and extended roles complement each other. But, what is driving such proposals; the OECD (2001; p.59) argues that the current universal model of schooling is relatively recent and not permanent and susceptible to change in the future, with patterns of compulsory attendance at school blurring with non-compulsory attendance, despite a strengthening of initial education.

Part of the drive for change is to understand the role of schools in attaining the goal of 'lifelong learning for all' adopted in 1996 by the Education Ministers of the OECD – which is in line with principles adopted by other organisations and countries; see for example, *A Memorandum on Lifelong Learning.* (Commission of the European Communities 2000); *Lifelong Learning in the Global Knowledge Economy: Challenges for Developing Countries* (World Bank 2002).

The present UK government has been increasing its investments through a broad range of initiatives since 1997, initially in the most disadvantaged communities, but now extending these more widely, although generally with lower levels of investment. The Social Exclusion Unit established by the Prime Minister in 1997 identified a established Policy Action Teams to take forward the recommendations in their report published in September 1998, *Bringing Britain together: a national strategy for neighbourhood renewal.* The research undertaken by the Social Exclusion Unit found that in many disadvantaged communities the only major public service still provided was

the primary or secondary school, all other public services had withdrawn, and in many communities this also applied to private services such as shops, leisure facilities and employment. The opportunity to use schools, building on pioneering work undertaken in a limited number of areas, to raise the quality of life, with increases in the formal and informal esteem of learning, as well as providing public services all contributing to community renewal was recognised as a major opportunity that needed to be put into action. Hence, a *Schools Plus* Policy Action Team was established with a broad remit to report and recommend actions on education projects that increased support for children and families beyond the traditional focus of the school, increased community use of school in core and non-core hours, encouraged co-location with health and other social services, involving parents in their children's learning, indeed to identify ways the learning community of the school could be enriched and extended with the goal of raising individual and collective community achievement. This policy has now been established formally, including necessary legislative changes, with a programme to establish 'Extended Schools'.

An extended school (DfES 2002) is one that provides a range of services and activities beyond the school day to help meet the needs of its pupils, their families and the wider community. Such a school will provided support for and access to, for example, adult education, study support, ICT facilities, community sports programmes, access to health and social services. Through extended schools, children, families and the community will secure ready access to learning through ICT, providing opportunities to use ICT to support such informal as well as formal learning opportunities, and support the home use of ICT for learning. Services will not just be provided for those people with children attending the school, they will also give children an excellent start with "Children's Centres providing access to integrated early years education and childcare with health, family and parent support services for communities in disadvantaged areas, building on other integrated programmes." (DfES 2002).

CONCLUSION

The purpose of this paper has been to explore the interface between formal and informal learning communities and the contribution of information and communications technology to their development. In developing the argument, a further purpose has been to explore the opportunities for people not to have to rely on 'top down' provision for their learning and community, but to support lateral communities. Increased access to the web in all communities in the developed world, and

increasingly in the developing world, is supporting a move from the external, local and central government defined organisations to strong self-organised groups, which may exist physically and virtually.

"Today we know that… real networks are not static… Instead, growth plays a key role in shaping their topology. They are not as centralised as a star network is. Rather there is a hierarchy of hubs that keep these networks together, a heavily connected node closely followed by several less connected nodes, trailed by dozens of even smaller nodes. No central node sits in the middle of the spider web, controlling and monitoring every link and node. A scale-free network is a web without a spider, there is not meticulous design behind these networks either. Real networks are self-organised. They offer a vivid example of how the independent action of millions of nodes and links lead to spectacular emergent behaviour." (Barabasi 2002)

The role of ICT should be to support community networks, including, but not exclusively on-line communities. Such communities are relatively new, although as the paper has illustrated, also strong and diverse in nature.

"The limited evidence available suggests that the relationships people develop and maintain in cyberspace are much like most of the ones they develop in their real-life communities: intermittent, specialised and varying in strength. Even in real life, people must maintain differentiated portfolios of ties to obtain a wide variety of resources. But in virtual communities, the market metaphor of shopping around for support in specialist ties is even more exaggerated than in real life... The provision of information is a larger component of online ties than real-life ties. Yet despite the limited social presence of online ties, companionship, emotional support, services and a sense of belonging are abundant in cyberspace... People of the net have a greater tendency to base their feelings of closeness on the basis of shared interests rather than on the basis of shared social characteristics such as gender and socio-economic status... the homogeneous interests of virtual community participants may be fostering relatively high levels of empathetic understanding and mutual support... The distance-free cost structure of the net transcends spatial limits even more than the telephone, the car, the airplane because the asynchronous nature of the Net allows people to communicate over different time zones. This could allow relatively latent ties to stay in more active contact until the participants have an opportunity to get together in person." (Wellman and Gulia 1999; p.186)

The two lengthy quotes are included by way of conclusion to support the argument that self-organised communities are supported by networks of people and actions, and that these can exist in real-life and online, but will be different in nature due to the differing ties and resources that are available. Such communities could be formal or informal, but if they are self-organised they are more likely to be informal learning communities, at least initially, as they will be communities of interest. However, it is likely that they will need to develop themselves to interface with the formal learning communities in situations where mutuality is beneficial. A clear example is proposed with extended schools, where the need of society to regenerate neighbourhoods causes formal communities, schools, to radically change their purpose and the way they interface with their communities.

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Towards an organisational model of 'interface' university structure as a means of serving Lifelong Learning needs

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Abstract: The paper conceptualises on the experiences of the Centre of Information Society Technologies (CIST), Sofia University, Bulgaria, in serving the learning and training needs of non-university audiences who fall in situations that can be described as lifelong learning-determined. In developing this conceptualisation we use the research findings and policy agendas in two distinct areas – Lifelong Learning, and Higher Education Systems. More specifically we explore the organisational and management issues and challenges of the quite interesting situation of a structure behaving "in between" the market shaped lifelong learning demands, and the rules and practices of "classical university" structures to which CIST is subordinated. As a result of these three streams of thought and practice we outline an 'interface' model of university interdisciplinary structure, which aims to explicitly meet the demands of the lifelong learning market.

Key words: higher education, learning demands, learning delivery, Lifelong Learning,management, organisation, service provider

INTRODUCTION

Sofia University "St. Kliment Ohridski" is the first and the largest school of higher education in Bulgaria. Today it has more than 35,000 students

studying in 76 Bachelor's and over 200 Master's degree programmes. Since its establishment the university has always played a very important role for the development of the country. However the university experiences a lot of challenges related to the overall transformation of the economic and social system in the country, the changing models of education, and the new role of the universities in the knowledge-based society. Sofia University is also challenged by the opportunity to be actively involved in the development proposed by the Bologna Declaration European Space of Higher Education (Nikolov 2002; p.1).

The Centre of Information Society Technologies (CIST) was created in 1996 as an extension of the Department of Information Technologies, Faculty of Mathematics and Informatics. It is an interdisciplinary research and training institution, motivated by the challenge of supporting the development, introduction and wide use of Information Society Technologies (IST). This challenge is addressed by performing high-quality research, design and implementation of IST-based systems, and by the design and delivery of 'learning technology'-rich and ICT-supported training to various groups of learners, and variety of institutions and society groups. CIST is designed as a flexible junction between the university, the academic community, local community, industry, NGOs and policy makers, coordinating their efforts at spreading the overall use of, and excellence in, IST (CIST 2002; pp. 1-2).

LIFELONG LEARNING

The knowledge-based economy relies primarily on the use of ideas and knowledge rather than physical abilities of a person, and on the application of technology rather than the transformation of raw materials or the exploitation of cheap labour (World Bank 2002b, p.ix). This has implications for the demands placed on learning by the labour market and the society on citizens with respect to the knowledge and skills necessary in life. Thus, it is important to equip people to deal with these demands. The most promising way to assure this is lifelong learning.

We will use the lifelong learning definition proposed by the European Commission's "Memorandum on Lifelong Learning" (Commission of the European Communities 2000):

"All learning activity undertaken throughout life, with the aim of improving knowledge, skills and competencies within a personal, civic, social and/or employment-related perspective."

Crucial for the success and sustainability of any lifelong learning system is to put all policies, strategies, and activities in an overall framework of incentives to all concerned (World Bank 2002b).

LIFELONG LEARNING DEMANDS UPON THE LEARNING DELIVERY STRUCTURES

Lifelong learning places new demands on the educational institutions and learning providers. Several broad groups of demands can be identified, also high in the political agenda (European Commission 2001, 2002; World Bank 2002b):

- Learner skills demand (person-, labour market-, or society-conditioned):
  - "Technical" skills (literacy, foreign language, mathematics, science, ICT skills, information processing, problem-solving, analytical skills);
  - Interpersonal skills (teamwork, leadership, communication skills);
  - Methodological skills (learning to learn, pursuing lifelong learning, coping with risk and change).
- 'Essence of learning' demand:
  - Definition and aims of learning;
  - Culture of learning;
  - Variety of delivery forms and contexts.
- Institution management demand:
  - Resourcing;
  - Customers' needs awareness;
  - Matching opportunities to interest;
  - Dealing with change and innovation;
  - Entrepreneurship and risk management;
  - Partnership approach (internal and external).
- Accessibility demand:
  - Valuing all types of learning (formal, non-formal, and informal);
  - Facilitating access;
  - Social inclusion.
- Demand on consumer protection and fairness:
  - Quality assurance;
  - Assessment and certification (non-traditional forms of learning);

  Awareness of available providers and learning pathways.

These demands upon the delivering institutions require an adequate response in order to truly serve the learners' needs and to be competitive in the learning market.

THE NATURE OF HIGHER EDUCATION INSTITUTIONS

Higher education (HE) institutions are social structures that have as their main activity the processing and development of advanced knowledge, enrichment and dissemination of the world's intellectual heritage, and the education of the intellectual human potential of the nations and the world (Clark 1983, p.11). There are three groups of main activities of the HE institutions - research, teaching, and services. We will consider in more detail how teaching and services are dealt with in the work of HE institutions.

For the purposes of the lifelong learning provision analysis we will briefly look at the features of the "classical" HE institutions with respect to their:

- Work organization;
- Beliefs (norms and values);
- Authority (decision-making processes, and power distribution and exercising);
- Processes of change (innovation).

The organisation of work at a HE institution is arranged in separate scientific disciplines and is linked in the form of a "loosely coupled system". It is bottom heavy, adaptive and sustainable. The organisational fragmentation of the different disciplines assures overall stability of the institution, where even cancelling the activity of one unit or discipline does not affect the work of the others. Vertically we can group the organisation levels in the HE system at "superstructure" level, that is – the national HE system, "structure" level - the institutional level as a whole (university, college), and "under-structure" levels - the organisation levels of faculty, department, and individual academics. The professional work is done at the under-structure levels, which possess a great deal of decision-making power as to the essential matters of the disciplinary work. The guiding logic at these levels is the logic of the scientific discipline.

The beliefs of the humans working at university are rooted in the scientific truth, pursuing knowledge for its own sake, and discipline loyalty (rather than institutional loyalty). These beliefs are also source of identity, authority, and power. Noteworthy, the shared system of disciplinary and institutional beliefs affects the decision-making processes.

The authority at the institution and under-structure levels reflects the structures of work organisation and beliefs. The substantial part of decision-making processes are bottom heavy, made collegially on the basis of professional (disciplinary) and expert judgment; so is the decision-making

power possessed and exercised. This especially holds true for the disciplinary research and teaching. And despite the significant variety in the power distribution across the different institutions, the under-structure levels have always the final say in deciding on the substance of their professional work.

The innovation and change at under-structure levels occurs mainly on disciplinary grounds – following the changes in the knowledge base, work patterns, and discoveries in the corresponding academic field. On the other hand under-structures are prone to resist other types of change. As Clark (1983; p.207) notes they are primarily responsive to the demands in their scientific fields (other professors), and the large environmental forces as "consumer demand" and "labour-force demand" are largely resisted at that level. In this respect the under-structures differ from the institution management level, which is more responsive to the environmental demands, but in many cases can hardly force the under-structures to take account and implement these demands.

The described change pattern differs from institution to institution and for individual institution over time. In general it can be summarised that (Clark 1983; pp. 202, 209-212):

1. Research universities are inner-directed – first to their research interests, and then, only secondary to the interests of their students and "customers".
2. Teaching and service colleges/institutions, are other way directed.
3. When students are abundant universities tend to follow the internal staff desires and place teaching and services on a take-it-or-leave-it base.
4. When students and resources are in short supply, institutions think more what attracts students and services and are more responsive to the environmental needs.
5. When a new university structure appears (structural change) it tends to appear on a base of discipline specialisation (birth of a new sub-discipline). Interdisciplinary or cross-curricular structures are not highly regarded by the under-structures (this is not generally the case with the institution management level). Such structures tend to be the first "victims" sacrificed in hard times, thus being in unstable position unless managing timely to take roots in the individual institution system of beliefs (see also Bridges 2000; pp.44-48).
6. Change frequently occurs as a result of an intersystem perspective (international transfer is a major route of change).
7. The change, which is translated into prestige and honour for the group as well as the individual, encourages the under-structure clusters to seek and to maintain high rank in the direction of that change.

In the knowledge economy the production, development and application of new knowledge becomes the main task of more and more people and organizations. HE institutions lose their role as exceptional producers, distributors, and gatekeepers of advanced knowledge. As a consequence, the market is penetrating the HE systems to an extent unseen up to now (Global Symposium on the Future of Higher Education 2001; p.5). Despite that the basic characteristics and patterns of work and changes in the HE systems remain pretty much the same. Addressing the lifelong learning needs of individuals, business, and society is a substantial change process for the HE institutions, ands if we intend this change to occur and take roots in the HE institutions we have to bear in mind the statement of Clark (1983; p.237, emphasis added) that *"Desired changes attenuate and fail unless they become a steady part of the* ***structure of work,*** *the* ***web of beliefs,*** *and the* ***division of control".***

CIST AS A LIFELONG LEARNING SERVICE PROVIDER

The structure and organisation of CIST consist of an executive director, advisory council, coordinators, financier, assistants, and a network of experts as temporary contracted staff - researchers, trainers, and design and development specialist (CIST 2002; pp.2-3). At present there are 15 permanent staff, and an operational network of 50 to 70 non-staff experts. CIST works in two main directions – research, and teaching mainly to non-university audience. Some 14 research projects in which CIST has participated have distance learning and e-Learning orientation (CIST 2002; pp. 9-11).

Some of the main groups of training activities of CIST are related to:

- Training public administration and bank employees
  http://www-it.fmi.uni-sofia.bg/ce/
- Cisco Network Academy Training Program
  http://www-it.fmi.uni-sofia.bg/ccna/
- Local delivery of the international MSc. programme "Educational and Training Systems Design" (ETSD) of the University of Twente, the Netherlands
  http://www-it.fmi.uni-sofia.bg/etsd/

The ETSD programme and the research projects of CIST in the domain of learning, play a key strategic role as international scientific "channels" for building CIST' own design & teaching capacity in human learning, education, and training.

The Centre also delivers a variety of on-demand courses and training seminars to non-university audience by employing both its own teacher resources and academic staff resources of the university.

The lifelong learning service work of CIST can be schematised as follows:

1. Delivery of specialised training in challenging domains and topics, which requires use of **advanced knowledge** or application of **advanced learning design** expertise (to **effectively** use the **advanced knowledge capacity** of Sofia University, and to offer challenging training situations as incentives to the contracted university teachers).
2. Active external marketing (the real-market demands) and internal marketing (the possible advanced Sofia University supply).
3. Matching the internal supply to the external demand.
4. Development of CIST capacity for design and delivery of training in Information Society technologies (CIST 2002), and lifelong learning skills.
5. Development of CIST-own delivery infrastructure and facilities (of which the **e-learning** infrastructure and facilities are of decisive importance).
6. Work, based on the following **key characteristics:**
   - **Management & decision making** on business principles;
   - **Strong incentives** to staff and the associated experts;
   - **Strong leadership** (both business and academic);
   - **Entrepreneurship** (see Nikolov 2002);
   - Ongoing **human and organisation capacity development.**

In summary, CIST as lifelong learning delivery structure transforms the academic knowledge supply (advanced discipline-based knowledge and content teaching) into full-fledged lifelong learning market products focused at solving concrete context-based learning problems. In this transformation CIST employs its own expertise capacity, puts "key ingredients", and controls and steers the transformation process. Thus, it is not merely a "transmission" structure, which simply facilitates the organisation and administration of faculty-developed courses, but acts as an interface, in the meaning assumed for this term by the Telecom Glossary 2000 – the American National Standard, T1.523-2001, - *"the point of interconnection between two distinct but adjacent communications systems having different functions"*.

