Digital Opportunities for Students and Teachers: Some Technological Solutions at the University Politehnica of Bucharest

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Abstract: The paper discusses the idea that high quality software can raise the standards of education at all levels and make best practices available throughout society. Using examples from the experience of the University *Politehnica* of Bucharest, the paper shows that software products give students control over their learning environment, that they can hold their interest and provide new and interesting learning experiences not available in a traditional classroom. The paper emphasizes positive experience in the use of *Information and Communication Technology* in education and training programmes. It is shown that ICT has helped improve the scope, quality and effectiveness of these programmes. The initiatives of the University *Politehnica* of Bucharest in this domain have enabled users of ICT to focus realistic training on the precise learning needs and abilities of the students. Furthermore, ICT has improved efficiency in the monitoring and overall management of the training process. The paper evolves the idea according to which the benefits already gained in industry can also be achieved in the public education sector, provided that the necessary investment in technical facilities and related training is made.

Key–Words: information, technology, communication, subjects, digital, education, qualification, proficiency, competency, standards

1 Introduction

In the Digital Age, the Information and Communication Technology qualifications, such as processing and handling of information, are becoming as important as the traditional basic qualifications: reading, writing and arithmetic. Therefore the students have to be ICT users. Furthermore, the rapidly increasing production of information in society makes a number of demands on the personal qualifications of the students. It is among other things a question about the ability of the individual to transform information into knowledge, to sort information, to cooperate, and to enter into a process oriented working method. Simultaneously it becomes necessary to revise the traditional idea of the role of the teacher. The role as organizer and distributor of knowledge is to be developed so that the future teachers can also act as guides and sparring partners (coaches) for the students [2]. At the same time the teachers have to be able to master the ICT tools themselves. In that connection it is also important to focus on the specific pedagogical possibilities, which become available with the use of ICT in the teaching. In this paper we emphasize that new pedagogical possibilities are to be explored and tried. Research and development are to be focused on and at the same time the means of exchanging information among students, teachers and management on the educational institutions are to be provided. As technical universities have a research role, the academic staff are often caught between conflicting needs to conduct their research and teach students. The paper is based on the educational experience at the University *Politehnica* of Bucharest. It is proven that technical universities must become more involved with the other links in the Education Chain. They have a role to play in the diffusion of new e-learning technologies and should be seen as the normal base for training all teachers.
The e-learning strategies adopted by University *Politehnica* of Bucharest (UPB) can be analysed from the perspective of three common objectives:

- widening access to educational opportunity;
- enhancing the quality of learning; and
- reducing the cost of higher education.

The most striking characteristic of the e-learning strategies adopted by UPB is its diversity, and inherent characteristic of adaptability in use and flexibility in application. The implicit compatibility with institutional aims suggests that the e-learning strategies

adopt and reflect, rather than influence, institutional ethos and that by virtue of the capacity to adapt to different contexts, e-learning may be more adaptable - and ultimately less threatening - to academic mores than some observers fear.

E-learning - the latest innovation in technology-based teaching - is more pervasive in use than its predecessors, due in large part to the ubiquity of the enabling technologies; and more diverse in application, due in large part to the changing environment in which university now discharge their traditional roles. From the outset of their involvement in e-learning, UPB has offered programmes in response to varied demands: for career-related qualifications, for professional development, for 'top-up' programmes that allow students to complete degree studies commenced years earlier, or more generally to provide opportunities for lifelong learning.

The impact of e-learning on widening access is positive; however, the effect on equity of access is more problematic, and dispersion of the enabling technologies is such that universal access through e-learning remains elusive. In spite of the potential of e-learning for widening access to university education, and the substantive progress to date, it is not yet clear that this positive effect will extend to equity of access.

