ICT in education: the opportunity for democratic schools?

Helen Drenoyianni
Senior Lecturer of ICT in Education, School of Education, Aristotle University of Thessaloniki

SUMMARY

What is the future of schools and what is the role of ICT in this future? To some of us, ICTs are emblematic of contemporary discussions about educational reform; their incorporation into education offers significant improvement to the overall quality of education our children receive. For others, this improvement cannot be realised under current educational conditions. For the liberating, dynamic and emancipatory capacities of ICT use to grow, we need a different terrain, suited to a human and democratic vision for education. This article attempts to examine these two perspectives in the context of facts, figures and stories from the reality of classrooms, and to raise critical arguments about the potential role of ICT in education.

Introduction

In the late 1980s a broadcast discussion took place in Brazil between Seymour Papert, developer of Logo and leading figure in educational technology, and Paulo Freire, one of the world's foremost critical educators and philosophers ([1]). The main theme of the discussion was the 'future of school' and at the beginning of the conversation Papert suggested the existence of three stages 'in the relationship between individual and knowledge'.

Stage one begins with the birth of the child, who starts to learn in a self-directed, experiential and explorative way. Later on, and within this stage, the child appears to enter a qualitatively different situation, which is

---

([1]) Available from Internet: http://www.papert.org/articles/freire/freirePart1.html [cited 2.6.2006].

signified by a shift in the process of learning. Learning by exploring evolves into learning by 'finding adults who will tell you things'. 'Learning by being told' reaches its zenith in stage two, meaning in school. This is a critical moment during which the child has to stop learning and must accept the process of being taught. Learning by being taught and receiving deposits of knowledge is the ultimate and main characteristic of this dangerous and, perhaps traumatic phase which may be held responsible for destroying the instincts of many children. However, those who survive it learn a range of skills, which give them the opportunity to explore a much wider universe and to enter stage three. This last stage could be described as a return to the creative process of stage one. Learning is becoming again explorative and experiential, it is driven by the individual's needs, interests and aspirations; it is creative and is not so verbal.

Freire agreed with Papert's lucid description and analysis of these three stages. He commented that the school stage is indeed horrible and that it has been bad for many children, but he also advocated that the idea of school is both necessary and valuable. He argued that, in history, people learned before teaching and that it was precisely the realisation of the experience of learning that 'taught us to teach' and to invent the 'learning by being taught' stage. Within this invented stage, that we call school, a child is supposed to depart from the 'common knowledge and common sense' experience of the first stage and get to the systematisation of the knowledge that ensures the continuity of the search for and the production of knowledge not yet in existence. As he asked:

'How do we make the essential transition from the common knowledge and common sense to the more methodically rigorous knowledge of the sciences without the proper organisation provided by an entity specialised in this matter?' [2]

Within this line of reasoning Freire illustrated and explained his disagreement with Papert's metaphysical, as he characterised it, analysis of the inevitable end of school. According to Papert, what is wrong with schools is absolutely fundamental. He argued against their distressing effects on children's creativity, natural curiosity and intellectual power and said that the seed of change is in the children themselves, who will eventually revolt. Using a range of examples, he placed technology use at the centre of children's predicted refusal to accept the oppression of schooling. To him, the idea that technology could be used to advance school is absolutely ridiculous. Technology will not improve schools, it will actually displace them, cause them to disappear and shift completely our understanding of the entity of school (Freire and Papert, 1980s; Papert, 1996a; 1996b). Nevertheless, to Freire the challenge did not announce the end of schooling, but its reconstruction with the help of all those who survived it and escaped cognitive death by it.

---

[2] Available from Internet: http://www.papert.org/articles/freire/freirePart4.html [cited 2.6.2006].

'[The challenge] is to change it completely and radically and to help it to give birth from a body that doesn't correspond anymore to the technological truth of the world … to a new being as actual as technology itself … To me, the problem we face today is the correction of the mistakes of the second stage that are not all didactic and not methodological mistakes but, indeed, ideological and political ones' (³).