TOWARDS CONSTRUCTING A MODEL OF LIFELONG LEARNING 'INTERFACE' UNIVERSITY STRUCTURES

Below we outline a model of 'lifelong learning interface' university structure by describing the key seven critical functions of that structure (besides the "trivial" administrative and organisation functions). The notion is about such a university 'interface' structure, which is aiming at direct service of the lifelong learning market, in a way both to long-term survival within the university, and to be competitive and self-sustainable on the external learning market. The key critical functions are:

1. Business management function
   Assures external competitiveness – behaving in the external market the way business behaves. Includes entrepreneurship, strong leadership, financial incentives, judging by performance, profitability, etc. Critical for the external self-sustainability of the 'interface'.
2. Internal (university) politics function
   Assures the within-university long time survival. Requires work embedding the 'interface' aims and existence as a steady part of the university structure of work, the web of beliefs, and the division of control. Critical for the long-term survival of the 'interface'.
3. Marketing function (internal and external)
   Accounts for the proper transformation of the university "supply" – advanced knowledge and teaching, in ready for use marketable learning products. Bi-directional – towards the university "suppliers" (internal), and towards the actual market demand (external). Critical for both assuring internal incentives to the "suppliers" and staff, and assuring external profitability and self-sustainability.
4. Learning design function
   Accounts for integration of the market learning demands into the "products" to be offered. Converts mostly content-based academic knowledge into market "outcome" products demanded by the market knowledge, skills and competencies.
5. Teaching (delivery) of lifelong learning skills
   Assures acquisition by the learners of skills and competencies needed for learning through life. The regular university teaching does not have as a prime concern these skills (Bridges 2000, pp.44-48).
6. Learning (and particularly e-Learning) infrastructure and facilities
   May be considered as continuation of the learning design function. Having or sustainable contracting of such infrastructure assures the physical delivery of the training and learning. Crucial for conducting the training/learning.

7. Strategic internal HRD function
   Accounts for the continuous development of the internal and external expert staff. It is a part of the market competitiveness, and internal incentives policy. Critical in dealing with knowledge experts.

CONCLUSION

The outlined model does not have broad coverage and is not a universal solution to the issue with the higher education institutions approaching (or being approached by) the lifelong learning market. We constrained ourselves within the case of a "classical" university which combines both research and teaching. Also, we bear in mind that such a 'grass-root' and partial approach may look temporary and is not comprehensive in the sense of moving at once the whole university towards lifelong learning demands. Even so, we believe that the current situation of transition of education needs feasible current solutions; and that it is highly unlikely that a comprehensive strategy for quickly turning an entire classical university (or whatsoever HE institution) can succeed. In turn, when regular academic teachers are employed to work with 'interface' lifelong learning structures, it is highly possible that they will bring lifelong learning design solutions and teaching strategies back to their regular teaching. This is the most convincing and usually met way of implementing innovation and change within the university disciplines.

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Creating e-confidence in schools

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Abstract: In today's world of advancing technologies, we must continually ask, "What are the benefits to the Learners?" Over the last decade ICT (Information and Communication Technologies) have moved from A) **"Liberating the Learner"** to B) **"Networking the Learner"** and now as communications and the internet are becoming invisible to the user, to C) **"The Learner at the Centre".** The process is being accelerated by governments around the world providing learners with faster and faster access to the world wide web and many have set high targets for years 2004 and 2005 in terms of the number of connections and the curriculum that should be taught. But if youngsters seem to cope so easily with ICT why can't our teachers? As nations we must continue to train our teachers, provide more classroom support and ensure that newly-qualified teachers entering the profession are competent. Hence we move to an ICT **competent** profession. A teacher's role will be to advise on various networks of learning and knowledge and to prepare pupils to "manage their learning". Learning opportunities will be available 24 hours a day on-line together with an on-line teacher, tutor or mentor. Schools will become the local hub of lifelong learning, bringing together parents, local residents and public agencies to offer community-wide learning opportunities.

Key words: community learning, home learning, learning culture, Lifelong Learning

INTRODUCTION

Often much can be learnt by looking back at History, though sometimes what one sees is very worrying to particular individuals. In the 15th Century in Europe, the printing press arrived and many a religious worker saw their role as writer and copier of manuscripts, under threat from the new machines. A similar thing happened in the 19th Century with the invention of the steam engine and the introduction of machines into factories. The story continues into the 20th Century (certainly in the UK) with the decrease in the need for cotton mills and coal miners, and then the reduction in agricultural labour, partly due to the introduction of machinery and partly due to cheaper production in other countries. Then came the turn of the fishermen; they saw their 'catch quota' limited by legislation, resulting in a reduction in the numbers employed. Could it be that the 'teaching' profession is next?

In today's world of advancing technologies, we must continually ask "What are the benefits to the Learners?" Within IFIP, our World Conferences on Computers in Education, WCCE (held approximately every 5 years) have reflected this view. In 1995 we talked of "Liberating the Learner". This phrase was not created lightly. It started as 'liberating the teacher' - then 'liberating the teacher and student', but the Programme Committee were united with the final result of "Liberating the Learner". The reason is clear. If the technologies are not improving the learning process for the student then why are we bothering? In 2001 in Copenhagen our WCCE had the theme "Networking the Learner" and with the number of local area networks (LANs) and wide area networks (WANs) being used in education one can see clearly how this theme applies to more than students networking with each other.

In the 1960s when the 'internet' first appeared and Open Universities were being planned, hopes were high that students could study anywhere: at home, on public transport, in groups, at summer schools, individually, in institutions, in resource rooms. The term 'distance learning' has been with us for thirty years, and yet can we really claim that we have 'liberated the learner' and that Open and Distance learning are really working? Hopefully, at last we can say "YES", though examples are still limited in both number and range.

WHAT SHOULD WE BE DOING?

All new technological applications seem to start slowly and many a promoter will claim success when the new system repeats what was previous available 'before computers' albeit that it is same that is now available electronically. How many businesses can survive today by computerising their accounts without the facility of being able to analyse their progress day by day? It is important that every time we use computers we question the added value. Not to the extent that we reject what's on offer, but that we, like good teachers take it further and expect more.

In the last 20 years we have moved a long way in the ease of use - remember the overnight processing of the "main frame" and the cassette tape storage of the first Personal Computers. Today, with the inkless pen in our hand and the icons on the screen we are at the stage of the student driving a virtual "exploring space-ship" down through the screen, visiting site after site. There is no need for the student to know whether the data is coming from their machine's hard disk, from the server in the next room, a mainframe across the city, or from the other side of the world. Being able to view on one's Laptop, the changing scene provided by a camera on another continent, as it happens, can certainly add a new dimension to one's study, (e.g. http://www.camcentral.com/)

In a parallel way we can see that successful industries are competing in a global market place and national borders are commercially irrelevant. Information via the Internet does not recognise borders, and education must progress with schools and other institutions sharing a partnership of knowledge.

Education should provide an opportunity for these partnerships to be fully developed, but distance learning has had a slow beginning. As the UK's Open University was developing in the 1970s with its television and radio broadcasts so similar projects were underway in other parts of the world (e.g. The Netherlands, Scandinavia, and Australia). But rarely were other technologies involved and citing examples of good practice where distance learning made use of the new technologies was a difficult task. IFIP's third conference on "Teleteaching" held in Trondheim, Norway in 1993 brought together and published papers on over 100 of best examples of distance learning at that time (Davies & Samways 1993), though the presentations clearly reflected a lack of progress at school level. However one learnt as much from the failures as from the successes and we should encourage our colleagues to share experiences even when they haven't been a success.

It is interesting to note that at the time of the World Conference on Computers in Education held in 1995 delegates spoke of a 'world wide web'

and the 'Mosaic' browser program. However, access was still restricted in terms of costs and (learning) time but projects were in progress all over the world. In fact about 40 papers on this topic were selected for presentation at WCCE'95 (Selwood et al. 1995) and these provided a teleteaching conference stream which ran throughout the week of the conference.

In 1996 one of the successful projects for school children, both elementary and secondary, was the "Buddy Project" whereby a 'cuddly toy' was taken by many international delegates (attending the IFIP World Computer Congress) to schools in the Canberra area and these were exchanged for a similar 'buddy' which was taken back to schools in the delegates' countries. Each 'buddy' was cared for by a class of pupils who recorded events in a 'diary'. During the project the two linked schools communicated by e-mail on the internet and after a period of three months the 'buddy' was returned together with the diary and photographs etc. The many successes were due to the pupils having a topic for e-mail communication and the fact that the project had a limited life. But not all exchanges resulted in success, often because a teacher had been allocated the task of managing the project at short notice, or because the two schools were very differently organised.

Another report that deserves a mention is the implementation of TeleNet, a computer network for Teachers which, although developed for teachers of English in Hong Kong, highlights some of the problems and some of the successes that are applicable to all educators (Ki & Lai 1996). It seems that there is a critical-mass before an on-line conference begins to take off. Another reference is the advice given by Aiken and Aditya (1997) for the effective use of technology in teleteaching. Their golden rule 'Teach unto others as you would like to be taught' and their list of the ten commandments of teleteaching provide good advice for those in undergraduate education.

DEVELOPMENTS AND THE FUTURE

In the last few years we have seen the number of internet users expand from 10 million to 30 million to 100 million and still increasing. With Web browsers being provided by Netscape and Microsoft, Pentium processors rated at over 1000 Megahertz and broadband connections, access has become so easy and so fast. In fact we are very close to the user not being able to distinguish between data from the PC's own CD-ROM and data from the other side of the world. The virtual "exploring space-ship" referred to earlier in this article.

Certainly e-mail can be used to transfer materials, tutorials and problem solving exercises along with distant interactions between teacher and learner and between learners themselves, i.e. distance learning. However it must be remembered that projects across countries usually have different aims for different participants. Sometimes it is the global involvement; sometimes the cultural perspectives. In other cases it is environmental issues or the language differences or historical aspects. Access for disabled students in their homes is an extra feature while in-service training for teachers is another option.

HOW FAST IS CHANGE?

There are many commentators who believe that ICT is bringing about major changes. Bill Gates, for example, in his book "The Road Ahead" foresees a world in which market information will be plentiful and transaction costs low. Others talk of the "end of work" as we know it. All agree that the pace of change is rapid, compared, say to the industrial revolution of the last century. But there are strong reasons why we should believe that the impact of ICT is a greater revolution than we have seen in the past:

- Taking Moore's law that the microprocessor power doubles every eighteen months you can calculate that computer power today costs one hundredth of 1% what it did in the early 1970s.
- ICT is all-pervasive – it changes what we do, how we do it, our efficiency, our travel, our taxes, etc.
- It includes 'information' and that is the core to all our business.
- Once developed it can be copied and shared at virtually no cost, except that which the developer decides to charge.

But we must not repeat such views blindly. Development is never uniform and one has only to look at the changes that our parents experienced compared to those that we and our children are experiencing. Consider the products around the home: With the exception of the PC and the video/CD/DVD player, virtually all were around in my childhood, but certainly not of my parent's.

WHAT'S THE EFFECT OF CHANGE?

In terms of employment the ICT industries are increasing the number of workers, but the actual numbers are far less when you compare Intel with

General Motors. Ford for example has seventeen times as many employees as Microsoft. The new technologies do increase the efficiency of production of goods and services, but they don't fundamentally change the nature of those products. They do allow us to process the financial side more effectively but this doesn't necessarily increase sales. However it does deliver facilities that were not available before (e.g. the home computer, the internet access) and this is providing a new consumer market. Interestingly in Europe we see 'video' hire shops closing down whereas attendance at cinemas and theatres is on the increase. New restaurants are opening as people "get up and do" things. Sport and leisure centres are thriving and many more people are concerned about their health and ways of better living. Surely this lifelong learning must be due to increased leisure time and receiving greater financial rewards.

WHAT WILL THE FUTURE OFFER?

ICT will improve the effectiveness of our companies. It may not reduce our workforce but it will make us more efficient. No longer will we have to correct previous mistakes; no longer will goods be delivered wrongly. Our time will be used more economically as 'waste' is reduced and customers will benefit from the 'added-value'. Individually we shall have the world's information at our finger tips. A single press on our mobile communicator will bring us the latest news, sports, company data, share prices. A quick digital electronic search will provide answers which previously would have taken a visit to a library or several phone calls. Using previously unproductive time such as train or plane journeys where 'input' was not previously possible, allows us more time to do those things we enjoy.

Of course we shall need less typists, bank cashiers, book-keepers and telephone operators, but the demand for computer specialists, for health carers, for teachers, for nurses, for chefs will increase. The move is to hi-tech and hi-touch services which are the things that people enjoy and will be able to afford. But note that those careers and professions where there is a demand are changing ones and this means that training and education has to be on-going. We have to subscribe to lifelong learning.

The ICT will change - larger images on easily-scrollable, small screens, on-line access anywhere, faster communications, and lower costs - and as always it will be commercially-led. Just as the mobile phone has limited memory but access to good connecting and processing facilities so our "Tablet PC" will soon offer us the ICT power we need wherever we are. In fact following the 'laptop with a phone inside' and the personal PDA, it could well replace the mobile phone for many users. Some people will make a

fortune in those areas where ICT can actually create new categories of consumer demand (e.g. learning packages and entertainment products) and if you can do this I wonder why you are reading this and not getting started.

HOW TO GET STARTED

It seems so straight-forward to connect a school to the internet. First you need a line, a telephone or cable connection, and a modem or a network card inside (or outside) your computer. Pay an Information Service Provider (ISP) for the link and that completes the facility and the school is connected. Clearly there is a need for a network inside the school if more than one machine and more than one person is to use the facility. And the facility supports the whole curriculum so all classrooms have to be connected and then there is a requirement for additional equipment such as Laptops, Interactive whiteboards, mobile communications. And if there are more users then the line has to be faster . . . . . And so on.

WHAT ARE THE BENEFITS

As the reader will know the school's own network (LAN) will allow:

- E-mail connection to others within the institution, within the community and throughout the world;
- Access to their intranet and the world wide web;
- Sharing of resources (printers, software, files etc.).

But it can also free up time for teaching and learning. However, many companies computerise their records but to no real advantage except they can make changes more quickly. Schools, like companies, have to be managed and the management decisions need to be based on facts – data that the system can provide, and I would emphasise that you cannot separate curriculum from management.

All schools have to go through development stages, but those not at the leading edge need not make the mistakes if good practice is shared. Just as in a company, one must ask "What are the benefits that we are trying to achieve". Here might be my list:

- To raise standards (More efficient learning and at a greater rate);
- Anytime, anywhere learning (AAL);
- Provision of accurate knowledge;
- ICT confident and competent teacher (Curriculum and Management);
- ICT qualified teachers;

- ICT certified school leavers;
- Efficient electronic schools, local councils and governments.

From the school's point of view this requires a commitment of staff, pupils and parents – a whole ICT school policy with a shared understanding of aims.

Others have defined the factors for successful implementation (for example see Becta, 1999) but the list should include:

1. Agreement of the aims by staff, pupils, parents;
2. The integration of ICT into classroom practice;
3. Allocation of appropriate resources;
4. Teacher understanding of the benefits of ICT;
5. Reliable and timely technical support;
6. Realistic replacement plans.

