E-LEARNING, THE 21 CENTURY SKILLS AND THE FUTURE OF SMART LEARNING: PERSONALISED LEARNING

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Abstract

This paper describes a current smart educational solution and how it can be used in educational processes, what the relationship between the smart learning, twentieth first century skills and e-learning.

The paper aims to highlight advantages for using a smart educational system as a support for the twentieth first century skills and e-learning in the knowledge management. The paper emphasizes the relations between e- learning, smart education and twentieth first century skills and knowledge management. The economic process end product of the smart education is the professional competence, a set of knowledge acquired by a person who uses them to take part in other economic processes. The input in this economic process is represented by people who accumulate knowledge and skills through the educational system. Living in a knowledge-based society driven by the wide-spread diffusion of ICT(Information, Communication, and Technology) does indeed give rise to the need for acquiring new digital competences and ICT skills.

The paper also looks at changing technology, especially the emergence of ubiquitous computing and the development of social software. The researchers believe that we are coming to realize

that we cannot simply reproduce previous forms of learning, the classroom or the university, embodied in software. Instead, we have to look at the new opportunities for learning afforded by emerging technologies.

Keywords: E- learning, ICT skills, smart education, personal learning environments

1- Introduction:

It has been proved that computer is a very useful tool which may be used for teaching and learning in an improved way than the conventional method. Our society is undergoing profound changes with a resulting increase in the demands being placed upon the educational system. At the same time, technology is opening up new possibilities for when and how learning can take place.

If it is accepted that this is a time for enormous change, then, from a learning point of view, an important question to be addressed is 'what are the skills that people should be equipped with in order to live fruitfully in such a dynamic environment?' Obviously an appreciation of the significance of ICTs and skills in their use is a key requirement, but again this question should not be addressed solely in a narrow technological context (UNESCO, 2005).

ICT has to play a rde in supporting learning in the information age context. It argues that ubiquitous learning technologies, such as the Internet, multimedia and virtual environments, have a key role to play in a flexible, broadly constructivist learning paradigm where the focus is on learning with technology, not learning about technology.

Now the application of ICT is being worked out in many areas but some areas are yet to get the full benefit of it and education is one of the those (De Meo et al, 2003).

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The paper will start by looking at the changing face of education and go on to consider the different ways called ‘net generation’ which use technology for learning. We will go on to examine some of the issues around E-learning, Personal Learning Environments and the emergent trends in the way smart education are being introduced.

To prepare students for a business environment and help them to gain the skills and knowledge, our educational system needs to become more instrumented, interconnected and smart. From this point of view, all over the world, several changes exist. Using smart systems to support teaching and to deliver education and training is one way to make some change. This solution will add new dimensions in educational activities (Gamalel-Din, 2010) and the graduated students will contribute to the success of their communities.

Technology innovations that occur each day and the complexity of the present technology based society, that uses modern electronic communication devices and channels have generated a constant growth as volume (Yi-chen, 2005) and diversity for services or activities in various fields.

Using a smart educational system, according to the latest data published by IBM in 2010 (Education for a Smarter Planet, 2010), teachers can analyze students data electronically from academic results, to information regarding mobility and attendance.

A smart educational system is based on three elements:

- interconnection: sharing different technology resources used in education;
- instrumentation: accumulation of necessary data;
- intelligence: making decisions that enhance the learning process.

A smart educational system can provide the tools and the understanding needed to make smarter decisions that affect the entire system. The system can provide data systems that collect, integrate, analyze and present reports on key performance factors such as attendance, evaluation criteria and transfers. Also, in

competitive environments like twentieth first century skills and e-learning environments, educational organizations must take marketing decisions (Filip, 2011) to become more visible and more attractive.

The benefits of smart educational systems for parents, students, and academic staff are:

- understand student attendance patterns;
- gain a complete view of student progress;
- quickly identify problems in the student's academic evolution;
- identify strategies to help students to gain skills and qualifications needed to find a job.

On the other hand, for the educational system, the benefits can be:

- accelerate innovation;
- accelerate knowledge creation;
- accelerate economic impact of science with powerful tools for researchers.