Arguably, the ideas, the points and the issues raised within this exciting and interesting conversation are still in effect nowadays, as they seem to underpin contemporary debates and discussions about the need for educational reform, and the revolutionary role and value of information and communications technology (ICT) use in education. It is notable that both sides, as with both Papert and Freire, seem to agree that schools have become tyrannical bureaucratic establishments fostering a banking and depositing concept of education. Both also agree that schools should be changed, and that ICT enables new, complex and diverse ways of knowing, learning, thinking, communicating and meaning making. Nevertheless, their explanations and analyses of the modern school crisis and their proposals to deal with it, including their perceptions of the role of ICT in these proposals, are fundamentally dissimilar.

On the one hand are those who, like Papert, find technical, artificial and metaphysical solutions to deep-rooted educational problems. To this group, ICT, by itself, can trigger fundamental changes in the way teachers perceive and act upon the processes of teaching and learning. ICT represents the centre of innovative educational change and its incorporation into every aspect of education is perceived as equivalent to the enhancement of the quality, efficiency and effectiveness of education. Others, like Freire, try to understand educational problems by placing them in their appropriate cultural, ideological and political context. To this second group, educational change is not synonymous with change in teaching method, but change in the aims, the processes and the structures of the whole educational establishment. From this viewpoint, ICT is placed at the border of educational change and is conceptualised as both a theme and a tool with potentially humanising, liberating and motivating capabilities. However, these capabilities can only be realised and fulfilled within the context of a radically different school setting that follows, in theoretical and practical terms, the principles of a human and democratic vision for education.

The subsequent two sections of this paper will examine both of these viewpoints. The first part seeks to approach the rhetoric underlying the role of ICT as both a change-agent and an education-antidote, examine the socioeconomic and pedagogical assumptions of this role in relation to facts and figures from the reality of classrooms, and raise critical arguments against the idea of perceiving ICT as the totem of educational change. The second part attempts to redefine and approach afresh the role of ICT from

---

(³) Available from Internet: http://www.papert.org/articles/freire/freirePart2.html [cited 2.6.2006].

a human and democratic viewpoint; it concentrates on ICT success stories, reflecting on the liberating possibilities of ICT, which can flourish when they are embedded in progressive educational settings.

ICTs as the emblem of educational reform

We are increasingly and repeatedly told that ICTs represent a high educational priority, that their use will improve the overall quality of education our children receive, and that they are the ultimate vehicles for radical educational change and innovation. The rhetoric underlying such claims usually begins with descriptions of how society, the workplace and life itself have changed as a result of the advent, the evolution and the ubiquitous presence and utility of ICTs in nearly every sector of human activity. Technology is placed at the centre of the social, cultural and economic transformations witnessed and is represented as one of the main causes inducing these changes and transformations. As such, we are reminded and informed that ICT use generates by itself a new highly-competitive economy and high–tech society, often called the information or knowledge society, which values knowledge and information as the keystones of economic development and productivity and needs a new kind of citizen and a new kind of worker with remarkable skills, abilities and knowledge.

'Technology and advanced communication have transformed the world into a global community … In this environment, employers value job candidates, who can acquire new knowledge, learn new technologies, rapidly process information, make decisions, and communicate' (Partnership for 21st century skills, 2003, p. 6-7).

In this context, technology is treated as an autonomous entity or an outside force, similar to a natural phenomenon - if not a natural disaster - that drives society and economy. It has the power to redefine what knowledge is and what it means to be a knowledgeable person, and, as an unavoidable consequence, serves as the impetus for the redesign and reinvention of education.

The rhetoric goes on to depict public education as ineffective, often conceptualised as the transmission of knowledge to pupils. Schools do not succeed in preparing children for their future roles as citizens, workers and professionals, since they do not manage to equip them with the knowledge, skills and attitudes that will enable them to be efficient, effective and competitive in today's fast changing world. This vision of a 'product to be consumed' education and the oratory of empowering the 'pupil-consumer-future worker' necessarily leads to reconsiderations of the priorities, the means and the ends of education (Apple, 2001). Higher academic standards, more rigorous national curricula, greater use of national performance-driven testing and an emphasis on the accountability of students, teachers and schools are represented as the solutions to the economic, social, political and cultural prob-

lems devastating education (Apple, 1993; Sheldon and Biddle, 1998). Among the many recommendations made by the promoters of such actions is greater emphasis on ICT use as a symbol of modern, sophisticated and quality education and life. Apparently, the paradox underlying these proposals is that ICT is presented as both the change-agent that brings forward multiple crises and the antidote or the solution to the social, economic and education problems initiated by these crises.