Taking the first of these six factors it is clear that there is much preparation to be done. At what stage is the school currently in terms of ICT? Just starting, or established, or confident? And what of the staff? Are they just starting with ICT, or established or confident? Most schools would have a mixture, but what of those schools where all staff are just starting?

So clearly the school needs a 'plan of action', and this might be a three or five year plan, but it is important that all agree the type of establishment that they want their school to become. In the UK the National College for School Leadership NCSL)(DfES 2003) has developed an initial framework for ten key features of the "e-confident schools". These can be briefly summarised as:

1. ICT competent staff;
2. Effective use of ICT in learning and teaching;
3. Comprehensive managed learning systems;
4. Effective management information system;
5. Continuing professional development;
6. Decisions based on sound data;
7. Appropriate funding for ICT;
8. On demand access and support;
9. Pupils having high ICT capability;
10. The school as the community hub.

In the past item 7, the cost and the source of funding is usually the first item raised. Thankfully many governments have introduced grants to assist schools to move forward, but there are many additions to the PCs and Laptops that are required if ICT is to become integrated across the curriculum. Scanners and printers require paper. Whereas digital still and

movie cameras cost hundreds of Euros, data projectors and interactive whiteboards cost several thousands. In a variety of ways schools are achieving funding and their greatest concern has moved to item 1, the need for staff confidence, competence and leadership in ICT. The 'Strategic Leadership of ICT' programme (SLICT) is designed to meet this demand in the UK. (www.ncsl.org.uk/slict).

OTHER COSTLY ITEMS

If youngsters seem to cope so easily with ICT why can't our teachers? They are not so competent even after the in-service training (professional development) programmes of the last few years. There are many for whom the technology is still a frightening thought and although they have some experience they feel far from competent. At least they have moved from **not knowing** they were **incompetent in ICT,** to **knowing** their **shortfalls in ICT.** As nations we must continue to train our teachers, provide more classroom support and ensure that newly-qualified teachers entering the profession are competent. Hence we move to an ICT **competent** profession. But such a profession needs to be well supported. Supported in terms of technical support (maintenance, upgrades, suppliers etc); in terms of software (advice, suppliers, installation); in terms of training (courses, qualifications, conferences); and not least in terms of status (job prospects, remuneration, professional development).

WHERE ARE WE GOING?

No longer will schools 'look after children' whilst parents are at work. Nor will teachers advise on which vocations to follow (Miller & Bentley 2002). Classrooms of, say, 8 years times will not be recognisable to the teacher of today. Firstly the teacher's role will be to advise on various networks of learning and knowledge and to prepare pupils to "manage their learning". The 50 minute group lesson period will be replaced by one-to-one tuition, but not necessarily face-to-face. Learning opportunities will be available 24 hours a day on-line together with an on-line teacher, tutor or mentor. Schools will become the local hub of learning, bringing together parents, local residents and public agencies to offer community-wide learning opportunities. In this way teachers will take a major role in shaping the society in which we live just as they did in the 19th and 20th centuries. So maybe it is not just a matter of connecting schools. What about broadband connections to the libraries, the youth clubs and, of course the home, so that

the youngsters can access their work from a variety of locations? There are several examples of pupils getting their course at home from the school web pages and having to e-mail their work to the teacher for marking. See:

- http://www.cornwallis.kent.sch.uk A GNVQ course in ICT;
- http://www.ninestiles.bham.sch.uk A year 7/8 science course.

Both schools have gone to wireless technology for their school networks and the children, well more exactly their parents, pay for the pupil's individual laptop. These are 'leased' at so much per week as a group scheme through the scheme with special consideration for 'poorer' families and those with more than one child. Not 100% take up but over 90% in one case and 75% in the other, with those without either, borrowing from the school or sharing a friend's at home. In terms of connecting schools and the robust 'fire-wall' for unwanted material, here we have examples of an additional problem in that pupils need to access school pages from outside the school.

CONCLUSION

I think my greatest worry is not that we won't succeed and achieve my list of benefits, but that we may waste much time and money in going in the wrong direction. Advice is offered by so many different agencies, some providing only a partial picture and our schools need help to ensure **all** the benefits are realised and that the successes of others around the world are shared to the advantage of all learners. In becoming 'e-confident', there are many considerations for schools to take into account; number of pupils, number of systems, locations, staff training, software access, maintenance, networks, curriculum systems, management systems, etc and poor advice will certainly affect a sizeable community, if not a whole nation.

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IFIP TC3 Lifelong Learning Position Paper

IFIP Technical Committee 3 Taskforce on Lifelong Learning

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Abstract: Three main research questions are identified for higher education to effectively address Lifelong Learning. Lifelong Learning is an educational issue, because it is pulled by the political agenda, by economical, social, civic, cultural, personal and also Information and Communication Technology (ICT) developments. From an employment related perspective 'students' in Lifelong Learning are knowledge workers (knowledge creators) and skills workers (knowledge appliers), basically learning at the workplace. From the social and civic perspective 'students' are people learning in 'learning communities'. From a personal perspective students are persons following initial education to be effective in the workplace (employment related) and in society (community related). The role of ICT is one of empowerment, enhancement of creativity and support. Lifelong Learning is demand driven, flexible learning that will force educational institutions to change. In this special attention should be given to the relevance of Lifelong Learning for countries with emerging knowledge intensive economies.

Key words: civic perspective, community learning, employment perspective, Information and Communication Technology, knowledge society, knowledge worker, personal perspective, research questions, skills worker, social perspective, sustainability, virtual learning communities, virtual learning organisation

ACKNOWLEDGEMENT

This position document has been prepared on behalf of the International Federation for Information Processing (IFIP), Technical Committee 3 (TC3), by the TC3 Taskforce on Lifelong Learning. The document reflects the personal opinions of the authors and does not have a status as IFIP TC3 policy document. Taskforce contributors: Mike Kendall (United Kingdom), Brian Samways (United Kingdom), Jan Wibe (Norway) and Tom van Weert (The Netherlands), who has also edited the document.

The original position paper, published by IFIP in October 2003, has been updated and edited to fit the format of this book.

LIFELONG LEARNING IS A POLITICAL ISSUE

The scale of current economic and social change, the rapid transition to a knowledge-based society and demographic pressures resulting from an ageing population in the industrialised countries are all challenges which demand political attention and a new approach to education and training. This is illustrated by the high priority given to Lifelong Learning in the context of these challenges by meetings of the European Council (http://europa.eu.int/comm/education/life/index.html).These meetings resulted in the communication of the mandate of the *Feira European Council*. In this communication *A Memorandum of Lifelong Learning* (European Commission 2000) Lifelong learning is defined as "all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competence, within a personal, civic, social and/or employment-related perspective."

What is Lifelong Learning?

The definition given above implies that Lifelong Learning is about acquiring and updating all kinds of abilities, interests, knowledge and qualifications from the pre-school years to post-retirement. It promotes the development of knowledge and competences that will enable each citizen to adapt to the knowledge-based society and actively participate in all spheres of social and economic life, taking more control of his or her future. It values all forms of learning, including: formal learning, such as a degree course followed at university; non-formal learning, such as vocational skills acquired at the workplace; and informal learning, such as inter-generational learning, for example where parents learn to use ICT through their children, or learning how to play an instrument together with friends.

In Lifelong Learning opportunities for learning have to be available to all citizens on an ongoing basis. In practice this should mean that citizens each have individual learning pathways, suitable to their needs and interests at all stages of their lives. The content of learning, the way learning is accessed, and where it takes place may vary depending on the learner and their learning requirements.

Lifelong learning is also about providing "second chances" to update basic skills and also offering learning opportunities at more advanced levels. All this means that formal systems of provision need to become much more open and flexible, so that such opportunities can truly be tailored to the needs of the learner, or indeed the potential learner.

Lifelong learning provides new opportunities for active participation is society, empowering citizens to increase their influence over social, cultural and economic factors, locally and further a field, as ICT permits remote participation. "Just as learning is being taken to the learner enhanced by the use of ICT, so is citizenship with developments in electronic governance."(Kendall 2000)

Lifelong Learning strategies

Coherent and comprehensive lifelong learning strategies should provide the building blocks to implement Lifelong Learning. What are the tools that can better integrate learning environments and open up access for all European citizens to good quality learning opportunities appropriate to their needs at any time of life?

The consultation which followed the publication of *A Memorandum on Lifelong Learning,* identified six essential elements for coherent and comprehensive lifelong learning strategies:

1. "*Partnership working*, not only between decision-making levels (e.g. national, regional and local) but also between public authorities and education service providers (schools, universities, etc.), the business sector and the social partners, local associations, vocational guidance services, research centres, etc.
2. *Insight into the demand for learning* in the knowledge-based society – which will entail redefining basic skills, to include for instance the new information and communication technologies. Analyses should take into account foreseeable labour market trends.
3. *Adequate resourcing,* involving a substantial increase in public and private investment in learning. This does not only imply substantially increasing public budgets, but also ensuring the effective allocation of existing resources and encouraging new forms of investment. Investment

in human capital is important at all points in the economic cycle; skills gaps and shortages can certainly co-exist with unemployment.

4. *Facilitating access to learning opportunities* by making them more visible, introducing new provision and removing obstacles to access, for example through the creation of more local learning centres. Special efforts are necessary in this context for different groups such as ethnic minorities, people with disabilities or people living in rural areas.
5. *Creating a learning culture* by giving learning a higher profile, both in terms of image and by providing incentives for the people most reticent to opt for learning.
6. *Striving for excellence* through the introduction of quality control and indicators to measure progress. In concrete terms, provision must be made for standards, guidelines and mechanisms whereby achievements can be recognised and rewarded."

DEVELOPMENTS IN OUR SOCIETIES

Lifelong learning is pulled by economical, social, civic and cultural developments, and developments in the personal sphere.

Lifelong learning is an economical issue

Economies are changing: In knowledge intensive economies the demand for competent knowledge workers and skills workers is increasing. Supply is not in balance with the demand. The main economic importance of knowledge workers in knowledge intensive economies derives from innovation through knowledge creation; the main economic importance of skills workers from innovation in knowledge application. To keep up with economic demands both groups have to enhance their competence in 'learning teams'. Learning is integrated into the work, learning on the job. This constitutes Lifelong Learning from an employment related perspective

Shortage of knowledge workers

In knowledge intensive economies the demand for educated personnel is increasing. Supply is not in balance with the demand. In the Netherlands, for example, in 2003 a shortage of 200.000 higher educated workers is expected (Sociaal Economische Raad 1999) developing into an expected shortage of 400.000 in 2007. The concept of Lifelong Learning offers a promise of reducing this shortage of workers by helping people to re-enter the labour market or to change jobs. In western economies with an aging population

this shortage of workers is the more urgent, because the total number of workers in the economy is decreasing, with enormous effects on the national product.

Knowledge workers create knowledge

Knowledge workers are found in innovative businesses and organisations, including communities where people are creating community capital and action. To keep up with demands and competition these innovative businesses and organisations create new knowledge in their domain. "A knowledge worker therefore is also a knowledge creator" (Weert 2002).

This knowledge work is teamwork, because the knowledge needed in many cases is multi-disciplinary, calling on formal and tacit knowledge. So for a knowledge worker also other "competencies" play a role: such as working in a multi-disciplinary team and multi-disciplinary problem solving. Knowledge workers are part of a 'learning team'.

Knowledge workers in most cases develop a knowledge career, whatever discipline they are specialised in, moving from executive to strategic roles. In fact knowledge workers are the embodiment of Lifelong Learning in economic life.

Skills workers apply knowledge

Skills workers use their skills in businesses and organisations to produce goods or services. Their skill is in applying knowledge. Knowledge creation may not be as much integrated in their work. However, skills workers need to adapt their skills to new situations. They also in many cases work in teams and learning on the job is also for them the best way to learn new skills. This learning may be not as much integrated in their normal working life as is the case for knowledge workers and updating of skills may have to be organised separately. This updating should be organised close to the job and in many cases for the whole team. The team then also is a 'learning team'.

Knowledge has an expiration date

Knowledge has become like fish: within a short period it has lost its freshness and cannot be used anymore. Or in other words: in economic life development of new knowledge, or learning, has become a 'must'. "In the old economy, the basic competences of the industrial worker, bricklayer, or

bus driver were relatively stable. True, you might have applied these competencies to different situations, such as different construction sites, but the learning component of your labour was small. In the new economy, the learning component of work becomes huge. Consider the researcher looking for a genetic basis for schizophrenia, the software developer creating a new multimedia application, the manager responsible for corporate planning in a bank, the consultant assessing a client's markets, the entrepreneur starting up a new business, or the teaching assistant in a community college, the farmer with new fertiliser and crop management, the shop assistant with new products and tills, the engineering with a new computer aided manufacturing process.. Think about your own work. Work and learning overlap for a massive component of the workforce." (Tapscott 1996; p. 198).

From supply to demand

Where the usefulness of knowledge expires, supply of knowledge through education also becomes less useful. Learning in initial education makes sense when the knowledge offered is relatively stable. However, in the new economic circumstances a demand for 'Just in Time' education is seen to develop, education on demand. And the 'customer' demands that the content of the education has a 'Just Fit'. And because business is going on as usual during learning education has to be flexible in time and place. Education has as yet not found an answer to these demands. As Davis and Botkin put it in their book *The monster under the bed*: "With the move from an agrarian to an industrial economy, the small rural schoolhouse was supplanted by the big brick urban schoolhouse. Four decades ago we began to move to another economy, but we have yet to develop a new educational paradigm, let alone create the 'schoolhouse' of the future, which may be neither school, nor house." (Tapscott 1996, p. 199).

It is clear that Information and Communication Technology (ICT), or 'the computer', plays an important role in this economic change from supply to demand. Industry and business would not be able to satisfy demands in an effective way if the power of ICT was not available.

Lifelong learning is a social issue

Social changes occur because of part-time work during initial education, because of a disappearing transition between initial education and working life, and because of change as a second nature in work. Also new technological possibilities such as mobile phones play a role. We want (to do) it now, we want to do more at one time, we want it flexible and we want it personal and meaningful. We do not want to wait for general supply, we

demand it now and want it personalised. This also applies to our social learning where 'learning communities' appear, be it local communities or communities of hobby or interest.

Part-time work during initial education

In societies which are economically striving, part-time work during initial education is becoming more and more popular. Economic circumstances provide the opportunity, students in our society produce the demand. Full-time studies are becoming part-time studies in practice. New forms of education are springing up in which working and studying are formally combined.

Changing nature of work

The changing economic circumstances have resulted in increased part-time work, the need to have multiple jobs and an increased frequency of job change – we no longer have a job, or skill for life. Following changing economic circumstances the nature of our work changes many times during our life.

Disappearing transition between initial education and working life

But also the transition from initial education to working life is becoming less clear cut: "A spreading of education over a wider period of working life is…becoming a reality. In some countries we can see this emerging quite clearly: in the transition phase." (OECD 2000; p. 22). In this transition phase student will already work in a profession while still studying to qualify for that profession.

We want (to do) it now

A few decades ago our society supplied opportunities which could be used or not. Today we demand those opportunities *now,* waiting is for dummies. We want money now, so banks have provided money dispensers in the wall. The same happens in the assurance business. We want travel assurance today, not tomorrow when we are already gone. Information and Communication Technology (ICT) is again behind all this, without ICT our demands could not be satisfied. And we use ICT in our social life, sometimes in disguised form, sometimes clearly recognised. We do not want to be frustrated by our inability to do something, to achieve a personal and/or group goal.

We want to do more than one task at a time

We were used to knowing the task we were going to do at any one time and got on with it. Now we have multiple channels of communication allowing the completion of simultaneous task, such as watching television, chatting on the computer and on the phone: a capability of the one machine. The boundaries between tasks have become more fuzzy, just as their start and finish.

We want it flexible

In earlier days you had to go to your own bank to get money. But we want money now, wherever we are, so we can now also use the money dispenser of other banks. We want advise now, so the consultant is also available in evenings. We want to buy something now, so shops are open on Sunday or even 24 hours a day. We also want whatever it is available in the chunks that we determine, sometimes to the detriment of someone of the overall coherence of a product or service, as seen by the supplier.