The clusters economic model and in particular the smart education is based on knowledge. The economic process end product of the smart education is the professional competence, a set of knowledge acquired by a person who uses them to take part in other economic processes. The input in this economic process is represented by people who accumulate knowledge, skills going through the educational system. These people are then absorbed by businesses that will use their experience to produce goods or other knowledge (Bătăgan, 2011).

The educational process is continuous, and even if individuals gain high skills and qualifications they will pursue the idea that through continuous training they will be more efficient and will have more opportunities and possibilities for their professional evolution.

E- learning is more than an information environment. It enables the students to do their own exploration into the wealth of information and resources. It also allows learners to determine their individual pace of study with a set of tools that enables

personalization of content and allows them to choose the way in which they learn most effectively. The combination of the communicative features, access to resources and the integration of various media leads to unique learning experiences whereby students have the luxury of comprehensive learning experiences, from synchronous learning to threaded discussions then to self-paced study, all involving a combination of various strategies (Wilson, 1996).

The inherent characteristics of e-learning also support the current and the accepted constructivist learning theory of knowledge construction where learning is student-centered rather than teacher-centered, and the teaching activity is interactive rather than deductive (Agostinho et al, 1997). The role of the teacher changes from that of the content expert to the facilitator of knowledge construction while the student's role is no longer that of a passive listener but more of an active collaborator (Idrus & Atan, 2002). This proposed teaching process is more on collaboration and interactivity rather than traditional drill and practice with the knowledge construction being brought about through transformation of facts and ideas rather than the accumulation and retention of facts (Jaiballan & Asirvatham, 2002). Any e- learning environment must include the combination of text, graphics, audio, video, animation, virtual environment and other multimedia aspects. The integration of all these media exposes the students to a very rich learning environment that can even outshine the level of understanding they might obtain from a classroom (Bransford et al, 2000).

A shift from a traditional to a progressive model of education has led to an increased interest in learners' individual differences. The new paradigm is student-centered, inclusiveness, cooperative learning, which encourages diversity. Furthermore, technology is seen as having the potential to enhance the capabilities of the learner and the teacher (Montgomery, 2001). Several earlier studies attempt to correlate learning styles and computer/Internet

related activities; however none to our knowledge related multiple intelligences and e-learning preferences. For example, Montgomery (Carver et al, 1999) asserts that multimedia can be used to address learning styles more effectively than traditional teaching methods. In February 2002, The Times Educational Supplement reported that there is growing evidence from research in [e-learning] that certain strategies...will enhance teaching and learning - just as certain tactics and strategies do work in face-to-face pedagogy. The article emphasized that successful e-learning must involve a mixture of course design issues and pedagogical issues. In order to entice students to participate, a course must offer group activities, structure, stimuli, cajoling by tutors and peers...[and] a purpose or a reason to go online (Lally, & Wallington, 2002).

The importance of instructional strategies to the success of the online environment has precipitated the creation of best practices guidelines for all aspects of the instructional process, including the planning and management of online instruction, online teaching techniques, and online student assessment and evaluation techniques.

In 2003, the Consortium presented Bill Pelz, a Professor of Psychology at Herkimer County Community College, Pelz shared his three Principles of Effective Online Pedagogy in a 2004 report.

Pelz‘s first principle is to let the students do (most of) the work. As he asserts, the more quality time students spend engaged in content, the more of that content they learn. Pelz provides specific examples of activities for which the students do the work while the professor provides support (Hargreaves & Shirley, 2009):

- Student Led Discussions
- Students Find and Discuss Web Resources
- Students Help Each Other Learn (Peer Assistance) + Students Grade Their Own Homework Assignments + Case Study Analysis

The second principle is that ―[i]interactivity is the heart and soul

of effective asynchronous learning, but Pelz stresses that interaction must stretch beyond simple student discussion (OECD, 2000).