> 'ICT fundamentally changes the way we live, learn, and work. As a result of these changes, technology tools, and the creative application of technology, have the capacity to increase the quality of people's lives by improving the effectiveness of teaching and learning, the productivity of industry and governments, and the well-being of nations' (Educational Testing Service, 2002, p. 3).

This line of reasoning raises the idea that the incorporation of ICT into every aspect of education is indeed inescapable for all those nations who wish to enhance the effectiveness of teaching and learning.

> 'Improving the quality of education thanks to multimedia and Internet technology is one of the priorities of European cooperation. All schools, if not all classes should be highly computerised, all teachers should be able to use the technology to enhance their working methods and all young people should be able to broaden their horizons by using it comfortably though with the necessary critical perspective. These goals are among the priority objectives for 2010 that the education and training systems of EU countries have set themselves in the follow-up to the Lisbon strategy' (Eurydice, 2004, p. 3).

The high level of expenditure and investment being made to equip educational institutions with ICT and train educators in its use, are justified through the adoption of two types of assumptions: socioeconomic and pedagogic. Socioeconomic assumptions are based on a social and economic efficiency rationale for education and promote the views that ICT use in schools will increase teacher and student productivity and will enable the preparation of a technologically empowered future workforce. ICT use can simplify and modernise administrative and managerial tasks, it can ease and improve teacher and lesson preparation, it can increase the speed and enhance the effectiveness of communication among parents, students, teachers, schools, education authorities and organisations, and make assessment more efficient through electronic testing and grading. As such, schools can profit from the productivity gains that ICT has brought to business and 'can get more work done at less cost' (Cuban, 2001, p. 13). At the same time, since technological skills and knowledge are greatly valued in the job market, guaranteeing well-paid jobs and upward social mobility, the introduction of ICT literacy lessons is a necessity. Pedagogical assumptions focus on the role that ICT can play in revolutionising teaching and learning methods. ICT use may transform education by making teaching and learning project-based, flexible, skill-focused, problem-based, individualised and child-centred. Its use can serve as a driver and a facili-

tator of radical curriculum change. It helps students become autonomous, motivated and independent learners, reinforces interaction and cooperation, enables deep understanding, provides information-rich learning environments and allows teachers to act more as tutors, supporters and guides rather than lecturers.

There is an increasing number of researchers and educators who believe that most of these assumptions, especially the socioeconomic ones, are ungrounded. To them, technology may be perceived as 'a powerful regime, enjoined by a confluence of forces alien to education' (Noble, 1998, p. 281) and represents a 'different way of applying economic logic to schools' by treating them as 'a potential market or a customer base', as well as the hotbed of 'a future customer base' (Bromley, 1998, p. 8; Apple, 1998; Cuban, 2001). Despite strong objections, the ICT rhetoric has been successful in advancing access of large populations to ICT, alarming educational communities, parents and authorities and accelerating the rate of introducing ICT in nearly every educational institution. Recent international figures illustrate that the integration of ICT lies at the heart of national educational policies and that levels of school and home computerisation are steadily rising (OECD, 2001; Eurydice, 2001). In particular, the latest Eurydice report (Eurydice, 2004), which includes empirical data from the PISA 2000 and PIRLS 2001 surveys, points out that:

• ICT is part of the compulsory curriculum of pupils in almost all European countries. In primary schools, the tendency is to treat ICT as an educational tool and in secondary education as both a tool and a subject in its own right;

• in most countries, basic training in the use of ICT for educational purposes forms part of primary and secondary teachers' initial teacher training experience;

• in the majority of European countries, the average number of pupils per computer varies between five and twenty among 15 year olds, but there are countries like Bulgaria, Greece, Portugal, and Romania, with an exceptionally high ratio that set out to reduce it. The level of school computerisation tends to mirror the level of home computerisation, but there are countries (again, Bulgaria, Greece, Portugal and Romania) in which home computers are widespread, while school facilities remain less developed.