We want it personal and meaningful

And as we move from supply of opportunities, where you had to take what was offered, to demand of opportunities we want these opportunities to be personally tailored and meaningful to us. What is good for my neighbour is not good enough for me. My advisors have to take account of my personal situation and their advice must be meaningful to me, not necessarily to others.

Lifelong Learning is a civic issue

New opportunities for active participation in society are needed, empowering citizens to increase their influence over social, cultural and economic factors, locally and further a field, as ICT permits remote participation. Lifelong Learning in citizenship communities is a means to this active participation: "Just as learning is being taken to the learner enhanced by the use of ICT, so is citizenship with developments in electronic governance." (Kendall 2000).

Lifelong Learning as a cultural issue

In technology rich societies Information and Communication Technology is getting more and more integrated. Just as electricity brought a revolution to our culture, ICT is doing the same, with a diverse range of technologies having an increasing impact across different societies. We have moved to a 'zap' culture with television, local satellite and webTV, which now is amplified by Information and Communication Technology. Small chunks of information, or entertainment, build up the mosaic of our cultural experiences, a culture of 'blips'. Ubiquitous mobile communication ("where are you?"), video and gaming, surfing the globe, all allow us to create our own cultural communities.

A 'zap' culture

Television, with local satellite and WebTV, has contributed to a 'zap' culture that now is amplified by Information and Communication Technology. Small chunks of information, or entertainment, build up the mosaic of our cultural experiences, a culture of 'blips'.

Ubiquitous mobile communication ("where are you?")

The mobile telephone adds to our 'zap' culture: we can call whoever we want wherever we are for conversations that we in other times would have had over a drink. But we can also do business with our bank manager, or order a pizza for dinner. It took only a short time for the mobile phone to become integrated in our economic and social life. And its Short Message Service (SMS) has enriched our cultural life with new symbolic language.

Video and gaming

Through Virtual Reality ICT allows you to move through "a world without limits where the frontier between fact and fiction is fuzzy. The more senses are involved the more real is this Virtual Reality. Here digitalisation is the 'most extreme' form of abstraction. It is learning by experience (but there is a risk involved). It enables money and time efficient creativity. " (Weert & Munro 2003; p. 78). Video and Internet gaming is quickly finding its place in our culture.

PC at home and surfing the globe

In technology rich societies the PC at home is becoming a common phenomenon. Recently it was for example estimated that there was a computer in more than 80% of the Dutch homes. These PC's empower house hold members and integrate services such as email in everyday life. And the "Internet is transforming the social interaction among different age groups in society in all countries" (Weert & Munro 2003; p. 77). Surfing the globe is becoming a common pastime.

We create our own cultures and communities

As we have more control, and more isolation and exclusion, we expect to be able to create our own cultures, finding like minded people in a community, or to establish our own identity and community of interest to the exclusion of others. These communities and cultures may be virtual, but have a very real physical impact.

Lifelong Learning is a personal issue

On-going personal development

Changes in economic and social life require on-going personal development. "Long term developments lead to fundamental changes in economic activities and put more weight on unique human qualities such as knowledge creation. Robotic type of work is taken over by automates. 'Human capital' is becoming more and more important and allows workers more freedom in giving form to their work commitments. Supported by Information and Communication Technology they become more and more responsible for all dimensions of their work. This contributes to the 'wholeness' of working life." (Keynote Lifelong Learning, Weert 2004).

Team and community learning

In *personal life* a person may be a 'lonely' learner. But economic, social and cultural life require 'team learning' or 'community learning'. 'Lone wolf' learners may be able to 'help themselves', but have to be drawn into teams or communities. These 'lone wolf' learners fall into several age groups. Attention must be given to reaching all ages.

Personalised flexible learning

Economic, social and cultural developments all point in a direction where personalised, flexible learning will be part of our economic, democratic, cultural and social life. Just as at the work place where its use is integrated, Information and Communication Technology will play an important enabling role. And ICT is able to play this role because also its integration in our social and cultural life is just a matter of time. It can furthermore be noted that: "ICT is a major component in merging personal, private, leisure and work time". (Weert & Munro 2003; p. 77)

WHO ARE THE STUDENTS IN LIFELONG LEARNING?

Economic, social and cultural developments all point in a direction where personalised, flexible learning will be ongoing part of our economic and social life. Information and Communication Technology will play an important enabling role in this Lifelong Learning. Lifelong Learning is also high on the political agenda. Therefore the 'what' is clear, but what about the 'how'? The question is: how should Lifelong Learning be organised? This question can only be answered when it is clear who the students in Lifelong Learning will be and what their needs are.

Employment related perspective

Knowledge worker as knowledge creator

Knowledge workers are found in innovative businesses and organisations, including civic communities where people are creating community capital and action. Work in these places is organised in non-traditional ways and the professionals work in a different way. Organisational structures suited for efficient, standard, large-scale throughput (old economy) change to structures facilitating flexible, custom-tailored, small-scale, high quality production or servicing (new economy) (Weert 1993). These new structures aim to satisfy a personal, demand-driven market and are reflected in organisational concepts such as 'Just-In-Time'. They are geared towards teamwork, flexibility and quality. Information and Communication Technology (ICT) is omnipresent and empowers the individual to act as expert in many areas. It also offers flexibility in time and place in support of teamwork. Work is result oriented and the professionals are accountable on results: team and organisation form a meritocracy. To keep up with demands and competition these innovative businesses create

new knowledge in their domain. A knowledge worker therefore is also a knowledge creator (Weert 2002).

This knowledge work is teamwork, because the knowledge needed in many cases is multi-disciplinary, calling on formal and tacit knowledge. So for a knowledge worker also other "competencies" play a role: such as working in a multi-disciplinary team and multi-disciplinary problem solving. Knowledge workers are part of a 'learning team'.

Knowledge workers in most cases develop a knowledge career, whatever discipline they are specialised in, moving from executive to strategic roles. In fact knowledge workers are the embodiment of Lifelong Learning in economic life.

Skills worker as knowledge applier

Much the same can be said about skills workers who have to adapt their skills to new situations. Skills workers use their skills in businesses and organisations to produce goods or services. Their skill is in applying knowledge. They also in many cases work in teams and learning on the job is also for them the best way to learn new skills. However, this learning maybe is not as much integrated in their normal working life as is the case for knowledge workers and updating of skills may have to be organised separately. This updating should be organised close to the job and in many cases for the whole team. The team then also is a 'learning team'.

Worker who needs reorientation

A special case is formed by workers who need reorientation. Their normal work place is not suitable for learning on the job, otherwise reorientation would not be necessary. This also implies that their team is not a suitable place to learn. These workers have much the same characteristics as students in the first part of Lifelong Learning: initial education.

Managers and leaders

Many people with management and leadership responsibilities do not recognise their need for Lifelong Learning (either for creating knowledge or for updating skills). In many cases they are not aware that Lifelong Learning takes place all of the time in their workplace, whether by design or chance. ICT provides many opportunities for such people to access Lifelong Learning, in the workplace and on the move, increasing the effectiveness of their companies. At the same time, the ready access to information and

Lifelong Learning by workers increases the pressures on managers and leaders to be up to date.

Social and civic perspective

Local community member

Local community members are persons who play a role in a local community, i.e. in their every day social environment. In this role learning takes place in this person's social environment. Learning might for example deal with question as 'how to fight petty crime' or 'how to keep my social environment suitable informed about something'. In this learning the interaction with fellow-members of the community is an important aspect. The person who tries to answer relevant questions, is in this case part of a 'learning community'. The 'local' community may of course be 'virtual'. For example, dispersed peoples are now members of strong on-line communities that mitigate the impact of diaspora., thus allowing communities to learn about and keep in contact with their own culture, family and geography, indeed continuing to shape these communities from afar.

Civic community member

Civic community members are persons who play a role in a civic community. In this role learning takes place in this person's democratic environment. Learning might for example deal with question as 'how bring down petty crime rates' or 'how to influence democratic processes'. In this learning the interaction with fellow-members of the community is an important aspect. The person who tries to answer relevant questions, is in this case part of a 'learning community'. The civic community may of course be 'virtual'.

Hobby or interest community member

Hobby or interest community members are persons who play a role in a hobby community or a community of interest. In this role learning takes place in the context of the community and deals with question as 'how to fight mildew' or 'how to organise our tennis tournament'. In this learning the interaction with fellow-members of the community is an important aspect. The person who tries to answer questions relevant for the community is part

of a 'learning community'. The hobby or interest community may of course be 'virtual'.

Personal perspective

Students in the educational system

Students, who follow initial education, learn mostly by studying in their personal life. Sometimes initial education provides the context of a 'learning community' for individual students (for example in primary education), but mostly students study and learn on their own. The classes they are in, cannot be characterised as 'learning communities' and 'team learning' has to be separately organised. Team learning however is important to students as their professional future will in most cases entail team work and team learning.

Learners 'on their own'

Because of ICT-related development in our society the way in which students engage with learning communities has evolved: It is no longer a single community with a common purpose, the student is likely to be a learner in a number of different communities, some formal and linked to institutions and some informal and linked to personal and group interest, some physical and some virtual. However, there are students who prefer to learn on their own ('lone wolf' learners). They study from books or computers and are able to 'help themselves'. They do not need to be part of a team or community learning experience, although they will purchase courses from correspondence colleges, open universities or the local bookshop.

Divers age groups

Divers age groups are of relevance:

- *First age Pre-working*
  Young people, from birth until independently economically active; those in school, those in care etc.
- *Second age Working* – paid and unpaid
  Industry and Commerce, Services, Government, Politicians (from parliament to local community and single issue politics).
  Educators who have to be helped/supported in moving from one way of working to another, becoming lifelong learners and supporters of Lifelong Learning (Teachers and University lecturers)

- *Third age Retired*
  New situation, preparation for retirement, new skills and knowledge leading to employment, remaining economically, socially and politically active. Enhanced roles in community – volunteers. Increasing number of retired people and inability to maintain standards of living – pension time bomb, hence economically active.

Hard to reach

In all age groups there will be persons who are hard to reach – lacking ambition to learn. The socially excluded, who are not allowed or able to fulfil their ambitions. The disabled, who are not easily able to fulfil their ambitions. The untapped mainstream, that does not see the need to take part in Lifelong Learning because there are no needs developing in their work or by their lifestyle. It is also likely that people will move in and out of this category as their life changes, for example, if they become unemployed or disabled and detached from their normal learning team or community and without access to learning resources and opportunities.

WHAT IS DIFFERENT IN LIFELONG LEARNING?

Lifelong Learning is demand driven, flexible learning which takes place in the context of economic life (knowledge workers or skills workers), social life (local community member, citizen, member of interest group) or personal life (student, 'lone wolf' learner). It is organised as 'Learning Teams' or 'Learning Communities'. The difference between a 'Learning Team' and a 'Learning Community' is that teams operate in a given organisational and cultural environment, communities mainly organise themselves.

Characteristics of Lifelong Learning

Many aspects in Lifelong Learning will be different from traditional learning.

Characteristic for Lifelong Learning are:

- Lifelong Learning is not necessarily the consequence of teaching, and also not of provision of information by someone who knows something the other does not (Visser 1999).

- Lifelong Learning is mostly done outside school; classroom, textbooks and teachers are not by definition ingredients of any environment that is supposed to facilitate learning (Visser 1999).
- Not textbooks, but opportunistic and rich environments form triggers for Lifelong Learning.
- Lifelong Learning is by empirical observation and enhances personal experience.
- Lifelong Learning occurs 'Just in Time'.
- Lifelong Learning is about interactions and groups (teams or communities): one-to-one, many-to-many (virtual).
- Self-motivation is the driving force in Lifelong Learning. This raises the question however of what to do about the socially and educationally excluded: the people who cannot motivate themselves or be motivated.
- Lifelong Learning requires active participation in learning teams and communities; citizenship is Lifelong Learning (Kendall 2000).
- In Lifelong Learning forms of progression and personal achievement are different. It is not what students can reproduce that counts, nor the solution of artificial exercises. What counts is what you are able to achieve in real-life situations, be it in real economic life, real social life and real personal life measured by common, real-life standards.
- Lifelong Learners will maintain a portfolio of personal achievements.
- Lifelong Learning is Open Window learning, the learning environment is global.
- Lifelong Learning may be Mobile Learning, Home Based learning, Work Based learning.
- Community learning, but it is essentially a social activity involving interaction with others. ICT will support these interactions from anyplace at anytime.
- Lifelong Learning education is learner centred: demand driven and aiming for personal achievements.
- Lifelong Learning allows informal and organic learning. It satisfies multiple learning needs/styles/groups of individuals.
- Lifelong Learning is from cradle to grave. The age profile of learners will change, for example retired people will take part.

Frictions with current organisation of education

There are economic and social challenges which demand a new approach to education and training, within the framework of Lifelong Learning (Lifelong Learning). For example in Europe these challenges originate in large scale economic and social change, rapid transition to a knowledge-

based society and demographic pressures resulting from an ageing population.

Traditional face-to-face education

These challenges cannot be met by the traditional face-to-face education. As stated by Visser (Visser 1999; p. 2): "Particularly traditional education is not capable of accommodating ever increasing numbers of learners and learning needs at an affordable cost. Large scale introduction of Information and Communication Technology (ICT) to automate traditional education (the textbook, the classroom and the teacher) will not bring the solution.".

Fundamental redefinition

Visser continues with stating (Visser 1999; p. 4): "Universities, and other learning institutions, are in need of redefining themselves in much more fundamental ways that by simply continuing their old practices by modern means. The production of knowledge has become a highly networked and increasingly fluid phenomenon. Universities play a role in it, but are no longer the exclusive or even major players. They are in need of continually repositioning themselves. Gibbons refers to the value-added inherent in the "creativity to configure knowledge and resources over and over again". These networks of knowledge production are likely to comprise more than just the academic community. ".

Lifelong going to an educational institution

Lifelong Learning (Lifelong Learning) is <u>not</u> about lifelong going to an educational institution. It implies a transformation of the organisation of education from teaching to learning. It also implies an inclusive approach with respect to economic life (business, services and industry) and social life (society). In the so-called '*Golden Triangle*' of learning Economic Life, Student and Educational Institution meet, just as Social Life, Student and Learning Community meet in the '*Social Triangle*'. Lifelong Learning implies profound educational change.

Individual social process

Lifelong Learning (Lifelong Learning) of an individual is an individual social process. It is not the content of the process we should focus on, but the structure of the process, called scenario by Bent Andresen (Andresen 2002). However, we need a learner focussed approach (scenario's for self-directing

learning activities), not a teacher focussed approach (scenario's focussed on self-directing teacher activities). Lifelong Learning changes the role of the learner from consumer of institutional products to the creator of new learning in the setting of business, organisation or community, which may or may not be facilitated by a formal institution.

Role of institutions

The new learning in Lifelong Learning is about the organisation of learning. As society changes, so will the organisations of learning as the focus on the learners and their needs increases. Existing organisations will change, and new public and private organisations will emerge, especially to meet the needs of new target groups. Also locations of learning institutions will change as people are learners within a global education marketplace. Institutions themselves will have to learn about the pedagogy of learning, and about how to match the complexity of learning ambitions to educational organisations. The main question is: how do we organise learning? 'Teachers' will organise the process and learners will do the learning. Accreditation and validation will be of learning achievements within learning ambitions.

Students

Students find the current organisation of education a barrier hindering the fulfilment of their learning needs. Current systems were built to meet needs associated with a different set of goals. Existing institutions are organised for the efficient delivery of and access to content, specifying the learning pathways of individuals in advance and not to meet the preferred learning styles and ambition of the learners.

Students are not full-time, they work or have other demands on their time and attention to which schools, colleges and universities are competitors. With changing ambitions, learners will no longer pay for 'chunks' of content and results, often deconstructed whole courses and with requirements to attend linear courses. In stead learners will only pay for learning outcomes (own achievements) that fulfil their ambitions.