Pelz‘s final principle is to ―strive for presence. According to Pelz, there are three forms of presence for which to strive in online learning environments: Social Presence, Cognitive Presence, and Teaching Presence. These ideas are described in detail in Pelz‘s report:

1. Social Presence: When participants in an online course help establish a community of learning by projecting their personal characteristics into the discussion they present themselves as real people. There are at least three forms of social presence:

a. Affective. The expression of emotion, feelings, and mood.
b. b. Interactive. Evidence of reading, attending, understanding, thinking about others‘ responses.
c. Cohesive. Responses that build and sustain a sense of belongingness, group commitment, or common goals and objectives.

2. Cognitive Presence: The extent to which the professor and the students are able to construct and confirm meaning through sustained discourse (discussion) in a community of inquiry.

Cognitive presence can be demonstrated by introducing factual, conceptual, and theoretical knowledge into the discussion. The value of such a response will depend upon the source, clarity, accuracy and comprehensiveness of the knowledge.

3. Teaching Presence: Teaching presence is the facilitation and direction of cognitive and social process for the realization of personally meaningful and educationally worthwhile learning outcomes.

The technology integration concept is part of the Syrian Education ministry agenda that exposes students, teachers, administrators and parents to ICT in every aspect of education at the administrative and classroom levels. This concept also aims to systematically change the education system from rote learning and examination-

oriented culture to a thinking and creative knowledge culture. School classrooms in this programme feature such technology-enablers as individual desktop personal computers, multimedia computer laboratories, video conferencing systems and high-speed Internet connections. Learning will thus be self-directed, collaborative, individually paced, continuous and reflective, utilizing teaching, materials that are not only limited to printed books, but also include electronic books, multimedia software, courseware catalogues and databases. But this project will not succeed if we well not understanding what the real relationships between e_ learning and technology integration.

2- The Role of Networks in Supporting Innovation:

The argument is built upon the premise that, in education as in other fields, networks have a key role to play in supporting innovation and development. Accordingly, networks need to be regarded as support structures for innovative schools – facilitative, too, of the dissemination of both 'good process' and 'good practice', overcoming the traditional isolation of schools, and challenging traditional hierarchical system structures through lateral leadership and learning norms.

In the past, most school systems have operated almost exclusively through individual units set within hierarchically designed structural forms. Such isolation may have been appropriate during times of stability, but during times of rapid and multiple change there is a need to 'tighten the loose coupling', to increase collaboration and to establish more fluid knowledge flow in order to foster responsive structures. Networks are a means of doing this – and one for which there is an ample evidence base from other public and private sector organizations seeking to respond to the twin challenges of the knowledge economy and the associated iniquitousness of change (OECD, 2000).