These data might suggest that the problem of access to ICT facilities and ICT relevant experience is being slowly, but steadily, resolved. Yet, access is only one part of the problem and use of ICT and use, particularly in an innovative manner, is a totally different one. As the same Eurydice report (Eurydice, 2004) states:

• nearly half of primary school pupils report that they use ICT never or almost never at school. Frequency of computer use rises noticeably at secondary school level.

• the majority of pupils aged 9 or 10 report that the two most common computer activities at school are those related to writing using a word processor and searching for information.

Regarding increased frequency of ICT use among those aged 15, most secondary schools treat ICT as a separate subject, while writing and searching for information are not the innovative uses that most ICT promoters envisioned. In fact, there is a growing body of academic research which, for the majority of schools, draws a rather disappointing picture of classroom ICT use and appears to recognise the existence of a wide gap between access, use and quality use of ICT in schools (Murphy and Beggs, 2003; Reynolds et al, 2003; Kozma, 2003; Zhao et al, 2002; Cuban, 2001; Williams et al, 2000; Pelgrum and Anderson, 1999; Cuban, 1999). The outcomes of Cuban's study of Silicon Valley schools (Cuban, 2001) are typical of similar findings reported by several educational researchers in Europe and other parts of the world:

• compared to the past, students and teachers had far more access to ICTs in both homes and schools. However, classroom use of ICT continued to be unequal and infrequent. More than half of teachers did not use computers in their classrooms and less than 5 % of students reported that they had significant technological experiences at school;

• the majority of teachers did not blend ICT use into their curricular practices. Less than 5 % of teachers integrated use of ICT into the teaching of school subjects. Most ICT users perceived computer activities as enrichment or a valuable add-on and most students' use was peripheral to their principal learning tasks. Students' use was limited to completing assignments, searching and finding information in CD-ROMs and the Internet, while teachers' use was mainly restricted to planning and preparing for teaching, communicating with peers and parents and carrying out administrative tasks;

• most teachers thought of students' increased access to information as 'a phenomenal enhancement to their teaching' (Cuban, 2001, p. 94), but the changes brought by ICT use were incremental and related to communicational and administrative tasks. No revolution has taken place as a consequence of technology use and 'the overwhelming majority of teachers employed the technology to sustain existing patterns of teaching, rather than to innovate' (Cuban, 2001, p. 134).

In response to such findings, some researchers and educators appear to offer a 'slow revolution' or 'slow evolution' explanation, while others tend to emphasise the conditions of successful and innovative technology use. Yet, almost all propose extension of heavy promotion and considerable investment in terms of training provision, software development and purchase of equipment (Eurydice, 2004; Reynolds, et al., 2003; Kozma, 2003; OECD, 2001; Zhao et al, 2002; Cuban, 2001; Scheuermann, 2002).

The majority of the explanations offered cause confusion. As they concentrate on the level of teachers, students and school equipment, they define both the educational problem and the solution to it in a way that serves given needs, values, ideas and outcomes. To Papert, for example, findings like the ones mentioned above are illustrative of how the reform that sets out to change school is, in the end, changed by school. According

to him, the school is a 'living organism', which naturally 'resists the reform by appropriating or assimilating it to its own structures' and 'by doing so, it defuses the reformers and sometimes manages to take in something of what they are proposing' (Papert, 1996a; 1996b). If this is so, the solution lies within school's replacement with a different kind of structure.

It has always been true that new educational technologies are charged with remarkable pedagogical properties and dispositions and are often represented as the solutions to all education's ills. In reality, educational media and tools can only strengthen, further and reinforce established educational goals, curriculum contents and methods (Tsiakalos, 2002). Since this is what they are expected to do, their use will normally be assimilated into current educational practices and structures.

However, new technologies are created as a consequence of scientific advance. Even though they may have their own in-built assets and characteristics, they cannot become autonomous or be understood in isolation from the broader and more powerful social, economic, and political contexts and dynamics (Bromley, 1998; Apple, 1998). As their educational use becomes assimilated, it also mirrors, and to a certain degree influences, contemporary socioeconomic problems and prevailing educational conditions. Consequently, the incorporation and use of ICT in education may, for instance, reflect:

• the centralisation of official educational purposes and goals and the rigidity of school curricula;

• the multidisciplinary nature of content organisation and the dominant epistemological, economic and ideological beliefs about subject knowledge;

• the most traditional, conservative and unimaginative approaches to teaching and learning;

• the effects of a process, often called deskilling, which echoes teachers' separation from the conception of teaching and learning tasks and the reduction of their role to an executing one.