Lifelong Learning is an educational issue

Important issues for the new educational institutions are: Technology access of learners and how to reach excluded groups and hard to reach groups and individuals. But also the question: with virtual learning organisations springing up, community lead and bottom-up created, short-

term, informal, and non-institutional, where lies the added value in the role of an educational institution?

ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

In Lifelong Learning the role of ICT is one of empowerment, creativity and support. Just as in economic life, application of ICT in education goes through phases (Weert 1992). There are three stages of development in application of ICT, each characterised by technological innovation:

1. Stage of *automation,* in which processes are automated;
2. Stage of '*informatisation*', in which ICT is used as a (personal) tool to empower and support the professional in processes of work;
3. Stage of '*communicatisation*', in which the computer is used as a (personal) agent in a communication network.

At the moment education is moving from stage 1 (automating the teaching process, i.e. the teacher in the computer) to stage 2 (empowering and supporting students).

The current technology on our desktop, in our homes and in our community provides a powerful toolbox for support of Lifelong Learning. What is needed is effective organisation of its use, not more technology. We do not need elaborate electronic learning environments to be effective in Lifelong Learning. Important applications deal with communication (finding and interacting with resources, organisations and people), knowledge management (organising, storing, creating and sharing of knowledge) building together personal (learning) environments for learning support.

Important applications of ICT in education

Important applications deal with:

- Personal communication (finding and interacting with resources, organisations and people);
- Organisation of activities (planning, scheduling, monitoring);
- Information management (organising, storing, creating and sharing of information);
- Organisation of learning team and learning community work (group work).

These applications can be used at work, in the home or at any other location providing access, including mobile devices. Use of the applications is individually and in groups. And anywhere, anytime, to meet an ongoing needs, as well as specific short-term transaction based requirements.

Lifelong Learning is an ICT issue

Lifelong learning provides new opportunities for active participation in society, empowering citizens to increase their influence over social, cultural and economic factors, locally and further a field, as ICT permits remote participation.

Economic, social and cultural developments all point in a direction where personalised, flexible learning will be part of our economic, democratic, cultural and social life. Just as at the work place where its use is integrated, Information and Communication Technology will play an important enabling role. And ICT is able to play this role because also its integration in our social and cultural life is just a matter of time. As mentioned before: "ICT is a major component in merging personal, private, leisure and work time" (Weert & Munro 2003; p. 77).

VIRTUAL LEARNING ORGANISATIONS AND COMMUNITIES

It may be concluded that Lifelong Learning is demand driven, flexible learning. Educational institutions will have to provide learning environments covering:

- *The employment-related perspective* (students becoming knowledge workers or skills workers);
- *The social or civic perspective* life (students becoming local community members, citizens);
- *The personal perspective* (students in initial education or 'lone wolf' learners).

Lifelong Learning may be organised in 'Learning Teams' (employment related perspective, personal perspective) or 'Learning Communities' (social, civic and personal perspective). The difference between a 'Learning Team' and a 'Learning Community' is that teams operate in a given organisational, social and cultural environment, and that communities mainly organise themselves.

Learning = Working = Learning

In Lifelong Learning working and learning come together. Virtual learning organisations may offer the organisational environments for this combined learning, bridging the gap between education and the work environment. There are several typologies of virtual organisations available. In 'Organisations going virtual' (Metselaar & van Dael 1999) the following typology, developed by Campbell in 1997, is presented:

a) Internal virtual organisation;
b) Virtual organisation;
c) Dynamic virtual organisation;
d) Web enterprise or agile organisation.

This last type of ICT-supported organisation (d) is a temporary network of experts working in a specific field or on a specific topic. "..a spatially dispersed and temporarily flexible cultural community, the reproduction of which is dependent upon learning and innovation of its constituents" (McLoughlin & Jackson 1997). Knowledge management and the sharing of information among partners are essential elements for an agile organisation (Metselaar & van Dael 1999; p. 204). Applications of ICT in virtual organisations are: local and wide area networks, electronic data interchange, the internet, intranets, workflow management systems, knowledge-based technology, and other applications of artificial intelligence, such as intelligent agents (McLoughlin & Jackson 1997). A first proposal for the design of a Virtual Learning Organisation may, for example, be found in (Weert 2002).

Learning = Living = Learning

In Lifelong Learning working and learning come together, but also living and learning. Here Virtual Learning Communities (or Virtual Communities of Practice) may offer the organisational environments for this combined learning, providing an extension of the living environment. McDermot (1999), (2001) and Wenger (2001) provide guidelines for the creation of Virtual Learning Communities. Von Krogh et al. offer guidelines for enabling knowledge creation (Krogh et al. 2000).

RESEARCH AGENDA

Research focus

What is different when comparing Lifelong Learning with traditional education? The difference is very fundamental: Lifelong Learning mostly is about learning and traditional education mostly is about teaching. Lifelong Learning is a setting, in the words of Peter Senge (The Fifth Discipline), "where people continually expand their capacity to create results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to learn together" (Senge 1990; p. 202). The foregoing implies that for Lifelong Learning the central question is: how to organise that people can learn effectively, whereas the central question in traditional education is: how to teach so that people will learn what is taught.

How to organise effective lifelong learning?

The central question of Lifelong Learning is a difficult one. We are thinking in terms of an educational system with the focus on teaching. It is therefore difficult to think about and envisage an educational system which organises effective learning. Also we are thinking in terms of an educational system where ICT has not yet penetrated very far into the teaching. Problems associated with bringing computers into every day education therefore are not very well understood although lessons could be learned from others, outside education, in this respect. And one thing is clear: ICT will be integral part of Lifelong Learning.

It may be concluded that Lifelong Learning is demand driven, flexible learning which takes place in different perspectives:

- *The employment-related perspective* (students becoming knowledge workers or skills workers);
- *The social or civic perspective* life (students becoming local community members, citizens);
- *The personal perspective* (students in initial education or' lone wolf' learners).

Lifelong Learning may be organised in 'Learning Teams' (employment related perspective, personal perspective) or 'Learning Communities' (social, civic and personal perspective). The difference between a 'Learning Team' and a 'Learning Community' is that teams operate in a given organisational, social and cultural environment, and that communities mainly organise themselves.

Virtual Learning Organisations (organising Learning Teams for Working = Learning) and Virtual Learning Communities (organising Learning Communities for Living = Learning) may provide the organisational setting for Lifelong Learning. In these organisations and communities ICT is a necessary and integrated facilitator.

Research questions

From the analysis in this position paper follow three main research questions to be addressed.

Research question A

How to design, develop and implement
ICT-integrated Virtual Learning Organisations
to facilitate
Learning = Working = Learning
which is 'Just in Time', has a 'Just Fit' and provides flexibility in time and place?

Research question B

How to design, develop and implement
ICT-integrated Virtual Learning Communities
to facilitate
Learning = Living = Learning
which is 'Just in Time', has a 'Just Fit' and provides flexibility in time and place?

Research question C

On the background of these two main research questions there is a third main research question:

How to enable learning these ICT-integrated Virtual Learning Organisations and Communities?

Action research

Design, development and implementation of Lifelong Learning Organisations for working has to be done in a learning process in which both employers and educational practitioners (students, teachers and developers,

educational managers) work together on action oriented research and innovation. This will be a complex learning process which merits the attention of a (virtual) learning community.

Design, development and development of Lifelong Learning Communities for living has to be done in a learning process in which both society stakeholders and educational practitioners (students, teachers and developers) work together on action oriented research and innovation. This will be a complex learning process which merits the attention of a (virtual) learning community.

Sustainable implementations

Special emphasis should be given to sustainable development: how to design learning environments that will continue to function in an effective and sustainable way after initial creation within the boundary conditions set by higher education itself. Design should take into account that the learning environment can sustain itself.

Countries with emerging knowledge intensive economies

Special attention should be given to the relevance of design, development and implementation of Lifelong Learning in countries which do not (yet) have a knowledge intensive economy. Not only economic factors, but particularly social, cultural, civic and political factors will have to be taken into account, just as availability of ICT-resources.

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Information and Communication Technology in Higher Education

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Abstract: Various approaches can be identified to the development of Information and Communication Technology (ICT) in Higher Education. These approaches are related to the situation in a particular institution with respect to the growth of ICT. These approaches are: *Emerging, applying, integrating and transforming.* A Higher Education institution may induce progress in various areas where the ICT-approach will have an impact. These areas are: *Vision, Philosophy of learning and pedagogy, Development plans and policies, Facilities and resources, Understanding the curriculum, Professional development of institution staff, Community involvement, Assessment.* For each approach a picture is sketched of the impact on the various areas. Separate attention is given to the professional development of teaching staff in each approach.

Key words: approaches to change, areas of change, assessment, community involvement, curriculum, development plans, facilities, formal learning, higher education, Information and Communication Technology, philosophy of learning, professional development, vision

ACKNOWLEDGEMENT

In the autumn of 2000 a working party of the International Federation for Information Processing (IFIP) produced an updated version of "Information

and Communication Technologies in Secondary Education, A Curriculum for schools" (Weert & Tinsley 1994) for UNESCO. This updated version was published under the title "Information and Communication Technology in education, A curriculum for schools and programme of teacher development" by UNESCO in 2002 (Anderson & Weert 2002 UNESCO, Paris.

There was broad consensus within this working party on the way Information and Communication Technology influences developments in education on all levels. This consensus made it possible to also produce a document specifically aimed at higher education "Information and Communication Technology in Higher Education (http://poe.netlab.csc.villanova.edu/ifip32/).

Members of the IFIP working party were: Yvonne Buettner (Switzerland), Charles Duchâteau (Belgium), Catherine Fulford (USA), Pieter Hogenbirk (The Netherlands), Mike Kendall (United Kingdom), Raymond Morel (Switzerland) and Tom van Weert (The Netherlands)

This document has been edited to fit the format of this book.

APPROACHES TO ICT DEVELOPMENT

One can identify various approaches to the development of Information and Communication Technology (ICT) in higher education. These approaches are related to the situation in a particular institution across all areas related to the growth of ICT in the institutional system. A matrix has been developed (see Table 1 and Table 2) to help institutions determine their stage of development in various areas. An institution may find itself more in one area of the matrix while being less involved in other areas. The identified approaches and areas of development are in line with international trends of the use of ICT in education.

Each institution must work within the context of its own system to fit choices to what best suits its unique situation and culture. The advancement of technology and the way it is incorporated into a system is a dynamic process. Even within one institution, various units or courses may use different approaches. The approaches are hierarchical with the "emerging" approach as a beginning point, and the "transforming" approach as goal many perceive as the future of education.

Emerging

This approach is linked with an institution in the beginning stages ICT development. The institution begins to purchase equipment and software. In

this initial phase, administrators and teaching staff is just starting to explore the possibilities and consequences of adding ICT for institution management and the curriculum. The institution is still firmly grounded in traditional teacher-centred practice. For example, teaching staff lectures and provides content while students listen, take notes, and are assessed on prescribed content. Institution organisation provides discrete time periods for each subject. Learners access to technology is through individual teachers. Curriculum that increases the basic skills and awareness of the uses of ICT assists movement to the next approach (Applying).

Applying

This approach is linked with an institution in which new understanding of the contribution of ICT to learning has developed. In this phase administrators and teaching staff use ICT for tasks carried out in institution management and in the curriculum. Teachers largely dominate the learning environment. For example, teacher lectures may be supplemented with ICT such as presentation programs and word-processed handouts. Students listen to lectures and add notes to teacher prepared handouts. They use ICT tools to complete required lessons and are assessed on prescribed content. Institution organisation provides discreet time periods for each subject with some flexibility to combine subjects and time periods. Learners access to technology is mainly through computer labs. Up till now ICT has been taught as a separate subject area (ICT-literacy). To move to the next phase (Integrating), the institution chooses to implement an ICT-curriculum that increases the use of ICT in various subject areas with specific tools and software.

Integrating

This approach is linked with an institution that now has a range of technologies both in laboratories, classrooms, and administrative offices. The institution staff explores new ways in which ICT changes their personal productivity and professional practice. The curriculum begins to merge subject areas to reflect real-world applications. For example, content is provided through multiple sources including resources through the internet. The access of learners to technology enables them to chose projects and ICT tools to learn and demonstrate their knowledge across subject areas. Institution organisation provides overlap and flexibility to combine subjects and time periods. Learners have more choices with regard to learning styles and pathways. They take more responsibility for their own learning and assessment. ICT is taught to selected students as a subject area at the

professional level. To advance to the next phase, the institution chooses an ICT-curriculum that allows a project-based, ICT enhanced approach

Transforming

This approach is linked with an institution that has used ICT creatively to rethink and renew institutional organisation. ICT becomes an integral though invisible part of the daily personal productivity and professional practice. The focus of the curriculum is now learner-centred and integrates subject areas in real-world applications. For example, students may work with community leaders to solve local problems by accessing, analysing, reporting, and presenting information with ITC tools. Learners access to technology is broad and unrestricted. They take more responsibility for their own learning and assessment. ICT is taught as subject area at the professional level and incorporated into all vocational areas. The institution has become a centre of learning for the business community.

AREAS OF ICT DEVELOPMENT

An institution can determine progress in various areas of ICT development. Below general descriptions of those areas are given for all four approaches to the development of ICT in Higher Education.

Vision

This area refers to the aspirations and goals of both individuals within an institution and the institutional system as a unified whole. As the system advances, the vision should become more unified, be written down, and provide a basis for decision-making. It should help individual members of the learning community visualise the future and act in harmony.

Philosophy of Learning and Pedagogy

This area refers to ways in which teachers and students interact and the system is managed for learning. These philosophies will necessarily characterise the ways in which ICT is incorporated into the system. A setting that is dominated by the teacher as the provider of content, is a teacher-centred philosophy. ICT in this setting is controlled by the teacher as well. A learner-centred philosophy describes a setting where content comes from a

variety of resources, then projects are chosen and designed by the student. ICT tools and resources are selected to by the student to match the project.

Development Plans and Policies

This area refers to the detailed steps of how the vision and philosophies are carried out. In this plan, goals and objectives are further defined providing interim and long-term targets. Policies are set, budget is allocated, facilities are dedicated, roles are defined, tasks are delegated, and an evaluation plan is created to define the direction ICT development will take.

Facilities and Resources

This area refers to the learning environment in which ICT is used. It includes infrastructure such as, electrical wiring, internet access, lighting, air-conditioning, and space. Decisions on inclusion or lack of ergonomic design and choice of furniture impact not only use of ICT, but the health and well-being of users. This area also includes various types of technological devices from computers with peripherals and video equipment to specialised tools like digital microscopes. Resources include various types of software as well as traditional tools like books, videos, and audio-tapes.

Understanding of the Curriculum

This area refers to the progression of ICT in the curriculum in following various stages of development. First (A.) is an awareness stage in which students become ICT literate with regard to what is available and how it might be used. Second (B.), as students learn basic skills, they begin to apply various ICT tools to their regular tasks and projects. Third (C.), as students become more capable and confident with ICT, they begin to integrate and overlap both subject areas and tools. Last (D.) is the vocational use of ICT in which students are now enabled to tackle larger, more complex, real-world professional applications.

Professional Development of Institution Staff

This area involves various stages of development that parallel the curriculum for students. The personal productivity and professional practice are enhanced with the use of ICT. First, is an awareness stage (A.) in which teachers and staff become ICT literate with regard to what is available and how it might be used. Second (B.), as teachers and staff learn basic skills,

they begin to apply various ICT tools to their regular tasks and projects. Third (C.), as teacher and staff become more capable and confident with ICT, they begin to integrate and overlap both subject areas and tools. Last, is a change in professional practice in which teaching staff is now enabled to design lessons to incorporate larger, more complex, real-world projects using ICT tools and resources. As ICT is introduced into systems, there is a tendency to move from discreet skills training to reflective practice and integrative professional development. Budget allocation and provision for release time for professional development seriously impacts the ability of the system to incorporate ITC in a meaningful way.