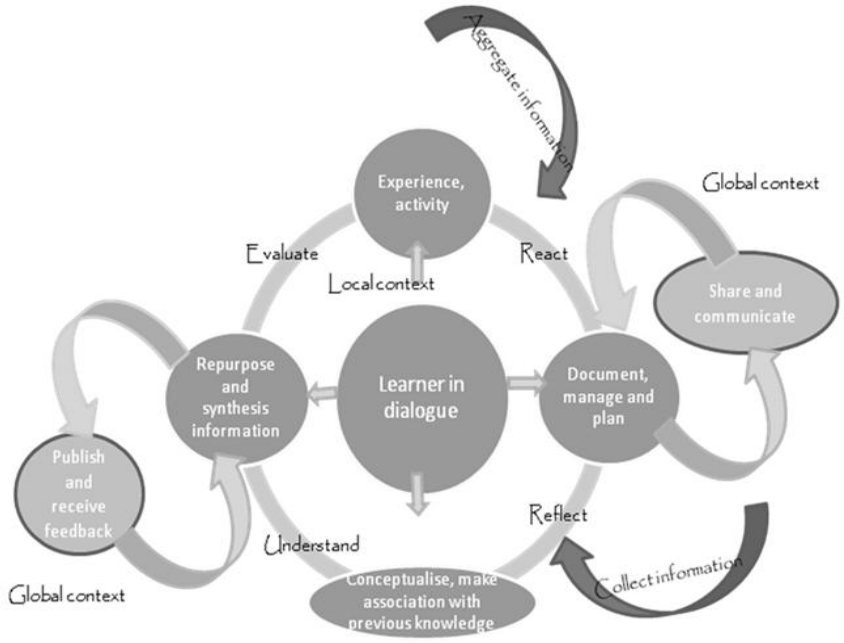

Figure (1): The model of learning in a personal learning environment, Kop 2010

Networks are locations in which specialized knowledge can be created and transferred within collaborative team contexts. Senge (1990 cited in OECD2000) emphasizes team learning and team skills rather than individual skills and individual learning as being the key to competitiveness. The OECD research (cited above) suggests that the move towards learning organizations is reflected in changes both in firms' internal organization (internal networking) and in inter-firm relationships (external networking). Within firms, the accelerating rate of change makes multi-level hierarchies and strict borders between functions inefficient. The report goes on to suggest that to build schools as learning organizations may be one of the major challenges for the future. New findings from the

learning sciences are bringing about changes to how educators understand learning. Education is in a time of transition in which older models of teaching and learning live side by side with new understandings of how people learn, new curricula, new knowledge, new pedagogies and new technologies. Entrenched images of schools as places in which information is dispensed to students through a one size fits all curriculum and testing regime no longer fit with new findings about learning (Sawyer, 2008) see figure (1).

In addition, inexpensive, ubiquitous networked digital technologies, with an accompanying increase in freely available online content, are straining a system of education that was created for societies in which information and content were scarce. As leaders consider the role of networked digital technologies within their schools, it is important for them to focus their attention beyond merely the ability to access and retrieve information in the form of content. While the quality of content and information literacy are important, "The concept of knowledge societies encompasses much broader social, ethical and political dimensions" (UNESCO, 2005). "What really matters in the new age, isn't information at all. What is really significant is the relationships between people, and between people and organizations, that are made possible by the new modes of communication" (Gilbert, 2005).

Creating schools and school districts for today requires educators who are attuned to the demands of a knowledge society (UNESCO, 2005). Learning is a key value in knowledge and innovation societies, for "what people learn, how they learn, and what they do with what they learn, is of primary importance" (Friesen, 2009). Acknowledging this fact will mean that schools will need to broaden their focus from managing information exchanges to engaging learners, all learners— youth and adult alike—in collaborative knowledge building activity (Bransford et al, 2000, Gilbert, 2005, Hargreaves, 2003, Hargreaves & Shirley, 2009, Jardine et al, 2006, Papert. 2 0 04, Chatterjee, & Dhande,

2004, Scardamalia, 2003, Wagner, 2006). From within school structures and processes designed to meet the needs of the industrial past, educational leaders are called upon to invent new learning environments, new education systems to address our contemporary society. It is becoming clearer to many leaders, that simply improving the current one size fits all system will not get their districts to where they need to go.

3- 2 1st Century Learning:

More and more leaders recognize that the competencies needed to thrive in today's society are different than those needed for industrial societies. However, for some, it is not that change is needed but rather, the nature of the changes being asked for that remains somewhat elusive. In many regards, this is to be expected because 21st century learning is not a single thing requiring a singular change. Rather, it is a multifaceted idea, consisting of advances from the learning sciences, combined with advances in networked digital technologies.

