

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 diverse 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

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<i>Motivation</i>	\leftrightarrow	<i>Sustainability</i>
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).

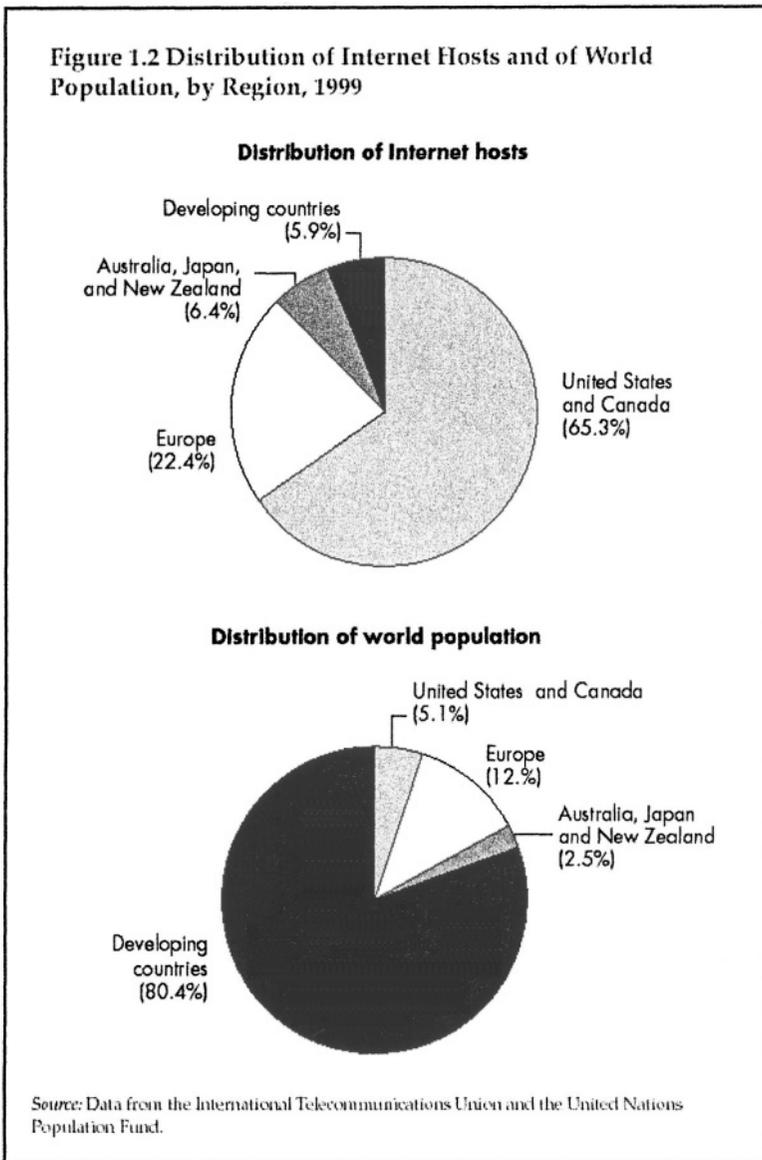


Figure 2. Distribution of Internet host and of world population

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

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“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.

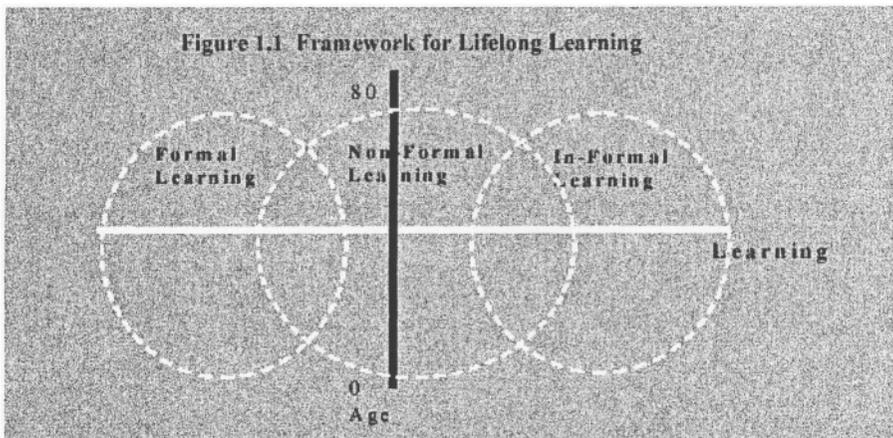


Figure 3. Framework for Lifelong Learning

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/wh/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 & Caneshan 1998) 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 difference, 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 and 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 habits) 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 be 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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