

The Future of ICT and Learning in the Knowledge Society.

Executive summary

The need for a new vision of learning in the Knowledge-based Society

At the European Council in March 2000 in Lisbon, Europe set itself a strategic goal for the next decade “to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion”. To achieve this ambitious goal, Heads of States and Government asked for “not only a radical transformation of the European economy, but also a challenging programme for the modernisation of social welfare and education systems”. This was then translated into specific actions such as those under the Education and Training 2010 programme in order “to improve the quality and effectiveness of EU education and training systems; to ensure that they are accessible to all; and to open up education and training to the wider world.”

To realise these objectives, it is acknowledged that a fundamental transformation of education and training (E&T) throughout Europe is needed. This transformation must encompass all the ingredients that make up current education and training systems. A recent mid-term evaluation of the modernisation of E&T recognises that progress is being made by the Member States, but observes that further steps towards realising change for the development of the Knowledge-Based society (KBS) need to be taken.

There is an urgent need for change, not only to maintain existing levels of education and training in the population, but also to develop the new skills and competences required if Europe is to remain competitive and grasp new opportunities. The development of the information society and the wide-spread diffusion of Information and Communication Technology (ICT) give rise to new digital skills and competences that are necessary for employment, education and training, self-development and participation in society.

Technologies, especially ICT, have a particular role to play in realising these changes. It is difficult and almost impossible to imagine a future learning environment without some sort of ICT, at the forefront or in the background. There is growing awareness in Europe that a new vision of “ICT and learning” is needed that takes into account the shifts and trends that are transforming the way people work, learn, make sense of their world and have fun in a digitalized, networked and knowledge-based society. Preferably, this vision would be realised through a proactive strategy that would envisage and anticipate future learning needs and requirements, rather than an adaptive strategy where reactions to new requirements would be made as they arise.

The objectives of learning

Most debates on the future of learning are focussed on the instrumental objectives of learning, related to the adaptation of learning institutions and the labour force to the requirements of the knowledge economy. Addressing such instrumental concerns is already a serious challenge for all stakeholders involved and, as mentioned above, much still needs to be done to make the necessary changes for the development of the knowledge-based society. But there is more.

Learning is also important for its contribution to emancipation, empowerment and self-fulfilment of people. Learning objectives such as social competence, critical thinking, knowledge sharing and cooperation techniques need to be pursued as well.

A reflection on the future of learning in the KBS should not only tackle the instrumental questions but also raise the more theoretical, normative and ethical issues related to learning and education: What do people need to know and learn? Why do we need to learn? What kind of society do we envisage when we expect people to have certain skills and competences? Such questions would also be more in line with the pro-active strategy mentioned above.

An holistic approach to learning: ICT-enabled Lifelong Learning

Thinking about the future of learning in the knowledge-based society needs to be holistic as learning will become a lifelong activity that cuts across different learning generations and life spheres such as private, public and work. The focus should therefore be not only on traditional formal learning institutions such as schools and universities; and existing training organisations and training practices for both the unemployed and employed, but it should also embrace other forms of adult education, informal learning and also learning to use ICT.

Living in a knowledge-based society driven by the wide-spread diffusion of ICT does indeed give rise to the need for acquiring new digital competences and ICT skills. The European Commission has already identified “digital competence” as a “key competence” that individuals need to acquire for personal development, active citizenship, social inclusion and employment. It is important to acknowledge this and to confirm that it is not only about “ICT literacy”, i.e. learning to operate the technology, but also about higher-order skills such as knowing and understanding what it means to live in digitalized and networked society. This applies not only to learners but also to teachers and training staff.

Trends and challenges affecting future learning in the Knowledge-based Society

There are a number of trends and challenges that are expected to shape future learning in the knowledge-based society. Some of the technological trends, in particular Information Society Technology (IST) trends are:

- Broadband internet access that is becoming widespread;
- Weblogging, Short Message Service (SMS) and Multimedia Message Service (MMS) that are becoming major sources for personalisation of information and for connecting with others such as friends and now increasingly also friends of friends (social software);
- The rise of podcasting (both audio and video) that provides opportunities for mobile learning via portable digital media players;
- The availability and use of open source software and open source content (e.g. Wikipedia), and the unlimited and cheap storage of digital information;
- The rise of new internet-native content players that experiment with content services that have clear educational implications.

Other major IST-related technological trends are infrastructure convergence (integrating broadcast, phone, data and other networks), the rise of alternative wireless technologies (e.g. Wifi), content/media convergence (newspapers, music, TV, blogs...), multi-modal devices (e.g. new mobile phones: pictures, email, movies, play radio and... phone). Last but not least, there is the European vision of the future information society labelled as “Ambient

intelligence” that encompasses the above by connecting humans, machines and sensors in heterogeneous and ubiquitous networks and by making them user-friendly and people-centric.