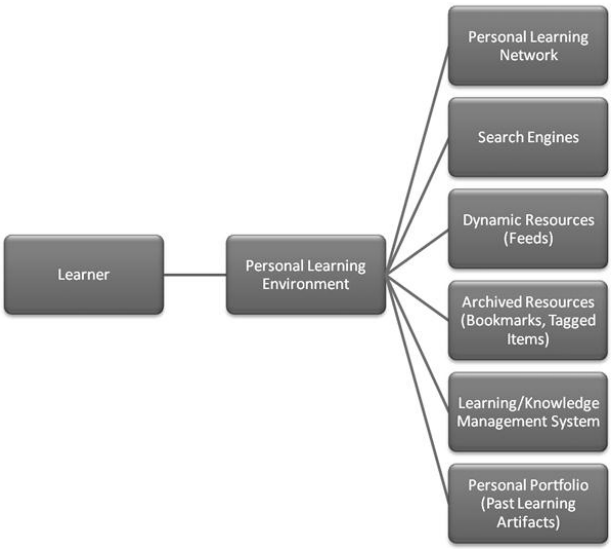

Figure (2) the learner in a personal learning environment

We have identified several documents that we believe will be useful in order to: i) grasp an understanding of 21st century learning, and ii) illuminate some of the ways they might make progress towards creating 21st century organizations.

1. Binkley et al. (2010) working with the research group, Assessment and Teaching of 21st Century Skills (ATC21S), approach 21st century learning through a focus on the following skills: "Ways of thinking; Creativity and innovation; Critical Thinking, Problem Solving, Decision Making; Learning to learn, Metacognition (knowledge about cognitive processes); Ways of working; Communication; Collaboration (teamwork); Tools for working; Information literacy; Information and communication technology literacy; Living in the world; Citizenship - local and global; Life and career; Personal and social responsibility including cultural awareness and competence" (Binkley et al, 2010).

Embedded in this list of skills are a number of research findings from the learning sciences. However, to fully understand the impact of this list of skills on learning it is important to understand these skills within the context of knowledge building classrooms, not as add on to existing timetables.

2. The U.S. Department of Education's national education technology plan (2010,4) "presents a model of 21st century learning powered by technology with goals and recommendations in five essential areas: learning, assessment, teaching, infrastructure, and productivity". This broader model of 21st century learning embraces advances from the learning sciences as well as the ways in which technology makes it possible for educators to enact these advances see figure (2).

•**Learning**: "The model of 21st century learning described in the U.S. Department of Education's (2010) national education technology plan calls for engaging and empowering learning experiences for all learners. The model asks that we focus what

and how we teach to match what people need to know, how they learn, where and when they will learn, and who needs to learn. It brings State of the art technology into learning to enable, motivate, and inspire all students, regardless of background, languages, or disabilities, to achieve. It leverages the power of technology to provide personalized learning instead of a one size fits all curriculum, pace of teaching, and instructional practices"(U. S . Department of Education, 2 0 1 0).

- **Assessment**: "The model of 21st century learning requires new and better ways to measure what matters, diagnose strengths and weaknesses in the course of learning when there is still time to improve student performance, and involve multiple stakeholders in the process of designing, conducting, and using assessment. In all these activities, technology based assessments can provide data to drive decisions on the basis of what is best for each and every student and that in aggregate will lead to continuous improvement across our entire education system" (U. S . Department of Education, 2010).
- **Teaching**: "Just as leveraging technology can help us improve learning and assessment, the model of 21st century learning calls for using technology to help build the capacity of educators by enabling a shift to a model of connected teaching. In such a teaching model, teams of connected educators replace solo practitioners and classrooms are fully connected to provide educators with 24/7 access to data and analytic tools as well as to resources that help them act on the insights the data provide" (U. S . Department of Education, 2010).
- **Infrastructure:** "An essential component of the 21st century learning model is a comprehensive infrastructure for learning that provides every student, educator, and level of our education system with the resources they need when and where they are needed. The underlying principle is that infrastructure includes people, processes, learning resources, policies, and sustainable models for continuous improvement in addition to broadband

connectivity, servers, software, management systems, and administration tools. Building this infrastructure is a far reaching project that will demand concerted and coordinated effort" (U.S. Department of Education, 2010).

- **Productivity**: "To achieve the goal of transforming education, we must rethink basic assumptions and redesign our education system. We must apply technology to implement personalized learning and ensure that students are making appropriate progress through our system. These and other initiatives require investment, but tight economic times and basic fiscal responsibility demand that we get more out of each dollar we spend. We must leverage technology to plan, manage, monitor, and report spending to provide decision makers with a reliable, accurate, and complete view of the financial performance of our education system at all levels. Such visibility is essential to meeting the goals for educational attainment within the budgets we can afford" (U. S. Department of Education, 2010).