Community Involvement

Community involvement may include parents, families, businesses, industry, government agencies, private foundations, social, religious and professional organisations, as well as, other educational institutions such as vocational institutions and universities. Community involvement could be donations of equipment and resources or, may be human resources provided for training and technical assistance. As the community gives to the institutions, the institution can give back in many ways. ICT provides an opportunity for the institution and its students to interact with both local and global communities.

Assessment

This area includes both assessment of students, as well as overall assessment of the system. These two parts are intricately interwoven. An improvement in one area should predicate an improvement in the other. Means of student assessment should reflect choices in learning pedagogy and the understanding of ICT in the curriculum. For example in the emerging and applying stages of ICT, assessment may be linked to pencil and paper test, while in the in integrating and transforming stages project based portfolios may be more appropriate. Each area of the system as described in the matrix should be assessed to determine its the impact on learning. Assessment should inform practice and support the management of learning. It should allow the system to determine whether outcomes have been met, then, review and revise accordingly. Budget allocations, policies and procedures for ICT should match vision, philosophies, and curriculum choices.

ICT DEVELOPMENT AT INSTITUTIONAL LEVEL

Descriptions below provide a picture of what each specific approach to ICT development (*emerging, applying, integrating, transforming)* may look like in a situation where an institution is at the same level of this approach in all areas (Vision, Learning pedagogy, Development plans and policies, Facilities and resources, Understanding the curriculum, Professional development for institution staff, Community, Assessment).

The rich picture described below, is summed up in a matrix (Table 1 and Table 2).

Emerging Approach

Please, see Table 1 and Table 2 for a summary.

Emerging: Vision

The institution's vision of learning and ICT is beginning to develop. The use of ICT is focused on computers under the responsibility of an enthusiastic individual or small group with very specific uses for teaching, or administration based on their own knowledge and expertise. The vision is a pragmatic response with the access to resources and expertise available.

Emerging: Philosophy of Learning and Pedagogy

The individual teacher is responsible for discrete lessons concentrating on the development of ICT skills and the transmission of subject knowledge. The pedagogy of the enthusiastic individual or small group of teachers is restricted by institutional organisation and limited time periods.

Emerging: Development Plans and Policies

The development of ICT in the institution is separate from the overall institution development plan and policies regarding curriculum, personnel, professional development, finance, community, teaching, learning and assessment. Teaching staff and students discover for themselves the opportunity to use computers.

Emerging: Facilities and Resources

The ICT facilities and resources consists of a few isolated, stand-alone computers and printers in the institution office and a few classrooms. The content available is very limited consisting of generic office type applications and institutional management software with a few games providing reward to some students. Content will be determined by the needs of a few teachers and their teaching.

Emerging: Understanding of the Curriculum

The ICT teaching is to ensure students are ICT literate. The curriculum is structured to teach students a sound basic understanding of the available software applications. The curriculum is planned and delivered by individual teachers.

Emerging: Professional Development of Institution Staff

Learning and ICT training will emphasise the need to learn a limited range of software for teaching and administration. Individual members of staff will identify their training needs, generally restricted to technical training. The ICT development plan will identify training separately from other institution training and professional development. ICT training and development is partly funded by the institution and the teacher.

Emerging: Community

Community involvement is a welcome, although often an unplanned activity. Discrete donations of computers are accepted if and when they are offered. The community is rarely involved in teaching except to solve problems. Guest speakers support learning.

Emerging: Assessment

Assessment strategies emphasise the limiting nature of equipment and budget on levels of attainment. Paper and pencil testing is widely used due to the limited ICT resources. Assessment allows the teacher to control the pace of learning. Assessment tasks and moderation of levels of attainment is the responsibility of the individual teacher. ICT assessment is independent of other student and institution assessments.

Applying Approach

Please, see Table 1 and Table 2 for a summary.

Applying: Vision

The ICT specialist is responsible for the institution's vision of learning and ICT, with the emphasis on learning about ICT and developing the institution's facilities and resources.

Applying: Philosophy of Learning and Pedagogy

A teacher centred didactic approach concentrates on the development and transmission of ICT skills and factual knowledge. The pedagogy of ICT specialists enables the teaching and use of ICT as a separate specialist subject.

Applying: Development Plans and Policies

The ICT specialists concentrating on the acquisition of ICT facilities and resources support part of the institution's curriculum controlling the development of ICT. Responsibility for development of the ICT plan and policies is delegated to the ICT specialist. The plans and policies centralise the use and access to ICT resources, tightly managing access opportunities. Funding is provided for the acquisition of hardware and software in support for a defined part of the institution's curriculum and pedagogy. The plan seeks to automate some existing practice to increase teaching and administration efficiency and effectiveness.

Applying: Facilities and Resources

There are a number of computer laboratories for ICT specific outcomes with available resources and access managed by the ICT specialist. A limited range of peripherals specific to the ICT curriculum are provided as well as the computers and printers. Internet access is available for a number of the computers. Software is available to teach the ICT curriculum. The applications are used within teaching contexts created by the teacher to provide clear predictable results for the students, ensuring success. The Internet and WWW is used in a controlled way with planned access to known sites to ensure predictable outcomes to lessons.

Applying: Understanding of the Curriculum

The ICT teaching will provide opportunities for students to apply their ICT literacy using teacher created and isolated contexts. The curriculum is structured to provide students with opportunities to apply their ICT literacy in other subject areas to acquire specific skills and knowledge.

Applying: Professional Development of Institution Staff

Skills training will be provided to support the teachers of the ICT curriculum. The training will support the use of individual software applications and learning resources. Training will concentrate on the management of the ICT emphasising personal ICT skill development. The training will tend to be just in time for a specific teaching topic or the arrival of a new piece of software. Internet based training will emphasise the identification of information and direct support for the existing curriculum in a range of subjects.

Applying: Community

The ICT specialist will be seeking donations and grants to develop the ICT resources and facilities. The ICT skills of the community will be sought in support of the specified curriculum.

Applying: Assessment

Assessment allows the teacher to report the students' level of ICT literacy and the ability to apply their learning in ICT and other subjects. The teacher shares assessments of students' attainment with other teachers within their subject area to moderate their reporting of standards of attainment. The assessments provide the opportunity for teachers to amend their curriculum. Assessment strategies are the responsibility of individual subject areas.

Table 1. Areas of ICT-development , first part

Approach	Vision	Learning pedagogy	Development plans and policies	Facilities and resources
Emerging	Dominated by individual interest Limited Pragmatic	Teacher centred Didactic	Non-existent Accidental Restrictive policies No planned funding	Stand-alone workstations for administration Individual classrooms Computers and printers Word processing Spreadsheets, databases, presentation Institution administration software Games
Applying	Driven by ICT specialist	Factual knowledge based learning Teacher centred Didactic ICT a separate subject	Limited ICT resource lead Centralized policies Hardware and software funding Automating existing practices	Computer lab or individual classrooms for ICT specific outcomes Computers, printers and limited peripherals Word processing Spreadsheets, databases, presentation ICT software Internet access
Integrating	Driven by subject specialists Discrete areas	Learner centred learning Collaborative	Individual subject plans include ICT Permissive policies Broadly based funding, including teacher training	Computer lab Networked classrooms, intranet and Internet ICT and learning resource rich learning centres Range of devices, including: digital video and audio, graphical calculators, lap

Approach	Vision	Learning pedagogy	Development plans and policies	Facilities and resources
				tops, remote sensing devices Video-conferencing Word processing, spreadsheets, databases, presentation software Range of subject orientated content Multimedia authoring, video/audio production Range of subject specific software
Transforming	Leadership Acceptance by entire learning community Network centred community	Critical thinking and informed decision making Whole learner, multi-sensory, preferred learning styles Collaborative Experiential	ICT is integral to overall institutional development plan All students All teachers Inclusive policies All aspects of ICT funding integral to overall institution budget Integral professional development	Whole institution learning and ICT infrastructure and access to a wide range of current devices. Emphasis on a diverse set of learning environments. All of the above and Web based learning spaces Brainstorming Conferencing and collaboration Distance education Web courseware Student self-management software

Integrating Approach

Please, see Table 1 and Table 2 for a summary.

Integrating: Vision

The institution's learning and ICT vision is developed and shared by subject specialists seeking to increase the levels of attainment in their subjects, exploring new ways of learning and the management of learning. The vision created belongs to all students, staff and the institution's local and global learning communities.

Integrating: Philosophy of Learning and Pedagogy

A learner centred approach supporting students' choice of preferred learning styles and learning environments. Students are able to collaborate with other learners, integrating learning across subjects, utilising a wide range of student found resources. The use of ICT to investigate and explore new approaches to learning is accepted.

Integrating: Development Plans and Policies

The individual subject areas integrate ICT into their plans and policies within the whole institution development plan and policies. The institution's planning processes encourage collaborative approaches to learning and the management of learning by staff and students. The funding of ICT is broadly based and integral to the annual budgetary cycle. The provision of funding covers all aspects of ICT provision, including professional development.

Integrating: Facilities and Resources

The whole institution is networked to ensure access to multimedia ICT and learning rich resources wherever you are in the institution and out of institution, and via the Intranet and Internet. The computer labs are sufficient in number to allow ready access by students and staff in most subjects across the institution. The content is critically appraised to ensure it matches the requirements of the curriculum supporting a wide range of multi-sensory learning styles. All staff identifies the software and learning resources required. Onsite technical support is provided to ensure the ICT works when required. A wide range of peripheral and remote working devices, including video-conferencing are provided and integrated into the curriculum. Large and small group presentation facilities are readily available.

Integrating: Understanding the Curriculum

The curriculum provides the opportunity for students to integrate their ICT literacy into problem solving and projects offering new ways for students to demonstrate their learning. The curriculum seeks to use real context for learning, using institution based and externally available resources. ICT is used as a tutor to support specific learning goals. Staff regularly review the curriculum for opportunities to integrate ICT.

Professional Development of Institution Staff

The emphasis is on the professional development of teachers' subject skills and capabilities to apply ICT in a range of contexts. The provision of institution-based in-service training to support the shared development of collaborative, cross curriculum uses of ICT complements external provision. The institution's programme of professional development has evolved to meet changing needs and new opportunities.

Integrating: Community

Staff and students make ready use of their local and emerging global learning communities to provide specific assistance for the curriculum making use of the additional opportunities offered through ICT, especially the Internet and video-conferencing. The institution has a regular programme to attract donations and grants to further develop the ICT resources and curriculum

Integrating: Assessment

The students' assessments are integrated into the whole curriculum, with reports on attainment informing all teachers in planning teaching and learning programmes of study. The students' are responsible for maintaining a personal portfolio, demonstrating their attainment, over time, using ICT facilities and resources to complement paper based records. The assessments inform whole institution curriculum planning and resource allocations.

Transforming Approach

Please, see Table 1 and Table 2 for a summary.

Transforming: Vision

The institution provides leadership to its learning community, providing innovative and creative access and opportunities to learning and the management of learning, maximising the contribution of ICT to realise the institution of tomorrow, today. The institution sees itself as network centred, providing a physical place to learn as well as web based learning spaces, accessible anytime, anywhere by students and staff.

Transforming: Philosophy of Learning and Pedagogy

The emphasis is upon the whole learner in all aspects of their learning, emphasising critical thinking skills and well-founded decision making. The student is responsible for his or her own learning. Learning is experiential, with learning pathways and learning styles continuously changing to meet learner requirements. The use of ICT to investigate and explore new approaches to learning is expected.

Transforming: Development Plans and Policies

The institution and learning community has used ICT to creatively rethink and renew the learning environment of students and staff, including the development planning and policy making processes. The plans seek to support continuous change and renewal, striving to provide truly differentiated and individualised curriculum for all students, seeking to maximise achievement. ICT funding is as essential as is the funding for basic utilities such as water and power. Effective, accessible and inclusive ICT enable learning environments are mission critical to all staff, students and learning communities.

Transforming: Facilities and Resources

A whole institutional learning and ICT infrastructure providing ready access to innovative learning environments and contexts. The facilities and resources are designed and enabled to support continuous change and development of approaches to learning, the management of learning and technology.

Transforming: Understanding the Curriculum

The curriculum is enabled by an understanding of the learning needs of every student informed on a continuous basis by management of learning systems. The students' ICT literacy is assumed to readily enable learning within a personalised curriculum. The curriculum normally uses virtual and real world, real-time contexts and modelling. The students are involved with solving real problems.

Transforming: Professional Development of Institution Staff

The focus in on learning and the management of learning with specific ICT training provided when it is required. The teachers' development is self-managed, informed by a well-founded personal vision and plan, supporting the institution's overall vision and the needs of the learners. The teacher accepts he or she is a co-learner, learning with their students. The teachers' are committed to professional development as a continuous critically reflective process.

Transforming: Community

The community is a natural partner actively involved in all aspects the staff and students learning processes, providing the real world contexts through which learning takes place. The institution is a learning resource for the whole community, offering access to the local and global learning environment with physical visits as well as virtual by the Internet. The institution is as much a part of the community as the community is a part of the institution, the boundaries are indistinct to the observer.

Table 2. Areas of ICT-development, second part

Approach	Understanding of the curriculum	Professional development for institution staff	Community	Assessment
Emerging	ICT Literacy Awareness of software Responsibility of individual teachers	Individual interest	Problem driven Accidental	Equipment based Budget orientated Discrete subjects Didactic Paper and pencil Controlling Closed tasks Responsibility of individual teacher.

Approach	Understanding of the curriculum	Professional development for institution staff	Community	Assessment
Applying	Applying software within discrete subjects Use of artificial and isolated contexts	ICT applications training Unplanned Personal ICT skills	Seeking donations and grants	Skills based Teacher centred Subject focused Reporting levels Moderated within subject areas
Integrating	Integration with non-ICT content Integrated learning systems Authentic contexts Problem solving project methodology Resources based learning	Subject specific Professional skills Integrating subject areas using ICT Evolving	Subject based learning community providing discrete, occasional assistance, by request. Global and local networked communities	Integrated Portfolios Subject oriented Learner centred Student responsibility Multiple media choices to demonstrate attainment Moderated across subject areas Social, ethical as well as technical
Transforming	Virtual and real time contexts, new world modelling ICT is accepted as a pedagogical agent itself	Focus on learning and management of learning Self-managed, personal vision and plan, Institution supported	Broad based learning community actively involved business, industry, universities, vocational institutions, voluntary organisations. Global and local, real and virtual Institution is a learning resource for the community – physically and virtually	Continuous Holistic – the whole learner Peer mediated Learner centred Learning community involvement
Transforming (continued)	The curriculum is delivered by the web as well as by staff	Innovative and creative Integrated learning community – students/teachers co-learners		Open ended Project based

Transforming: Assessment

The students' are responsible for their own continuous assessment to inform and plan a personal curriculum, matched to their preferred learning styles. The assessments are moderated between students as well as between teachers providing a holistic view of the whole learner across the curriculum. The student maintains a portfolio of all of their work on the network. The students' attainments and preferred learning styles determine the institution's curriculum and policies. Staff and student assessments determine the management of learning.

STAFF DEVELOPMENT

Teacher training and professional development are essential to establish the use ICT in the professional life of teachers. These are also tied to the approaches that are identified for ICT institutional development:

a) Emerging;
b) Applying;
c) Integrating;
d) Transforming.

Emerging

In this approach the focus is on the technical functions and uses of ICT and on the need for some knowledge and representation of the impacts of ICT systems as a whole. This approach often involves teachers own personal use of ICT, such as, the use of word processing to prepare worksheets; finding learning resources on CD-ROMs or on the Internet; communicating with friends and family be e-mail.

A. Emerging ICT Skills and Knowledge

Here teachers are developing their ICT literacy, learning how to apply ICT to a range personal and professional tasks. The emphasis is on training in a range of tools and applications and increasing their awareness of the opportunities for applying ICT to their teaching in the future.

Applying

In this approach the teachers use ICT for professional purposes, focused on improving subject teaching to become able to enrich their own ways of teaching with a range of ICT applications. This approach often involves the teachers integrating ICT to teach specific subject skills and knowledge; beginning to change their pedagogy; using ICT to support their own training and professional development.