ICT use may, as well, influence the deskilling process further through the ubiquitous presence of pre-packaged electronic materials and resources. It may reveal the increasing overload and the intensification of teachers' work and stress it even more by being a significant add-on skill that they have to learn how to use. Finally, ICT use may illuminate class, racial and gender inequalities and, through the notion of a digital divide, it may also affect social divisions by making them deeper and stronger.

Consequently, the following question could come to mind: If this is all that the new, transformative and revolutionary ICT brings to education, then why should one bother with it?

The brighter side of ICT use in education

The negative view of the introduction and use of ICT in education is not the only one possible. Success stories seem to point out a variety of alternative and progressive possibilities:

'Michael, an 8 year old boy, could hardly read and write. He often hit hard, smacked and beat other children in and out of class. One day, after an incident of serious injury, Michael confessed to his teacher that he had been very angry for a long time. He was not seeing enough of his father, who lived far away from him and his mother. His teacher showed him how to use e-mail at school, to send to and receive messages from his father. In six months, Michael became a fluent reader and a capable writer.

Within the context of a project on secure energy connections, students of a disadvantaged region in Sao Paolo, visit the archive of a well-known newspaper to do some research. They discover that most of the news articles published about their community were related to violence, poverty, drug dealers, fires due to illegal energy connections and accidents. Everyone left the place upset, sad and disappointed about the public image of their community, and the media representation of their lives, worth and values. They felt that most people would consider them as just a bunch of bums from shantytowns. They decided to respond in a powerful way. If the press was not fair to their community, they would make their own school newspaper, to show people all the good things that happen there. Using digital technology they designed and produced their publication and even made an economic viability analysis. Their newspaper was also supplemented with a special issue on illegal and insecure energy connections, which have been the cause of fires, black-outs and a number of deaths in the community. By publishing information and pictures of safe and unsafe connections, they could inform people and help them in making their home connections more secure. (Summarised extract from Blistein and Cavallo, 2002).

These and hundreds of other stories, disseminated in books, articles and the Web, seem to tell a different story about educational computing. They represent the projection of the hopes and visions of a considerable number of researchers, parents and educators, who see in ICT 'a space to breathe' and 'a chance for liberating the learner, democratising and humanising the school'. Within this vision, ICTs are perceived as a collection of powerful cultural artefacts, pleasurable gadgets and intellectual tools, which support collective work, can motivate the most inert and discouraged learners, enable the disadvantaged to access learning and 'participate actively in the production of culture by creating their own cultural forms and engaging in discussions of public issues' (Kellner, 2000, p. 206). Liberating use of ICT both at home and school makes better and makes possible a range of intrinsically enjoyable human activities, such as development of ideas and construction of things, expression in multi-modal and multi-semiotic ways, interaction in critical, challenging and sometimes pro-

voking ways, and creating meaning through communication, questioning and inquiry.

With these metaphors in mind, many ICT promoters repeatedly predict that the incorporation of ICT will eventually pose significant challenges to education. Success stories, they say, such as the ones previously described, will stimulate reflections about pedagogy and trigger discussions about the role of school and the role of teachers. As a consequence, ICT will act as a catalyst in teachers' pedagogical thoughts and beliefs; it will disturb established routines and provide the incentive for a radical shift to progressive teaching and learning practices. Unfortunately, this revolutionary vision has yet to be realised. Even though the interest in debating and discussing the transformative role of ICT in education has grown exponentially, little has changed in the reality of the majority of classrooms; this is because it is not only teachers that need to change, but the whole educational establishment. Bromley's lucid description of this necessity is characteristic:

'Although isolated success stories are sure to crop up even under current conditions, like weeds in the cracks of the status quo, by themselves they are unlikely to have much lasting effect. For these growths to flourish into a thriving patchwork of alternative practices, it will be necessary to modify the terrain' (Bromley, 1998, p. 22).