3. After extensive consultation with Albertans and informed by current research, the Inspiring Education Steering Committee created a vision for education for 21st century learning (Alberta Education, 2010 a). This vision encompasses three qualities and abilities: engaged thinker, ethical citizen and entrepreneurial spirit.

- **Engaged Thinker**: "An engaged thinker is someone who thinks critically and makes discoveries; who uses technology to learn, innovate, communicate, and discover; who works with multiple perspectives and disciplines to identify problems and find the best solutions; who communicates these ideas to others; and who, as a lifelong learner, adapts to change with an attitude of optimism and hope for the future" (Alberta Education, 2010b).
- **Ethical Citizen:** "An ethical citizen builds relationships based on humility, fairness and open mindedness; who demonstrates respect, empathy and compassion; and who through teamwork, collaboration and communication contributes fully to the community and the world" (Alberta Education, 2010b).

•**Entrepreneurial Spirit**: "An entrepreneurial spirit creates opportunities and achieves goals through hard work, perseverance and discipline; who strives for excellence and earns success; who explores ideas and challenges the status quo; who is competitive, adaptable and resilient; and who has the confidence to take risks and make bold decisions in the face of adversity" (Alberta Education, 2010a).

4- 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 organizations 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.

5- 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. 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.

6- Information society technological trends:

Important and possibly disruptive trends can already be observed today which will shape the future of ICT-enabled learning. The focus is on presenting briefly the technology trends:

- Broadband Internet access is becoming more widespread, especially in well-advanced economies, driven by peer-to-peer file sharing and always-on features. The combination of large bandwidth and permanent access can impact the way learning content is consumed and shared with others;
- Weblogs or blogs are becoming a major source of information and communication for Internet users. In combination with RSS (Real Simple Syndication), which is also becoming mainstream, they provide a powerful tool for Internet users to personalize and actualize content and information on the web, with clear implications for learning;
- Podcasting could be a driver for mobile learning. Initially,

podcasting featured audio content (e.g. a radio programme) but video files are becoming more and more available via portable digital media players;

•Short Message Service (SMS) and the more recent Multimedia Messaging Service (MMS) are also becoming important providers of news content (especially eyewitness reports) and offer ways for people (and thus also learners) to be mobile and share information on the go. Wireless delivery and Mobile systems IEEE refers to the term M-Education as "a new conceptual paradigm in the use of mobile and wireless technologies for education". In the WELCOME project (Montgomery, 2001), Mobile Education has been defined as "any service or facility that supplies a learner with general electronic information and educational content that aids in the acquisition of knowledge regardless of location and time". The above definition would embrace devices such as laptop and palmtop computers, PDAs and even mobile phones. From this definition we can deduce that there are a variety of environments and methods that can be used in the activities of mobile education, (or m-learning as it is more popularly known). Such environments and methods would mainly include: PCs, laptops, PDAs and other computer systems linked through a W-LAN; Laptops, PDAs and other handheld computational devices working off-line with occasional synchronization (off-line mobile systems with synchronization); Laptops, PDAs, mobile phones and other handheld computational devices that can offer wireless connectivity (on-line mobile systems) see figure (3).

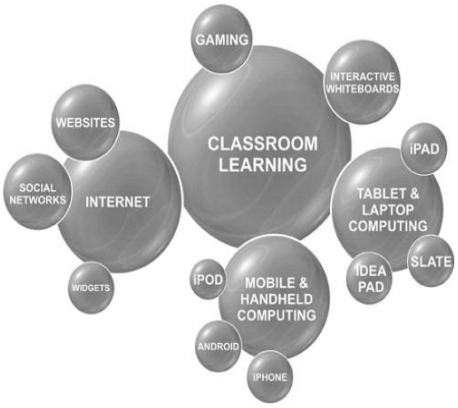

Figure (3): The information society technological trends

7- What does a Personal Learning Environment look like?

In the introduction I said that a Personal Learning environment was not an application. A PLE is comprised of all the different tools we use in our everyday life for learning.