A commitment to enhancing the quality of teaching and learning, especially for students on-campus, is a recurrent aim of university e-learning strategies - especially in traditional, research-intensive universities. Earlier modes of technology-based teaching were primarily used in distance teaching and, as a consequence, virtually all related research was predicated on a sharp dichotomy between contiguous teaching on-campus, on the one hand, and a distinctly different 'industrialised' mode of teaching, on the other. A dichotomy reinforced by self-evident differences in institutional mission.

In University *Politehnica* of Bucharest, enhancing the quality of teaching and learning in on-campus programmes, through the use of new technology, is a primary goal. A common approach is to use e-learning to supplement traditional teaching by providing an additional (sometimes optional) component in the teaching-learning process. In programmes of this kind, the primary focus is on the teaching of regular courses to conventional, on-campus students, enrolled in courses developed and taught by whole-time faculty, that lead to the normal degrees and awards of the university.

Programmes of this kind are typically an *integrated* part of the standard university curriculum, with e-learning employed essentially as a *supplementary* pedagogy for on-campus students. One of the older universities in Romania, UPB provides an interesting illustration of the development and integration of e-learning in on-campus teaching.

A university-wide strategy was developed around a traditional, campus-based perspective, with a primary focus on pedagogical outcomes. In keeping with a university-wide strategic approach, subsequent developments focussed on programmes, rather than courses, with systematic procedures for evaluation; central co-ordination by a university council; and the integration of educational, organisational, and technological support.

The experience of UPB illustrates how research on learning methods and instructional design, ultimately led to the adoption of a university-wide strategy for the pedagogic enhancement of campus-based teaching.

The initial commitment, with subsequent involvement in a wide and continuing range of technology-based teaching initiatives, has culminated in the extensive use of technology in teaching across the institution. The experimental use of technology, with a focus on pedagogical outcomes (grounded in the principles of instructional design), and university-wide strategy; has had a highly positive outcome. While on-campus e-learning strategies can vary in scope and focus, the creation of specialist centres (to assist in the development of programmes for the enhancement of teaching and learning on-campus) is a common, practical option.

The essential aim of the network is to develop and share online degree and certificate programmes to complement classroom learning on the campuses of participating universities, and to meet the needs of learners (including both on campus and distance learners). Courses are provided under the authority of the university or college that offers the programme. Each member institution is responsible for - and retains ownership of - its own courses; has full control over the courses it offers online, through the network; decides what fees to charge students; and is responsible for supporting students in their learning.

2 Education for an Information Age

Regardless of age, educational background and geographical location, all teachers are to have the opportunity of participating in a wide range of educational activities on a continual basis. This can become a reality through virtual educational programmes, where the physical presence is not imperative[5]. The proliferation of digital technologies has accentuated the need for creative thinking in all aspects of our lives, and has also provided tools that can help us improve and reinvent ourselves. Throughout the

world, computing and communications technologies are sparking a new entrepreneurial spirit, the creation of innovative products and services, and increased productivity. The importance of a well-educated, creative citizenry is greater than ever before.

Increasingly, nations are recognizing that improving education is the best way to increase wealth, enhance health, and maintain peace. But there is little consensus on how to achieve an educated population, or even on what it means to have an educated population. Every country in the world, it seems, has a plan for educational reform. But, in most cases, reform initiatives are superficial and incremental, and do not get at the heart of the problem. These initiatives often introduce new forms of testing and assessment, but leave in place (or make only small incremental changes to) existing curricula and existing teaching strategies. We need to reform educational reform. Instead of a centralized-control model (with a teacher delivering information to a roomful of students), we should take a more entrepreneurial approach to learning. Students can become more active and independent learners, with the teacher serving as consultant, not chief executive. Instead of dividing up the curriculum into separate disciplines (math, science, social studies, language), we should focus on themes and projects that cut across the disciplines, taking advantage of the rich connections among different domains of knowledge. Instead of dividing students according to age, we should encourage students of all ages to work together on projects, enabling them to learn from one another (and to learn by teaching one another). Instead of dividing the school day into hour-long slices, we should let students work on projects for extended periods of time, enabling them to follow through more deeply and meaningfully on the ideas that arise in the course of their work.