Without a doubt, the emancipatory view of ICT use can only be realised in the context of alternative educational settings, which:
- value autonomy, flexibility, and diversity,
- build education on students' needs, interests and aspirations,
- encourage understanding, reflection and analysis,
- involve interdisciplinary and integrated curricula designs and practices,
- follow project-based, child-centred, holistic, anti-racist, experiential and participatory approaches to teaching and learning.

So, what exactly does a progressive educational setting look like with respect to ICT? The controversial and deeply rooted differences between the following two episodes can serve as an avenue for stimulating reflection on this issue.

Episode 1: As the students come into class today, one boy shouts out, 'Are we going to the lab today?' The teacher answers, 'We've got those sheets again and the tapes …'. Invariably, when hearing that it was a worksheet day, students would start to grumble, one rather loudly, 'that man's so unexciting,' 'I hate this, this is boring,' 'do we have to do this all the time?' 'I cannot stand this class,' 'this isn't computer class, this is worksheets … what do we learn, nothing … how to push a button' (referring to the tape recorder). One student turned to one of us and referring to the worksheets, complained, 'We know this stuff already, maybe not these fancy words … but we know this stuff'. Although the students complained about the tapes and the worksheets, they did not disrupt the class routine … Their attitudes were for the most part ignored or made light of by the teachers, who appeared to regard a certain amount of negativism and complaining

as typical adolescent behaviour in school. (Extract from Apple and Jungck, 1998, p. 144).

Episode 2: Over the years of our operation, older teenagers, particularly teenage males, have been difficult to recruit. A fair number would drop in, have an initial experience, and drop out again. We puzzled over this: the standard applications like word-processing or graphics did not make it, even as an employment skill; the simulation games apparently weren't exciting enough. We had a little luck with cartooning for a while, but when we wouldn't allow them to create porn, that too palled. Our greatest success to date has come with the advent of multimedia.

Two or three teens … came up with the idea of creating a kind of electronic Harlem directory. It started with a subway map and some text about what to find in the area of each station (and what to avoid), along with some scanned pictures of the location. This idea caught on, and the initial group has now expanded well beyond our expectations. The project, too, has grown. Named by its creators *What's Homey about Harlem*, has become more than an annotated subway map. It now shows where each of them lives. It has pictures of their families and friends and of favoured spots in their neighbourhoods. Some have used a camcorder to do live interviews and have incorporated segments of their videos in the directory. Each person works on the elements they find most rewarding. All learn the processes of integrating their work into a single multimedia database. And best of all, they keep coming back and bringing others with them'. (Extract from Stone, 1998, pp. 189-190).

Both episodes appear to share modest similarities and a variety of differences. First, they are both taking place in settings with a purpose to educate; as such, the main actors involved are teachers and students. Second, in both incidents the educational goal is common. It is concerned with the development of computer literacy skills. However, each setting defines it differently, and in turn these diverse definitions are being translated into contradictory teaching and learning approaches.

In the case of Episode 1, computer literacy is perceived as an academic subject of an encyclopaedic nature with its own content knowledge that has to be covered and be deposited into pupils' minds. So, a 10-day computer literacy unit was planned, which because of organisational pressures, consisted of two filmstrips, a prepackaged commercial curriculum containing tape-recorded lessons and corresponding worksheets. As the extract provided reveals, students' dissatisfaction, anger and disengagement were evident. Most of the time they were required to sit quietly in a class and listen to lesson recordings transmitting information about the history of computing, the way computers operate, description of input and output devices, features of programming in BASIC and effects of computers on society. Three out of the ten days of the unit students used the computer lab and these were the most enjoyable ones, whereas the final day they were given a short answer test for assessment purposes.

Episode 2 takes place in an informal educational setting, which is a com-

munity computer centre. In this case, computer literacy is seen as a collection of knowledge and skills that one may choose to obtain and develop if he/she finds a personal meaning to it. This collection is not predetermined, but personally constructed, and, consequently, there are no standards and objectives to be met, no testing and examining, no lectures and textbooks, no tape-recorders or worksheets, and no teachers to supervise students as they go through subject matter. It is a discursive location where people come on a voluntary basis to master technology as a personal tool, because they want to and because they feel they might be able to learn something valuable for their lives. As a consequence, visitors and participants choose and have complete control over what to learn about digital technology and how to learn it. Staff teachers are there to help people identify what is that they want to learn and support them in achieving it.