B Applying ICT to the Teachers' Subject Area

Teachers have confidence in a number of generic and specialised ICT tools that can applied to the teaching of their subject area. The opportunity to apply ICT in all of their teaching is often limited by the lack of ready access to ICT facilities and resources, hence it is not fully integrated into all lessons for all students.

Integrating

In this approach ICT integrates in all aspects of professional life to improve the learning and management of learning processes. Integrated ICT supports active and creative teachers, able to propose and manage the learning of students, integrating a range of preferred learning styles and uses of ICT in achieving similar goals. The integrating approach often involves teachers integrating different knowledge and skills from other subjects easily into project based curricula.

C Integrating ICT to improve Learning and the Management of Learning

Teachers are fully integrating ICT in all aspects of their professional life to improve their own learning and the learning of the institution's students. The teacher uses ICT to manage the learning of the students and themselves. They use ICT to assist all students to assess their own learning in achieving specific personal projects. It is natural to collaborate with other teachers to solve problems and to share experiences as they become able to tell and analyse their own experiences (meta-competencies). ICT are not a problem, it is an opportunity.

D Supporting Integration by a "Resource Person" for Teachers and Students

Integration of ICT into a institution needs (as in all other areas) human resources to support users work and needs. Hence, there must be experts or specialist teachers who will spend a great amount of time acting as "resource persons" or ICT co-ordinator. Without this human support, integration will

not take place, whatever good the other factors are allowing ICT use and integration.

Transforming

In this approach teachers and other institution staff need not to be convinced of the value of ICT personally and professionally. Teachers and students will expect a continuously changing pedagogy designed to meet their personal learning objectives.

The above approaches are not a necessary hierarchy, they are intended to illustrate the approaches to ICT confidence and competence that many teachers go through, before they begin to transform their practice and the learning of their students. Integration is leading to transformation, the teachers and students will expect a continuously changing pedagogy designed to meet their personal learning objectives, at the same time as the teacher will also be expecting to be supported as they develop their pedagogy. The anxiety of the teacher will no longer be the technology, it will be the understanding of learning processes.

PROGRAMME FOR STAFF DEVELOPMENT

In (Anderson & Weert 2002) a programme for staff development is worked out that may also be used for staff development in Higher Education. Here we just give an overview over the programme described there.

A. Emerging ICT Skills and Knowledge

Here teachers are developing their ICT literacy, learning how to apply ICT to a range personal and professional tasks. The emphasis is on training in a range of tools and applications and increasing their awareness of the opportunities for applying ICT to their teaching in the future.

ICT literacy is not really different for students and for teachers: the basic concepts of understanding and using ICT do contain the same elements. These elements do have a parallel with the (European) Computer Driving License. Of course the actual use of ICT will be different for teachers and for students. Table 3 gives an overview over the relevant elements. More information is to be found in (Anderson & Weert 2002; Section V.). An ICT literate teacher should be familiar with all the elements of ICT Literacy.

Table 3. ICT literacy

A1	Basic Concepts of ICT
A2	Using the Computer and Managing Files
A3	Word Processing
A4	Working with a Spreadsheet
A5	Working with a Database
A6	Composing Documents and Presentations
A7	Information and Communication
A8	Social and Ethical Issues
A9	Jobs and/with ICT

Important points to not forget

- At this stage, psychological or affective factors are very important. One of the main goals is to decrease the fear about computers, showing the novice they are able to use a computer. Confidence is as important as competence.
- The majority of the professional life of the teacher is at home. Many of the basic skills relevant at this stage are of value for their personal life. The confidence and competence may be learned through autonomous work, using carefully prepared learning materials and, if possible, some distance interactions through appropriate communication tools.
- To support teachers to use ICT in their classes, and as much of their work takes place at home, they have to be encouraged. For example, to buy computers for teachers to use at home, to certificate their new competencies, to provide opportunities make mistakes.
- At this stage many teachers are affected by serious motor-skill difficulties. The very basic motor skills need to be mastered before development of the skills to use ICT tools: this is about confidence and self-esteem.
- Beginners have not only to become able to use ICT tools and environments, but to understand basic principles about architecture, file managing, e-mail transmission. Hence, it is important to provide correct representations about the computing systems and ICT they are expected to use in their institutions, not the theory of what may happen.

B. Applying ICT to the Teachers' Subject Area

At this stage teachers have confidence in a number of generic and specialised ICT tools that can applied to the teaching of their subject area. The opportunity to apply ICT in all of their teaching is often limited by the

lack of ready access to ICT facilities and resources, hence it is not fully integrated into all lessons for all students.

There are general competencies, common to all the uses, whatever the subject area. The focus of training and professional develop will need to focus upon these areas as teachers technical confidence and competence grows and they are seeking ways to improve their teaching.

Examples of general competencies:

- Be able to decide why, when, where and how ICT tools will be contribute to the teaching objectives and not provide a distraction; to choose from among a range ICT tools the ones which are the most appropriate to stimulate students learning.
- Be able to manage a class-based learning environment using team work to achieve teaching objectives.
- Be able to decide when whole class or group multimedia presentations will be useful.
- Be able to analyse subject specific multimedia educational software
- Be able to prepare students to find, compare and analyse information from the internet and from other sources specific to the subject area.
- Be able to choose and use appropriate tools to communicate, according to the teachers' own objectives, with colleagues or with their own students.
- Be able to assess communication to use teaching situations to facilitate collaboration.

More information is to be found in (Anderson & Weert 2002; Section V.).

Important points not to forget

- At this stage, the emphasis is on the use of generic or specialist tools to improve teaching, in a particular subject area.
- Teachers working together in the same subject area can work together in their institution to share their ideas and the learning resources they have prepared.
- The teacher needs to able to assess the contribution of ICT tools to subject skills and knowledge.
- At this stage teachers need to develop their pedagogy as well as further developing their technical confidence and competence.
- The teacher will still want to control the teaching and learning processes to ensure the lesson will be a success: they will only experiment as their pedagogy develops.
- The teacher is likely to use ICT in lessons that they know they are successful in teaching: this can sometimes lead to frustration, as the

lesson was not as good. It is good to suggest ICT be used where they know the lesson could be improved, and then if it goes wrong it is not as worrying.

C. Integrating ICT to improve Learning and the Management of Learning

At this stage, teachers are fully integrating ICT in all aspects of their professional life to improve their own learning and the learning of the institution's students. The teacher uses ICT to manage the learning of the students and themselves. They use ICT to assist all students to assess their own learning in achieving specific personal projects. It is natural to collaborate with other teachers to solve problems and to share experiences as they become able to tell and analyse their own experiences (meta-competencies). ICT are not a problem, it is an opportunity.

There are general competencies and abilities common to all approaches to the integrating ICT in to learning and the management of learning. The focus of professional development will be on the pedagogic confidence and competence of teachers, building upon their previous training and professional development in applying ICT to teaching. The professional development in this stage will be encouraging teachers to collaborate in developing their curriculum and identifying innovative pedagogy. The opportunity for students and teachers to experiment to identify preferred learning styles and differentiated pathways is encouraged. Integrating ICT across the curriculum to enhance learning and the management of learning leads teachers to an understanding of how to transform their practice and the learning of their students.

General competencies including and building on those at the applying stage:

- To understand why, when, where and how ICT tools will be contribute to the learning objectives; to choose from among a wide range ICT tools the ones which are the most appropriate to stimulate students learning.
- To manage whole institution and classroom based environments, and team work to achieve learning objectives.
- To integrate multimedia presentations into whole class, group or individual teaching and learning to increase access to learning programmes.
- To analyse multimedia learning environments.
- To support students to find, analyse and synthesise information from disparate internet and institution based learning environments.

- To integrate a range of communication to collaborate with colleagues, with students and other learning communities beyond the institution.
- To use ICT more and more efficiently, continuously taking part in professional development and participating in pedagogical experiments and developments.

Important points not to forget

One of the roles of a teacher is to help students to transform information, which is everywhere and in enormous amount on the Internet, into knowledge, which only exists in human brains, and into the wisdom to transform their own lives and the communities to which they belong.

As ICT put the stress on teamwork and collaboration for the teachers, teacher training and professional development will be organised not for individuals but for teams, that are local and global, where learners are co-learners.

D. Supporting Integration by a "Resource Person" for Teachers and Students

Integration of ICT into a institution needs (as in all other areas) human resources to support users work and needs. Hence, there must be experts or specialist teachers who will spend a great amount of time acting as "resource persons" or ICT co-ordinator. Without this human support, integration will not take place, whatever good the other factors are allowing ICT use and integration.

Sometimes this person is also the one who actually teaches informatics at a lower or advanced level. But this task can also be taken care of by another teacher. Also, the more specialised ICT curriculum Units in vocational education will be taught by specialised teachers. We do not fully describe the demands for actually teaching the subject informatics or vocational ICT subject, because that would lead to vast description which also depend very much on legislation and curriculum objectives in the different countries.

Here we will elaborate on the more essential role of the « resource person » or ICT co-ordinator:

- Collaborate with the management and administration;
- Be responsible for the policy towards technical infrastructure;
- Support teachers in integrating ICT to their own practices;
- Give support to team projects;
- Promote ICT uses inside the institution and to facilitate these uses;
- Support some specialised student activities with ICT;

- Go on with his own professional development.

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Educational innovation & ICT

Giving direction to policy at the University for Professional Education Utrecht

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Abstract: The University for Professional Education Utrecht is working on innovation in education and in particular the role which ICT can play in this. In the Informatics Policy Plan 2001-2003 it is made clear that as a result of social developments changes are urgently needed in education. ICT is an important tool in creating a rich learning environment as well as in creating the necessary conditions: the use of ICT makes it possible to organize educational processes differently.

Key words: change, community learning, communities of practice, employment perspective, innovation, learning environment, management, Lifelong Learning, policy, professional development, sustainable development, vision

ACKNOWLEDGEMENTS

This paper is a revision of the position paper 'Educational Innovation & ICT' (March 2003) that was written by 'the Education and ICT Knowledge platform' of the University for Professional Education Utrecht. Contributors were: Paul van der Aa, Marijke Hezemans, Hans van Keken, Geert Kinkhorst, Ton Koenraad, Magda Ritzen, Pim Schonk, Sipke Span, Pete van der Spoel, Rien van Stigt, Peter Verweij, Albert Visser, Bauke van der Wal and Tom van Weert.

POLICY PLAN ON INFORMATICS

The Informatics Policy Plan 2001-2003 of the University for Professional Education Utrecht describes among other things why there is a need for change in education and the principles on which this can be based. These issues give direction to educational innovation. A short description of these issues is given below.

Issues

The workforce is changing

The workforce which is needed is changing: knowledge workers. Social developments are taking place which compel the university to make changes in the education it offers. Information and Communication Technology (ICT) often plays an essential but also obvious role in this.

The student population is changing

The student population (target group) is changing: lifelong learning. Business and institutions in the professional field served by the university require knowledge workers whose main task is to acquire and process facts and information. They work together in (often multidisciplinary) teams. A large measure of independence and responsibility is expected of them. ICT is of great importance: in office equipment and communication tools, but also in field-specific ICT applications.

The curriculum and its organisation are changing

The curriculum programme and its organisation are changing: from supply-based to demand-based. This applies not only to the educational process itself but also to the way education is organized, the administrative and managerial organisation. A shift is taking place from the designing and implementing of curricula and courses to the organisation and facilitating of learning processes. The programme is arranged so that the student can actively acquire competencies together with others. Students share in decisions about how and where their education will be realized. As in the professional field, ICT facilitates organisation and the exchange of information.

The teacher role is changing

The teacher's role is changing: from the transmission of knowledge to the organisation of learning processes. This sort of learning demands new forms of supervision and assessment. The teacher's role becomes that of coach in a shared learning process and an expert to be called on when needed. ICT resources are a basic requirement for communication between teachers and students and among students, as well as for finding, acquiring and processing the necessary information. As in businesses and institutions increasing use is made of GroupWare applications, including digital learning environments.

Competitive necessity

In conclusion it can be said that social developments compel the need for change. The University for Professional Education Utrecht will have to increase the trend towards more individualization and flexibility. The university will have to strive towards diversification in target groups, more combination of learning and working, and more assignments commissioned from the field. These ambitions will have to be realized in a cost effective manner.

In some fields this could lead to competitive advantage. But above all it is simply a necessity for continuing to operate in a fast-changing education market, where slowly, but surely, more and more international players are coming into the field. In these terms, it is not so much a matter of competitive advantage, but of competitive necessity.

Principles of change

Further on the Informatics Policy Plan contains the following principles of necessary change:

Primary focus is on learning

The starting-point is always education, students' learning, the learning process. The desires and needs arising from this determine the priorities in the strategy.

Diversity in development

The need for change applies to every study programme, but not in the same way and at the same tempo. Each study programme in the university

has its own individual student population and professional field and realizes its education in its own way. There is diversity between programmes, also because there are differences in the phase of ICT development in the professional field and in the programme. The phase of development determines the approach which is chosen for the further use of ICT in the study programme.

Broad strategy and deep strategy

The university intends to accomplish the necessary changes along two lines: a broad strategy and a deep strategy. The broad strategy aims to raise the level of ICT to the minimum necessary level across the whole range of the institution. Examples of this are: bringing the ICT knowledge of all staff members up to a basic level; and in all programmes students learn to work with the ICT resources which are used in the professional field. The deep strategy involves innovations in which staff are leaders in ICT developments within the scope of the desired changes. Characteristic of all these activities is that they are not tied to a specific study programme or subject. Subjects and problems belonging to a particular subject or programme fall under the responsibility of the management of the departments or faculties concerned. Questions which are independent of the subject-specific context fall under the domain of the university which serves to benefit the institution as a whole. These innovative activities serve as an example for other programmes and teachers.

EDUCATION & ICT KNOWLEDGE PLATFORM

The Informatics Policy Plan described in the first section of this paper ends with an Action Plan (Hogeschool van Utrecht, 2001). One of specified actions was the setting up an Education and ICT knowledge platform. This platform aims to make a meaningful contribution to the realization of educational innovation and ICT at the University for Professional Education Utrecht within the frameworks which have been described above.

In the preceding period three themes in relation to educational innovation and ICT were of central importance on the platform's agenda:

- Vision on ICT and higher education;
- Change management;
- Professional development in education and ICT;

These three themes are interlinked: *vision* gives direction to the *management of change* and the way in which professional development is approached; *professional development* is needed to realize educational

innovation. Because these three themes figure in every discussion of educational innovation and ICT, the platform decided to work them out in more detail, within the framework of the current Informatics policy plan, and to use them to define the terms of the professorship in Education and ICT and to advise and guide the university's policy.

VISION ON ICT AND HIGHER EDUCATION

ICT is not an end, but a means

The use of ICT can never be an end in itself. ICT after all is just a means for designing more effective and efficient forms of education. How this takes place within the educational organisation depends a great deal on the phase in which the organisation finds itself. The position of ICT within an educational organisation is also greatly determined by its vision on education. In effective higher education students develop into starting professionals by carrying out assignments in the role of a starting modern professional (Weert 2004).

This form of education has the following characteristics:

1. The work field is involved in the educational programme: in the formulation of competencies, the formulation of (study) assignments, in providing assignments, giving feedback on students' results and in making a contribution to the assessment and development of knowledge;
2. Students form themselves a picture of the competencies and professional expertise which a professional needs to possess. They are helped not only by gaining insight into relevant competencies for the profession (and professional expertise), but also by establishing the level of the competencies they have already acquired. Within an individual (study) path they make a personal learning and working plan in which they indicate which competencies they will acquire and which educational means they will use to do this. ICT can support this in the following ways:
   - Digital support for the study plan;
   - Online information about competencies;
   - Self-assessments;
   - Peer assessments;
   - Digital portfolio.
3. Working is learning, learning is working: students achieve results through working at professional assignments. These are assignments in which students work as professionals; the activities they carry out are recognizable as belonging to the profession; they are motivating and

provide ample opportunity for learning. Through working at these assignments (and reflecting on them) they build on their own existing knowledge and on the knowledge of the organisation. ICT can support this in the following ways:
- Availability of digital tools, instruments etc.;
- Online information about assignments, criteria, possible learning aids, methods of work etc.;
- Communication between student team members; work on shared documents;
- Means of communication for feedback (from fellow students, other students, coach or the professional field) to improve quality;
- Development of an individual 'toolkit' for students (instruments, examples, checklists, etc.).