Much of what students learn in universities today was designed for the era of paper-and-pencil. We need to update curricula for the digital age. One reason is obvious: universities must prepare students with the new skills and ideas that are needed for living and working in a digital society.

There is a second, subtler reason: new technologies are changing not only what students *should* learn, but also what they *can* learn. There are many ideas and topics that have always been important but were left out of traditional school curricula because they were too difficult to teach and learn with only paper, pencil, books, and blackboard. Some of these ideas are now accessible through creative use of new digital technologies. For example, students can now use computer simulations to explore the workings of systems in the world (everything from ecosystems to economic systems to mathematical systems) in ways that were previously not possible.

When people think about education and learning, they often think about information. They ask questions like: What information is most important for people to know? What are the best ways to transmit that information from one person (a teacher) to another (a learner)? What are the best ways to represent and display information so that it is both understandable and learnable?

It's not surprising that people see a natural connection between computers and education. Computers enable people to transmit, access, represent, and manipulate information in many new ways. Because education is associated with information and computers are associated with information, the two seem to make a perfect marriage.

This focus on information, however, is limiting and distorting, both for the field of education and for computers. If we want to take full advantage of new computational technologies, and if we want to help people become better thinkers and learners, we need to move beyond these information-centric views of computing and learning.

The rapid technological development means that knowledge is no longer a once in a life time experience for the individual. It is rather an asset, which constantly has to be updated. Therefore recurrent education will gain increasing importance for young people as well as for adults with a view to maintain and develop earlier acquired qualifications. The nearly exponential growth of information, coupled with the ability to exchange it more rapidly among more people than ever before, is creating a new environment for education, in which the university may have to negotiate its standing as the de facto source of scholarly knowledge. The explosion of the Internet and associated technologies in the latter half of the 1990s has made combining production and delivery technologies with interactive communication technologies relatively simple. Information and communication technologies (ICTs) encompass many modalities and are underpinned by a plethora of new hardware and software. N-way video streaming, digital library and museum database management, simulations, teleconferencing, telephony, and wireless communications are just a few examples. Each modality has particular characteristics that contribute to its relative strength or weakness as an effective tool for tried-and-true teaching/learning methods.

3 The Students and the Digital Age

From an overall point of view it is the object of the education system to qualify the individual human being for working life and for life in general. Thus, it is not solely the aim of the education system to qualify young people and adults to acquire and reproduce the knowledge, which is disseminated by their teacher[7]. The crucial new factor in connection with the information society is that young people and adults are to be qualified creatively to sort, select, process and use the great amount of information, which ICT give access to. Moreover, in connection with the basic education they are to acquire new methods of learning processes in order to enable them to take a material responsibility for a continual and lifelong updating of their qualifications. How should universities balance their role of serving an evolving on-site student demographic and exploring new, potentially for-profit models of online education? They must first assume that future campus populations will represent a mix of residential and off-site students who will expect an innovative blend of ICTs in their courses. And they should continue to experiment, because university experimentation and evaluation will be an essential contributor to our knowledge about what does not work in online distributed education. In this line of thought, university experiments should:

- Be developed within the context of the residential university
- Facilitate the production of high-quality software and infrastructure that enhance teaching
- Monitor the quality of learning more closely
- Test whether online education can substitute for classroom experience
- Test what sources of revenue can cover the costs of both experimentation and scaling.

Second, university leadership should be very clear about institutional goals and possible market niches when planning to serve off-site students. There are a number of key issues to consider when thinking about the costs and benefits of entering into the expensive and fast-changing world of online residential and off-site distance education. We are all aware of the emergence in the past few years of a diverse array of online education models. Choices that make sense for an extension arm of a research university or a well-focused proprietary institution may be entirely different from choices that are realistic for a community college or a small residential institution.