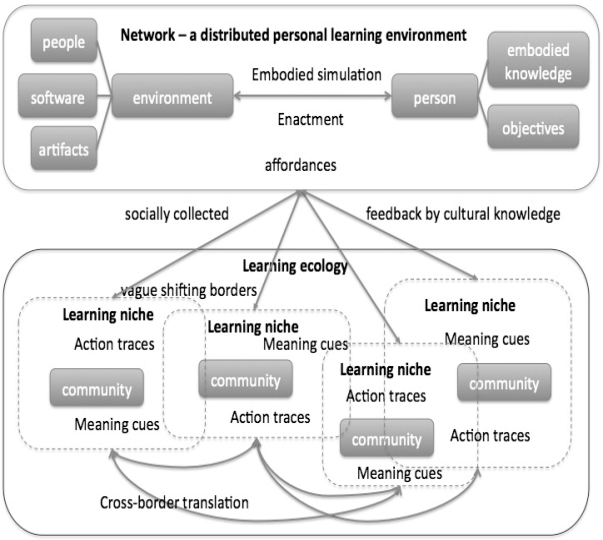

Figure (4): The Personal Learning Environment in the information society technological system

Many of these tools will be based on social software. Social software is used here in the meaning of software that lets people rendezvous, connect or collaborate by use of a computer network. It supports networks of people, content and services that are more adaptable and responsive to changing needs and goals. The development and support for Personal Learning Environments would entail a radical shift, not only in how we use educational technology, but in the organization and ethos of education. Personal Learning Environments provide more responsibility and more independence for learners. They would imply redrawing the balance between institutional learning and learning in the wider world. Change is difficult but it is probable that the rapid development and implementation of new technologies and social change make change in our educational provision inevitable.

8- A roadmap for enabling a future vision:

In the vision of the future, we imagine a world of interconnected education in which the following goals are possible:

- People routinely learn outside the classroom using the location, style, and device of their preference.
- Students are able to pursue a personalized path of learning and can document those experiences in a portfolio that follows them throughout their lifetimes.
- Teachers, learners, and administrators collaborate easily, although not necessarily face to face, and not necessarily in real time.
- Learning and administrative services are delivered across a virtualized, dynamic, cost-effective infrastructure.
- Life-long learning is integral to individual's careers and to the health of a region's economy

How will the educational continuum of the future unfold? Institutions can take the following technology-based actions today to prepare for this transformation:

- Create an open technology infrastructure
- Create an open environment for integrated data and processes

- Create a network of collaborative and shared services through open research and open learning.

9- Conclusion:

Modes of learning have changed dramatically over the past two decades—our sources of information, the ways we exchange and interact with information, how information informs and shapes us. But our schools—how we teach, where we teach, who we teach, who teaches, who administers, and who services—have changed mostly around the edges. The fundamental aspects of learning institutions remain remarkably familiar and have done so for something like two hundred years or more.

Last but not least, there is the European vision of the future information society labeled "Ambient intelligence" (or ubiquitous computing) that encompasses the above by connecting humans, machines and sensors in heterogeneous and ubiquitous networks and by making them user-friendly and people-centric. It also has implications for learning, for instance by facilitating social proximity and synchronous media-rich learning.

It is not our purpose to condemn traditional institutions but, we fervently hope, to be among those inspiring the kinds of change that will make our learning institutions better suited to the experiences, skills, goals, and ambitions of the young people they serve and who will be responsible for shaping the future.

Personal Learning environments are not an application but rather a new approach to the use of new technologies for learning. The argument for the use of Personal Learning environments is not technical but rather is philosophical, ethical and pedagogic. Moreover, Personal Learning environments can provide a more holistic learning environments, bringing together sources and contexts for learning hitherto separate. Students learn how to take responsibility for their own learning. Critically, Personal Learning environments can bridge the walled gardens of the educational institutions with the worlds outside. In so doing learners can develop the judgments and skills or literacy necessary for using new technologies in a rapidly changing society.

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