4. Students are provided with professional facilities and tools to carry out the assignments. In carrying out assignments they are coached and supervised by teachers. ICT can support this in the following ways:
   - On-line question time;
   - Internet site with FAQ's;
   - Discussion forum, in which the professionals involved in the assignments, can also take part.
5. Students are assessed using professional standards and criteria. The assessment is based not only on the final result but also on the method used to reach the results.

Departments and faculties will make a choice from ICT-possibilities. This choice will need to be adjusted to the current situation of a department. Issues such as the degree to which the educational concept is carried within the department, the current use of ICT and the level of professionalism of teachers will all influence this choice. Each department will thus have its own tempo for arriving at effective education in which ICT has an appropriate place.

ICT and change in educational processes

As well as being used to support educational processes ICT can also be used as an instrument of change. Using ICT makes it possible to organize educational processes differently. This means that educational organisations can manage their processes in a more efficient and effective manner and can achieve aims which were previously deemed impossible.

The use of ICT means that learning situations will evolve in the organisation in which the role and position of ICT as a supporting resource will change over the course of time. The development of applications surrounding ICT has not yet been finalized after all. This means that it is not

possible to indicate the end point (if there is one). It can however be stated that ICT developments will continue and that they will become more and more important for the organisation and the learning process. Future generations of students will also have much more experience in the area of ICT than previous generations. They will have grown up with the use of many various forms of digital communication such as the successors to MSN, SMS and e-mail. Educational departments will need to be aware of these new channels of communication if they want to reach this group adequately. Higher professional education will therefore have to continue to invest in staff and resources in the area of ICT in order to adapt its processes further to the professional field and the students.

What education will be like in the more distant future is as yet unclear. We are convinced however that students will have to be addressed as starting modern professionals. It is from this perspective that the use of ICT in education will need to be shaped.

ICT and the people in education

The picture of innovative education, which has been painted here - in which there is optimal use of ICT - has far-reaching consequences, not only for students, but also for teachers, supporting staff and educational managers. Because of their changing role, the people who provide education will have to develop new competencies. For teachers this means that, as well as the traditional roles of explainer, trainer and fountain of knowledge they will also have to fulfil the role of coach of learning processes, as well as designer of assignments and learning resources. And all of this will take place more and more in a digital learning environment. Not only will materials (texts, presentations, training programmes, tests) have to be made available digitally, but supervision will also take place for an important part through the internet. For designing assignments and materials the teacher will have to know how to navigate through electronic information and increasingly to communicate electronically with colleagues and the professional field. After all - as described earlier - teachers will be developing the programme together in teams. An additional factor here is that when students are confronted more and more with realistic assignments derived from the professional field, which they carry out in a rich learning environment, the programme will not be able to be delivered by a single subject-specialist. Not only the students, but also teachers will become team-players.

For the supporting staff it is equally necessary that they are competent at dealing with computer applications: from the multimedia centre to the office,

information is digitalized and the processes for working with information have been automated.

Finally for management it is important that a vision exists of the way in which the changes in society, and particularly the changing demands in the professions for which they are educating people, will influence the content, organisation and processes of education. The organisation will have to remain alert to this and make sure that staff always has the necessary competencies and that enough innovation time is available.

CHANGE MANAGEMENT

According to Arendt (1963) a real revolution always displays two characteristics. Every revolution wants to achieve something new, take a step forward, while at the same time giving a new meaning to the concept of freedom. The digital revolution certainly meets these two requirements. The digital hippies communicated through the internet on their trendy Apples and created a totally new idea of open communication and the experience of freedom in a virtual world. It is also the fate of revolutions, alas, that their original fervour fades; leaders become corrupted and changes get bogged down in bureaucratic discussions and schemes. But the digital revolution thought it could escape from this. One of its most important differences to the grand political revolutions is that the digital revolution has no real leaders, but a bottom-up character and a strongly anti-hierarchical tendency. Katz (2001) argues that, in spite of this, the revolution has stranded. The internet has fallen prey to balkanization and commercialization, and the idea of open communication and open media is as far off as before the revolution. The long path through the institutions seems then the only solution to achieve change. Change, it seems, does not follow automatically from a new fervour, but has, perhaps, to be managed?

Three level change

Digitalization offers the educational organisation enormous possibilities, in regard to both subject-content and methodology. It is not surprising that the application of the achievements of the digital revolution in an educational organisation such as the University for Professional Education Utrecht, are often initiated from the bottom up. The decentralized and anti-hierarchical character of the internet after all invites experimentation at the lowest possible level. This micro level is the level of a single class in a particular programme or institution. It is often individual teachers who

initiate this sort of experiment on the basis of their own understanding and involvement.

At the middle level, changes in education which can lead to improvement and even cost-saving are always welcome. As long as it is only experimentation which is involved there is little attention or involvement from department and faculty management: the middle level. It would appear, however, that it is exactly this involvement which is crucial for the further implementation of change.

Departments and faculties are not islands; the university is an association at the macro level. As far as ICT is concerned the macro level concerns itself mainly with technical provisions. But, for change to be implemented and decisions to be taken, this level also needs to become involved in content.

The implementation of change needs to be structured and supervised so that the three different levels can work together and support each other. The middle level is the key element in all change.

Towards the desired situation

In the vision described before, the desired situation is already imagined: what is implied in effective education, how students are facilitated and how ICT supports these developments. The perspective of the university as a centre of life-long learning lies within easy reach but can only be achieved through phased change (in steps and in leaps): directed evolution

With regard to the implementation of *stepwise change* it is mainly the faculties and departments who are responsible (middle level); the university has a facilitating role here (macro level).

Leap frog change should lead the way to this step-by-step change. It is especially here that the university can demonstrate its organisational advantage. A condition here is that the leaps do not overstretch the limits of the leaping 'frog'.

In the development of ICT in the study programme various phases can be distinguished: *emerging, applying, integrating, transforming* (IFIP, 2000). Realistic leaps in ICT-supported learning have to keep within these phases to be feasible. Taking the perspective of the university as regional knowledge portal and centre of life-long learning feasible leaps are summed up in Table 1.

Table 1. Feasible leaps in educational innovation with ICT

Leaps	From of learning	Student's role	Teacher's role	Role of ICT
Present situation	Traditional, assignment based	Reproductive	Presenting content; controlling	Presenting content; controlling
Leap 1	Task-based learning in teams	Executive	Coaching; controlling	Application in tasks
Leap 2	Problem-based, virtual projects	Tactical and executive	Coaching; maintaining standards	Integrated, allowing flexibility
Leap 3 University as knowledge portal	Situation-based; virtual knowledge organisation	Strategic, tactical and executive	Coaching, consulting, designing	Integrated, transforming,

To keep change under control it needs to be managed, with the kernel of control at the macro level. Macro actions include:

1. The vision of the university for the future is made operational in the Strategic Plan;
2. The vision is translated into operational models of teaching and learning according to the phase of development of the institution;
3. Suitable change management;
4. Methodical design, development and implementation of actual programmes; organisation of knowledge creation and recycling (Communities of Practice 'lessons learned');
5. Phased and controlled development of an ICT-basis (infrastructure, applications, ICT-competencies);
6. Organisation of knowledge-building and professional development.

Vision and educational concept

First of all it is important that the faculty/department has an educational concept that is broadly shared and in which the position and function of ICT is clearly defined. The educational concept describes the basic underlying principles of the study programme, and these form the parameters for the further development of the programme. The educational concept makes a bridge between the programme and professional practice: the practice in which the students will eventually function, whether this is the professional practice of the accountant, the physiotherapist or the teacher.

In an educational model claims are made about issues such as:

- The importance of competencies, the relation to the professional profile and the way in which competence development is approached (through

real professional situations or situations which are as similar as possible to the profession);
- The degree to which students are responsible for their own development of competencies and the way in which this is realized;
- The acquisition of competencies in the programme/ practical study;
- The degree to which the curriculum is supply or needs-based;
- The organisation of the curriculum (project-based, division into modules);
- Assessment policy: it is generally known that students direct their activities according to the way in which they will be tested.

The practice of the profession for which students are being educated stands as a model for the practice of teaching and learning within the programme.

Giving form to change management

Educational innovation and ICT can bring with them big changes in the way programmes develop: in the manner of learning and supervising, as well as in the organisation and supporting facilities. This demands attention from management. There is a great deal involved and a great deal to be dealt with. It is important that department/ faculty management acts as an initiator of change and that it facilitates and actively follows the changes which are initiated.

Success factors in this are:
- Developing new forms of teaching and learning needs to be 'learnt'. This can best be achieved by supporting 'developers' 'on the job': it is through doing that people develop the necessary competencies;
- The introduction of competence-based learning with ICT is complex. This can best be managed by keeping ambitions limited and realistic: in other words by beginning small and in this way acquiring a feeling for the kind of problems which can emerge, moving from experiments and pilots towards implementation;
- Success is important for motivation: are all those involved motivated and kept sufficiently informed? It is important to check whether everyone has the same expectations and whether there is unanimity about the educational concept and the role which ICT can play in this;
- All those involved need to be kept informed of what is expected of them in the change process. Make sure that there is an action plan which is made accessible to all and which is approved by the department management. It is very de-motivating if management or others who are involved are not interested in the progress and results of the change which has been initiated. Through the presentation of interim results or

the organisation of reviews in which the methods of work and the (interim) results are justified, those involved are informed and have an opportunity to provide input;
- The management needs to make sure that there is an open atmosphere in which there is a self-evident place for the justification of choices made (by all).

Change management demands organisational efforts and time at micro-, middle- and macro-level.

PROFESSIONAL DEVELOPMENT

Starting point in thinking about the role of ICT in education, is that the use of ICT only has a chance of succeeding if it is linked to the needs created by educational innovation. New education means new roles and tasks for teachers; the question then is what ICT can contribute in this.

Professionals and professional development

In general a professional is someone who caries out an occupation for their living. The theme group professional development defines a professional as a skilled worker who carries out their work according to standards which have been established for the occupation as a whole. The standards need to be of a high level determined by the profession as a whole, the participating students and the workplace. Professionals must be able to justify themselves at all times to this forum.

Being a professional in education means then that members of the occupation group: teachers and support staff (IT specialists, librarians etc) produce work of demonstrably high quality according to norms which apply to their professional group. Professional development is the process by which professional practitioners continue to qualify themselves as a result of changing circumstances. In higher education these changing circumstances have a sharp impact; among these, ICT, now an essential element in society, makes new approaches to education possible. The professional educationalist must take advantage of this.

A professional is someone who wishes to continue developing and who is enabled to do this, in order to be able to accept the challenge of new problems in his or her occupation in a changing world.

The University for Professional Education Utrecht will have to increase the trend towards more individualization and more flexibility. The university will have to strive towards diversification in target groups, more combinations of learning and working, and more assignments commissioned

from the field. This demands a great deal of the professionalism of staff: they must be able to develop and facilitate education which meets these changing circumstances. All those involved in higher education are undergoing a shift in the roles which they fulfil in the educational process.

In their new roles teachers can make use of the new possibilities offered by ICT. There are however also obstacles to overcome: many of the professionals currently working in the educational process are not yet aware of the possibilities of ICT and will thus tend to do new things with old tools. In particular teachers who are still place themselves at the centre of the educational process will need effective support (of course this also applies to their superiors and the supporters themselves).

How can the university support its staff in becoming modern professionals? In the university's 'Action Plan Taskforce Education' is written that every teacher must possess basic ICT skills by July 2003 and that 60 percent of teachers must by then have developed the competence to create learning environments rich in ICT. Meanwhile it is now March 2003 and these results are still far from being realized. Professional development is not easy!

ICT skills and educational development

When it comes to educational innovation and ICT a distinction is often made between ICT skills (basic skills) and the competencies needed to develop and deliver an educational programme, in other words: to facilitate students in becoming modern professionals. These competencies presuppose knowledge of the possibilities offered by ICT in developing learning environments and in communication with (among others) students. These also presuppose knowledge of the use of ICT in the professional field. ICT skills are necessary to develop innovative education. In the past attempts have been made by departments to make it obligatory for teachers to gain their 'Digital Driving License' (certificate of basic ICT skills). But this generally met with great resistance. Learning things that are not immediately relevant, is counter productive. For the development of basic ICT skills it is more efficient to adopt a sort of Buddy system. Teachers in the workplace help each other to solve concrete questions such as: How do I make a table in Word?; How do I set up a spreadsheet?

It would be useful if people with specific IT expertise within a department were known and could be consulted for specific questions: the department *cyber buddies.* In fact this would simply be confirming existing practice: everyone is always complaining about the standard courses and boasting about the wonderful colleague in the next room (but in the same corridor) who is so clever with Word (lnternet, or whatever) and who you

can always bother with the craziest questions and who can always help you right there and then.

As well as support from a buddy 'on the job' there is also a need for supportive training in relation to the role of the teacher as developer and coach, as a support in ICT environments. These demands for training could be realized through a personal development plan being made by teachers who have a development task.

To find out who can take on the role of cyber buddy and which people have experience with specific aspects of educational innovation, it is useful to have an overview of the expertise which is available among university staff. This could be achieved in different ways: through a knowledge management system (a skills bank): a dynamic database with advanced search technologies representing knowledge development in the university or through the university's intranet on which every staff member (and student) can present themselves on a homepage. As well as skills banks, Communities of Practice can also play an important role in the exchange and development of expertise.

Communities of Practice

In various places within the University for Professional Education Utrecht there are people working on educational innovation in their role as a developer or coach. Educational innovation has many aspects and it is often difficult to get a grip on what exactly you want, how you will realize it, how it fits into faculty or department policy and how it can be organized within a time framework. A great deal has already been published on the subject of educational innovation, ICT and how this and that can be implemented. This literature can provide a good basis but often provides too little concrete information to actually get going. It is precisely in the contact with colleagues that all kinds of experiences emerge which give something concrete to go on in practice. Such an exchange of experience is important: it provides not only support and inspiration but can also lead to new ideas, new experiences and new knowledge.

A Community of Practice (CoP) consists of a group of people who share a common interest in a certain subject and who want to exchange these experiences and information. The members of the community meet to address shared problems.

The aims and results of the community are set up by the members. The community exists for as long as it benefits its members. The exchange between the members is supported by 'face-to-face' meetings and a digital environment. A community can vary in size. The size depends among other things on how important it is for people to know (trust) each other and the

wish to develop knowledge together. Communities need time to come into bloom and they may benefit from support from an expert (moderator) and an instigator (facilitator). The university thinks it important that there is sharing of knowledge and development among its staff, and has thus reserved a sum for the moderator and facilitator. An important success factor for participants is that the CoP benefits them and provides something which is directly useful in practice. A CoP must therefore be closely linked to members' activities otherwise it becomes 'extra' and the energy which is put in is greater than what is produced.

CONCLUSION

In this paper we have described the way in which the University for Professional Education Utrecht is working on innovation and ICT, supported by a university policy and a vision on society and education.

Just as everywhere else in the world, we started years ago with small innovations that were 'invented' by the lonesome pioneer who did something with nice IT-tools. But there was never time and money to take a proper look at the results and go on with it.

Thanks to setting out a policy as well as a vision, motivated choices are being made on what is important in education and what the role of ICT should be. Management of change plays a key factor in innovation. Change can only be realized when the three university levels (macro, middle and micro) interact, set out plans, experiment and implement. Change can also only be realized when people are allowed to learn -as professionals- on the job. We have yet a long way to go, but as workers we learn and as learners we work.

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Keyword index