The education system also has to take into account the so-called less advantaged groups of students, which for various reasons run the risk of becoming marginalised in the usual education system [8]. It is therefore necessary to initiate ICT-based projects with the aim of developing new methods and teaching materials, which can support the learning processes of these groups [1]. There can e.g. be focused on individualized teaching programmes with a starting point in the specific needs of the individual student. In cooperation with other agents in the educational field, areas of special priority could be:

- Access to inexpensive and rapid network connections from the educational institutions as well as from the distance workplace.
- Development of and access to a comprehensive supply of quality services for educational purposes via network.
- Continual development of ICT-based teaching programmes and materials, which can generally support the learning processes on all levels, including especially the learning processes of the so-called less advantaged group of students.

University planners must consider that significant questions remain about whether high-quality interactions between student and teacher, and among students (the sine qua non of a quality educational experience) can be replicated, or even approached, in online environments. If one spends any time around computer scientists at a research university, however, one realizes that, indeed, Internet and the applications it can support will provide ubiquitous high-quality online interactions among individuals in the not-too-distant future. The nature of the technologies themselves may also foster entirely new modes of teaching and learning that we have not yet imagined. An additional wild card in future planning is that we simply do not know enough about the students of the future, who will have been weaned on peer-to-peer file swapping, Google searches, and wireless instant messaging. What expectations will they have about their learning environments and the nature of scholarship?

4 The Teachers and the Digital Age

The teachers are to be educated concurrently with the increase in the use of ICT. New knowledge based on the latest research and new interpretations of existing knowledge can in a few seconds be distributed globally with the use of information technology and electronic communication. Knowledge is constantly

changing or is becoming obsolete so rapidly that the distributors of knowledge - the teachers - can hardly be constantly updated. Knowledge is not static but dynamic and it moves at lightning speed in the information society. The very speed in which the amount of knowledge is increasing globally makes other demands on the teachers of today and of the future. Therefore it is necessary to revise the traditional understanding of the role of the teacher in the information society's education system[12].
The role of the teacher as organizer and distributor of the teaching has to be developed concurrently with the integration of ICT in the education programmes, because as a parallel to the development there will be an increasing need to sort information and to process collected information to serviceable knowledge. In the future the teacher also has to be capable of acting as adviser and sparring partner for the students. This new interpretation of the traditional distribution of roles between teacher and students is necessary if the students are to take a greater responsibility for their own learning and have the opportunity of displaying greater independence in the learning process. For a long time this has been the case within tertiary education, where learning is the responsibility of the individual student, and the teachers are advisers and inspirators[3]. A similar development can be expected within the other educational areas; however, the demand that university is also an important factor as a place of socialization for students still contributes to uphold many of the traditional teacher virtues as highly necessary. It may be more precise to talk about the extended role of the teachers than about their changing role.
Like other groups in society, the teachers have to personally master the ICT-tools and their possibilities concurrently with the fact that ICT is used as an integrated part of the individual educations and subjects. In addition to this a massive effort within in-service training is to be implemented with the purpose of focusing on the pedagogical possibilities, which lies in the use of ICT, including the importance of ICT to the content, didactic and pedagogical principles of the subjects. In that way a fundament is created, which makes it possible for the teachers to use ICT both in the personal planning process and as an integrated element in the teaching and in the learning process [13].
Most university educators would agree that high-quality teaching and learning encompasses a rich suite of activities-lectures, seminar discussions, library research, solitary study, formal and informal peer-to-peer discussion, faculty-student tutorials, and laboratories in the sciences and foreign languages. A live classroom presentation delivered by a poor lecturer may not be the best choice if a charismatic professor is lecturing over the Internet. A well-designed simulated lab may be an excellent substitute for a student who cannot attend a wet lab, or if the content of the lab can be more powerfully communicated as a simulation that allows visualization of complex microscopic processes. An online text chat may substitute for regular face-to face-meetings, but the quality of such interaction may be significantly magnified if students and faculty have an opportunity to meet in person occasionally. In foreign language instruction, learning may be enhanced by technological adjuncts to regular courses, such as online quizzes for drill and practice, real-time communication with native language speakers, and scaling the offering of seldom-taught languages to distributed populations. Determining how these technologies should be used in the service of education is a pressing problem confronting most universities. Rhetoric suggests that ICTs will be an important solution to the triad of pressures facing colleges and universities:

- holding down costs
- increasing access to an increasingly diverse demographic
- maintaining quality

It is in this environment that university leaders are faced with making decisions about internal and external online learning markets, but with no clear models to reference. Not only are answers to questions of educational efficacy, revenue streams, and the nature of potential markets unknown, but the creation of high-quality online offerings is expensive and requires huge capital investments.
Complicating this picture is the fact that our society is rapidly becoming a global knowledge economy. Any academic can verify that ICTs have provided powerful new tools for forging global research networks in higher education and industry. Responding to the ubiquitous hunger for technical and professional education, these tools offer opportunities for traditional and nontraditional higher education providers in the U.S., Europe, Asia, Latin America, and Africa to provide anytime, anywhere education across international boundaries, and possibly to make money while doing it.

The starting point for the updating of the teacher and in-service training is that the teacher group in the education system is not a homogeneous group. The teacher groups on the various educational levels have a widely different educational background. Therefore the overall transverse objectives of the educational policy have to be supplemented and strategy

and action plans have to be worked out, describing the updating of the teachers' ICT-qualifications on the individual educational levels. However, in the future there will be an increasing demand on the individual teacher to independently acquire new knowledge and methods within the ICT-area, just like other members of the labour market have to do.
This requires that the management is responsible for ensuring that the teachers have the qualifications, which are necessary for the teaching in question, but also that each individual teacher is responsible for keeping his or her general qualifications on a state of art level.
In this connection, it is necessary to look at the distribution of the teachers' working hours and find out if it is posing barriers to an effective ICT-integration. Areas of special priority could be:

- Ensuring that the general and basic ICT-qualifications of the student teachers in the beginning of the course of study are brought to that sufficiently high basic level, which the education necessitates.
- Formulation of minimum requirements as to ICT-qualifications, both general as well as subject related qualifications as a prerequisite for employment as a teacher.
- Formulation of requisite minimum requirements as to ICT-qualifications among the existing teacher groups. It is the aspiration that all teachers will be able to meet the minimum requirements at the end of the period.

5 The Subjects and the Digital Age

The concept of subjects is a part of the picture everywhere in the education system. In the school area and of course especially within the areas, which are based on research, theoretical thinking and philosophical abstraction, the subject notion is an operational way, in which to handle and categorize the scientific main areas.
Within the areas of research and science, subjects are also a scientific theoretical concept, as it is usual to operate with the subject notion within an 'education', characterized by a certain collection of 'subjects' [9].
When we speak colloquially about the integration of ICT in education and teaching, we speak primarily about the ICT-integration in the subjects (and the teaching/dissemination of them). It is therefore a crucial question, whether the integration of ICT has bearings on the self understanding and development of a subject and if it has, which ones and to what extent. The following areas are of special interest in this connection:

- *A scientific basis and understanding* (i.e. how to formalize and generalize within a scientific branch), which paradigms are the basis of the understanding of a subject, which values/conceptions are causing the fact that some theories are more acceptable than others, a general understanding of what is 'normal' within a subject,
- *Aims for qualifications and proficiencies* (i.e.which qualifications are the subject to provide - presumably this is also the proficiency dimension in a characteristic of the subject), and
- *A dissemination aspect*, which is a common or generally accepted way of representing/disseminating a subject.