Technological trends and challenges will have to match those social trends and challenges that Europe is facing and that have important implications for learning, now and in the future. There is the emergence of new skills and competences, as mentioned above, and also other trends such as the diversification of life trajectories and everyday life practices (e.g. flexible working hours) that are drivers for flexible, module-based learning. The need for adult learning, possibly enabled by ICT, is also confirmed by demographic evolution. Natural population growth and net migration will not be sufficient to satisfy the knowledge-economy demand for tertiary level educated people. It will therefore be necessary to involve and possibly re-skill more elderly people.

Budgetary pressure on education and training could result in under-investment in the quality of education and could give rise to a privatization trend focussing on high-quality and prestigious but expensive educational programmes. Investing in ICTs for learning could be perceived as an additional cost although they have a significant cost-saving potential as well. There is concern, however, that greater efficiency in education and training could result in less equitable outcomes for all.

Globalisation will also affect learning by encouraging the privatization of education. Established educational brands will compete for the best students world-wide. ICT-enabled learning could, however, also allow students to access high quality education, without the need to move abroad. But while education is affected by globalisation, its implementation usually is local, regional or national. An important challenge for EU policymaking – while respecting subsidiarity – is to align educational systems and curricula in Europe but also to stimulate cross-border learning.

Innovative applications of ICT for learning

This report presents examples of innovative applications to illustrate how ICTs are used and could be used in future learning environments and how they possibly could contribute to making learning better, different, more interesting, pleasant, and more relevant than it is today. These are experience-based learning via immersive virtual worlds; experimental learning via computer-generated simulations; pedagogic veils (products that teach people how to use them) and pedagogic learning objects; cognitive repair and support for people with special needs; Podcasting, Blogging, social proximity and synchronous learning; and Learning Content Management Systems (LMCS).

The potential of such systems will however be greatly increased if they would incorporate a vision of future learning that takes into account the shift towards a digitalised and networked KBS whereby learners become co-producers in the learning process, and not just receivers of learning content; whereby flexibility, user-friendliness (for both teachers and learners) and different “digital” learning styles are combined; and whereby learning is a social process and not an instructorless computer-generated individual activity. More elements of this vision are raised below but it is worthwhile insisting that such ICT potential will only be realised if accompanied by the necessary social and institutional change.

ICT-enabled learning and inclusion

There is already considerable risk that disadvantaged groups and marginalized people will not be able to benefit fully from the new opportunities offered by ICTs, either as competent users

of ICTs in general or as learners and trainees in particular. Therefore, dedicated efforts are needed to make sure that everyone is able to acquire the necessary digital competences in the information society and to learn and develop other key competences via ICTs for participation in society. The formulation of learning objectives for emancipation and empowerment are essential preconditions for inclusion, well-being and success in the KBS.

An example would be a “Lifelong Learning Membership Card” that connects learners throughout their lives with educational institutions, or a “Brain Gymclub” where people can go to keep their brains fit. The problem is that such clubs tend to be exclusive rather than open to all. However, ICT-enabled learning could also be inclusive as it could provide learning opportunities to more people, especially disadvantaged people, families and groups. But this will not happen automatically. People would only be motivated to start learning again or to continue learning if it makes sense in their everyday lives, social contexts and social networks. This could pave the way for associating ICT-enabled lifelong learning initiatives with other social inclusion policies. Of course, the need for a good, basic education for all continues to be as urgent and fundamental as ever.

Learning spaces: A vision of future learning

This report also presents a future vision of learning, called “learning spaces”, that embraces both the potential of ICTs and some of the new requirements for learning in the future. It constitutes a step towards nailing down requirements for learning in the future. It would consist of the following elements:

- Learning spaces are *connecting and social spaces*: Since learning is a social process, it needs to bring different actors together to share learning experiences. Learning spaces are both physical and virtual spaces that favour a learner-centred learning model but connected with the other actors involved in learning and with other social networks. As such learning spaces should also link learning individuals with learning communities, organisations and even learning cities and learning regions.
- Learning spaces are *personal digital spaces*: Every learner should have a personal, digital learning space where all learning material is accessible; anywhere, anytime, anyway (multiple devices and media). This personal space would allow the learner to go back and forth, without losing track of what has been learnt in the past. It would broaden the pedagogical scope to a more holistic approach to learning, providing the personal digital space is secure and private.
- Learning spaces are *trusted spaces*: Learning spaces provide trust and confidence (e.g. on quality and reliability) in a world where learners are connected digitally, and where learning content is co-produced and shared. Thus, it would also embrace the tacit aspects of knowledge creation based on human interaction and human values and experiences.
- Learning spaces are *pleasant and emotional spaces*: ICTs could make learning content more attractive (media-rich virtual environments) and learning more emotional (by connecting people); and transform the learning process into a pleasant and emotional experience. Many existing learning settings do not invite people to learn. The current focus is more on the transmission of knowledge, than on learning objectives and learning outcomes.
- Learning spaces are *learning spaces*: This is not a tautology. Even within the frame of lifelong learning, there is a time to learn and a time to do other things. Learning spaces could help to differentiate between these different moments.
- Learning spaces are *creative/flexible spaces*: Learning spaces should be creative spaces, rather than focussing exclusively on reproducing knowledge. Learning spaces

would also need to be flexible in combining different learning modes and learning styles, depending on the learning object, the learner, the teacher, the environment, etc.

- Learning spaces are *open and reflexive spaces*: Future learning spaces would need to be open and module-based, enabling people to plug-in again whenever they can. Future learning should enable reflexivity. It should give people the chance to develop the necessary cognitive and affective capabilities to think and reflect upon their own lives and upon living in the modern world.
- Learning spaces are *certified spaces*: Future learning can only be different from learning today if the current accreditation systems and learning assessment systems are adapted to the requirements of the knowledge-based society. The acquisition of ICT skills, digital competence and other new skills, be it through formal or non-formal education, should be demonstrated, evaluated and also certified. This would be an incentive for all stakeholders in the learning process.
- Learning spaces as *knowledge management systems*: The strength of most organisations lies in its people, hence the need to share experience and knowledge amongst colleagues, within the organisation, and even across organisations. Learning spaces could become informal platforms for organisational knowledge management. This could also involve people more closely in human resource management as it helps to put the right person in the right place, at the right time.

The vision of learning spaces puts learners at the centre of learning, but, at the same time, conceives learning as a social process. Learners become co-producers in the learning process and not just consumers of learning content. Guidance and interaction therefore continues to be very important. The role of teachers, tutors and/or trainers will change rather than disappear. It will require dedicated efforts to train and involve them in developing their changing role in the learning process. Learning spaces are not instructorless computer-generated spaces without interaction and community building.

Realising the change

Technological change is fast and full of opportunities but also unpredictable and full of uncertainties, while pedagogy and learning institutions require some stability and certainty to deliver quality and equitability in education. This creates tensions that make it very difficult to manage and implement change in institutionalised learning environments. That is why it is important to acknowledge and take into account that technology alone, however powerful, cannot bring about the necessary change. The potential of new technologies can only be realised when they work with, or rather, are embedded in, a social context that is open to innovation and supported by a favourable policy environment. This also explains why it always takes more time to realise technological change than expected.

People and institutions are not by definition hostile to change, but there should be sufficient incentives to make change attractive. New requirements for learning also demand dedicated efforts to “teach the teachers” and “train the trainers”. The new skills and competences that teaching and training staff must acquire are not only related to ICT literacy, but also to dealing with a learning audience that becomes more diverse in terms of age, ethnicity, language, etc. Moreover, teachers and trainers need to learn to teach differently as learning become more flexible, dynamic and personalised. Many people believe that ICT could be a catalyst for change while it is, at the same time, not the overall solution. In addition, also technological progress is needed so that it meets the expectations.

Future research challenges

Many different areas in the realm of ICT-enabled learning need specific research on how to address the many challenges summarised above. Socio-economic research could focus on the role and contribution of ICT when clarifying the fundamental objectives of future learning, on its impact on cognition and cognitive abilities, on the links between e-identity, self-appreciation, privacy and learning; and on the embedding of learning into ICT mediated daily practices and time patterns. The interrelationship between ICT-enabled learning and social inclusion also requires specific research efforts

Technological research challenges are related to the realisation of the above mentioned elements of learning spaces (e.g. supporting intuitive learning, flexible learning, the merging of physical and virtual learning environments, smart learning content) and to the challenges for learning anywhere, anytime and anyhow (or rather, to learning at the *right place, right time* and *right moment*), especially within the frame of lifelong learning. Learning to learn for life is also something we will have to learn.

Dedicated research efforts are also needed to better understand and manage change in general, and on how to let ICTs play the role of catalysts for change in particular. This includes a re-examination of curricula and assessment and accreditation mechanisms; with a special focus on change agents and leadership. The right change would provide many opportunities for more and better learning, education and training in the knowledge-based society. A different vision of future learning is emerging and research is needed to better understand it while it is in the making.