There is an increasing need to formulate a set of concepts to describe new possibilities and problems in connection with the integration of ICT in subject-related connections and in the subject-related terminology. With the appearance of modern information technology, new ways of acquiring insight, obtaining qualifications and of learning working methods have appeared [11].The qualification of the citizens, which was formerly expressed by the fact that you knew a trade or a profession, is no longer quite so unequivocally associated with the concept of a trade or a profession or with a well-defined group of qualifications and knowledge. It is still more necessary also to describe and qualify working methods, qualifications in the relevant use of the new ICT-tools in traditional as well as in new processes, and not least the ability to survey large amounts of data, extract the relevant information and then present the knowledge in a way, which is part of a meaningful context. The education system is build on the subject as the principal element. The composition of the subjects are rarely discussed, but the content of the subjects - topics, concepts, methods - are often debated. There is of course an interdisciplinary cooperation, but mostly with the basis in one or more subjects, which guarantees the total quality of the interdisciplinary projects.
Even though many and relevant attempts to describe the influence of ICT on the methods and contents of the teaching are taking place, there is a need for a general discussion about whether, and if so, how, the new information technology affects the objectives of the education programmes at all levels[6]. Moreover, such a discussion will necessarily involve the question of the organisation, content, arrangement, methods and pedagogical means of the teaching. There will

probably be a need for a level divided analysis of these circumstances, as there can hardly - not even today - be made any meaningful observations on subject-related quality and choice of methods, prevailing for the entire education sector. Research, development and counselling are sides of the same problem. In general we know too little of the new ICT-based education and teaching methods. Interim reports from a large number of pilot and development projects, which the Romanian Ministry of Education has initiated, show that education and teaching - and the derived organization of them - go through substantial changes. The sparse experience from recent projects, which the Romanian Ministry of Education has started, is only to a limited extent being gathered and processed.
Therefore there is a need for a strengthening of the research effort within education and teaching methods in general, including a special effort within the new ICT-based education and teaching methods[4]. In that way a systematic gathering and development of new pioneering education and teaching methods are ensured; this factor may form the basis of the development of the education sector, the education programmes and the teachings on the institutions of the XXIst century.
In the process of modernization of the University Politehnica of Bucharest important activities are involved in the field of informatics and communications. The latest achievement consists in the network for the processing of learning, the creation of a special service for the University's Management of Informatics as well as the design of a superior computing centre (CoLab) as a National Centre for the Technology of Information. Among the most important results there are:

- the creation of the Council for Informatics Coordination and Development with a role in the analysis of the present situations and in the elaboration of a development and modernization program;
- the creation of the Department of Informatics and Communication;
- the setting up of the Committees of Coordination and Informatics Development with a role in local coordination for the faculties and in connection with the University's Informatics Service;
- the achievement of the management network in the learning process at a top level and in faculties with special endowment due to Tempus UNICAS program and to the modernization grant financed by the Education and Research Ministry and by the International Bank.

A significant achievement is the setting up of the newest form of education, the Faculty of Applied Sciences, within the University Politehnica of Bucharest, in 2005. The Faculty has two sections, Mathematics-Informatics and Physical Engineering. It has modern laboratories and computer networks. The students learn computing as well as the most important mathematical subjects, both fundamental and especially Applied Mathematics. They will become professionals in Computer Science, specialists in mathematical modelling or teachers of Mathematics or Informatics.
The practical achievements make us think that more informal approaches to education are also valuable in the digital age providing young people with an opportunity to learn through practical experience. Formal education systems need more flexibility to allow students to undertake and gain credit for such activities. Peer based education, where students help students, and student exchange programs are also beneficial and popular.
Following the same line of thought what is significant for the Automatics and Computer Faculty (University *Politehnica* of Bucharest) for 2008 - 2009 is that the learning curriculum will continue to modernize with a view to the requirements of the international academic community. The structure and the services in informatics of the faculty will be modernized.
Thus, in the course of the research activity several components will be developed:

- the research abilities at the level of departments and research centres;
- taking part in competitions for projects in the National Program of Research and Development or to obtain grants from the Education and Research Ministry, the Romanian Academy etc;
- the development of an international collaboration with well-known European Universities to take part in mutual research themes;
- supporting the national industry of products and services in the field of automatics and computers by offering new concepts, solutions, technologies, prototypes;
- supporting the National Centre for the Technology of Information.

Technology has changed the structure of the economy, making many jobs obsolete and putting people out of work. Yet the information society also increases flexibility, it emphasizes collaboration over hierarchy, it creates the need for ongoing learning at work, and it

reduces the distinction between our home and workplace. New industries have been developed as a result of technological change. The information society is now a major part of our Pan European economy. Europe and North America are technology leaders, with more patents than other regions and a higher percentage of workers in knowledge-based or high-skilled jobs. These new industries are built upon innovation, and instilling a sense of entrepreneurship. A culture of risk-taking and the skills to take an idea and turn it into a profitable venture are vital to ensure the sustained growth of these industries and new ones not yet envisaged. For example the Faculty of Energetics (University *Politehnica* of Bucharest) has a Training Auto-desk Centre and several computer-assisted laboratories for design. We can mention some other courses and laboratories included in the syllabus at the University *Politehnica* of Bucharest:

- computer-assisted graphics (the Faculty of Energetics, I-st year)
- computer-assisted design in energetic field (the Faculty of Energetics, IV-th year)
- computer-assisted design of mechanic systems (the Faculty of Mechanical Engineering, IV-th year)
- AutoCAD (the Faculty of Transport Engineering, II-nd year)

Supporting young entrepreneurs in the developing world with education, financing, mentorship and encouragement is a critical pathway to bridging the digital division and fostering the creation of sustainable livelihoods.
Beyond the technological and infrastructural issues, there are crucial social, political, cultural and institutional dimensions. Different knowledge systems, cultures and civilizations enter into relations of dialogue and exchange, and these relations transform society. In this perspective, questions of social inclusion, gender, age, intercultural dialogue, cultural diversity should occupy a central place. As Koïchiro Matsuura, Director-General of UNESCO wrote 'UNESCO's perspective are four key principles: equal access to education; freedom of expression; the guarantee of a strong public domain of information; and the preservation and promotion of cultural diversity, including multilingualism' [10].
The digital age is founded on respect for, and enjoyment of, cultural expression. New ICTs should stimulate multiculturalism and plurilingualism and enhance the capacity of the universities to develop activities to that end.

As a confirmation of this concern, the United Nations Educational, Scientific and Culture Organization (UNESCO) is in the midst of defining a set of global ICT Competency Standards for Teachers (CST). The objectives of the project are to:

- Constitute a common set of guidelines that professional development providers can use to identify, develop or evaluate curriculum or teacher training programs in the use of ICT in teaching and learning;
- Provide a basic set of qualifications that allows teachers to integrate ICT into their teaching and learning, to advance student learning, and to improve other professional duties;
- Extend teachers' professional development to advance their skills in pedagogy, collaboration, leadership and innovative school development using ICT;
- Harmonize different views and vocabulary regarding the uses of ICT in teacher education.

The UNESCO has teamed up with Cisco, Intel and Microsoft, as well as the International Society for Technology in Education (ISTE) and the Virginia Polytechnic Institute and State University (Virginia Tech), to set up the 'ICT Competency Standards for Teachers' (CST) project. The goal of the CST project is to provide guidance on how to improve teachers' practice through ICT and giving a new dimension to their skills, regardless of where the classroom is located - resulting in better education and highly skilled students.
The United Nations, through the Millennium Development Goals (MDGs) and the UNESCO Education for All (EFA), World Summit for the Information Society (WSIS) and Literacy Decade initiatives, has set a high priority on the improvement of education worldwide. The G8 Heads of State concur and acknowledge the role that ICT can play in supporting educational improvement. The UNESCO ICT Competency Standards for Teachers project is developed in support of these priorities [14].
The goal of the 'ICT Competency Standards for Teachers' (CST) project is to improve teachers' practice. However, the Standards do not merely focus on ICT skills. By combining ICT skills with emergent views in pedagogy, curriculum, and school organization, the Standards are designed for the professional development of teachers who want to use ICT skills and resources to improve their teaching, collaborate with colleagues, and perhaps ultimately become innovation leaders in their institutions. UNESCO is giving

a high priority to the use of ICT for more equitable and pluralistic development in education. The broad questions on which UNESCO focuses are:

- How can one use ICT to accelerate progress towards education for all and throughout life?
- How can ICT bring about a better balance between equity and excellence in education?
- How can ICT help reconcile universality and local specificity of knowledge?
- How can education prepare individuals and society to benefit from ICT that increasingly permeate all realms of life?

6 Conclusion

These questions concern us all - students and professors alike. Several points must be borne in mind as one pursues these questions. First, ICT are only a part of a continuum of technologies, starting with chalk and books, all of which can support and enrich learning. Second, ICT, as any tools, must be considered as such, and used and adapted to serve educational goals. Third, many ethical and legal issues intervene in the widespread use of ICT in education, such as ownership of knowledge, the increasing exchange of education as a commodity, and globalization of education in relation to cultural diversity.
Innovations in information technology and telecommunications open unprecedented opportunities for learning to every person on the planet. But, as computers and new telecommunications dissolve the old limitations of time, distance, language, local competence and resources, every familiar model and practice in education the world over must be re-examined. From acquiring basic functional literacy to the most advanced search for new knowledge, every learning endeavor is being impacted by the new technologies.
Digital Opportunities for All: Preparing Students for 21st-Century Skills is this year's theme for the *UNESCO King Hamad Bin Isa Al-Khalifa Prize* for the use of Information and Communication Technologies (ICTs) in Education [14]. The prize winners will receive their awards during an official ceremony scheduled for 14 January 2009 at UNESCO Headquarters in Paris. The significance of this prize goes beyond its concrete value. What is important is that technology is changing the way classrooms operate, integrating multimedia textbooks, online research, and students presentations with the assistance of ICTs, making learning and teaching more interactive and participatory. The intellectual capital of a nation is more important than natural resources and financial capital to a country's ability to compete in the global economy. As the world evolves into a global community, education will increasingly be the basis on which a country can compete, or be left behind. Several challenges lay before professors as they consider how to enable their students with the skills required to compete in the 21st Century.
Romania has a highly diversified higher education system. There is a real fear among some that the traditional curriculum will be threatened by these developments.
Colleges and universities have been at the forefront of creating and experimenting with ICTs in their normal work of research and teaching. Most universities enhance many of their traditional course offerings and/or provide some courses entirely online, which means that faculty and students can exercise more choice about the modalities they use for teaching and learning. At University it Politehnica of Bucharest we find that many students do not use the library in the traditional way, and that they use many more resources from the Web. From our first year of work with the students we know that, given the choice, many students opt for an online video lecture component as either a back-up or a substitute for attending lectures. Many also appreciate the opportunity to do preparatory lab work and quizzing online. The positive response to the technological enhancements reflected the increased convenience for students and faculty. Changes were "generic" enough that students could use them flexibly and on their own terms (e.g., reviewing lectures online for exam study, repeating difficult passages, taking quizzes several times).
In a world where books tend to lose ground in their competition with Internet sources, Romanian students seem to be attracted to any kind of information requiring cyber-study. Various sites are nowadays offering them the possibility to change the (somewhat outdated) simple memorizing activity with other types of learning processes whereby the visual factor proves far more valuable.
The modern Romanian learner uses a complex of media types for accumulation purposes. The computer screen, however, seems to have quickly gained dominance over TV or other media sources of information, and it is the teacher's duty today to use such background knowledge and put it to work in the best interest of interdisciplinary learning.

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