Many of the structures and processes of the school described in Episode 1 represent one of the most unimaginative models of education, that has been repeatedly and severely criticised for making school an out-of-date establishment and an oppressive organism that wastes young people's lives, consumes their creativity and, by definition, excludes the most vulnerable ones from the adventurous, exploratory and pleasurable experience of learning. In contrast, many of the attributes of a community computer centre, as already seen in several projects involving ICTs and focusing on community development and empowerment (Dillon, 2002), are inherently comparable to the characteristics of a human and democratic school. Within an experiential environment, an attempt is being made to adapt the teaching process to the needs and the interests of individual learners, as well as help them experience collaboration towards common goals. As a result, everyone is entitled to participate and no one is excluded. Respect for difference and diversity is evident and free flow of ideas is greatly valued. Homogeneity is not a necessity, as the curriculum 'is not part of a selective tradition or someone's vision of legitimate knowledge' (Apple, 1993), but it is what participants make of it through their personal choices, which obviously reflect their personal and community needs, histories and cultures.

Apparently, this line of reasoning does not promote the idea that schools should become community centres, but it is significant to add that schools should act as 'learning centres' (Halfpap, 2001). As a consequence, they can learn a lot from the informal character, the freedom enjoyed, the collective capacity and the participating attributes of a community centre. Within the context of a human and democratic education, the role of ICT can be described as two-fold:

• ICT is by itself an interesting and important educational theme, one of the necessary 'keys' for 'unlocking' understanding and participating in the world;

• use of ICT tools can enhance, promote and extend the practices of a human and democratic educational setting.

In particular, the appreciation, critical analysis and reflective consider-

ation of the changing technological landscape of the economy and the cultural, social and educational implications brought about by the use of ICTs in human activity may be regarded as issues of considerable importance. Awareness of ICT involvement in the construction of power and consideration of the exclusions and oppressions introduced by its use may enable understanding of larger social problems that arise in the course of students' individual and collective lives and may help them foster the development of a more humane technological future.

In this context, ICT literacy is enhanced with a strong critical dimension, which calls for students' scepticism and puts constantly into question technological suppositions and discourses. In addition to this aspect, ICT literacy may be considered as part of a range of multiple critical literacies (Drenoyianni and Mylona, 2004), which require students to 'read' their cultural and social worlds and 'write' their own contribution to them.

'Surely education should attend to the new multimedia culture and teach how to read and interact with new computer and multimedia environments as part of new forms of multiple literacy. Such an effort would be part of a new critical pedagogy that attempts to empower individuals critically, so that they can analyse and criticise the emerging technoculture, as well as participate in its cultural forums and sites' (Kellner, 2000, p. 211).

As a result, ICT literacy may develop through experimentation and exploration as students engage in critically processing, analysing, interpreting, communicating and evaluating words, images, videos, sounds and multimedia contents. But it may also develop through spontaneous play and free investigation of the technological possibilities available in the course of collaborative projects.

'Two fifth-graders, Monalisa and Gleidiane, were not so excited about Lego, but they liked arts and photography a lot. Monalisa painted a picture in the first day. Then they began exploring the other arts materials, making small figures and miniature furniture in clay. They decided to build a house to put their furniture inside, doing a little claymation. They were extremely happy with it, but I had a concern: their house had nothing technological. There were no robotics, no programming, no digital stuff. We care about those technologies because they open up many possibilities that conventional materials do not allow. I was tempted to give some ideas about how to integrate robotics into the house, but it was clear to me that it would be an imposition from my part. However, something else happened: two other girls, Mauriza and Edilene had the idea of adding some robotics to the house, like an automatic front door and timers for the lights, so that the house would save energy. The original creators of the house continued together with them for a couple of hours, but then decided to leave and do more painting … That illustrates that having a multiplicity of expressive tools and a convivial space opens up new possibilities for real collaborative work. The fruitful collaboration between the 'architect-girls' and the 'engineer-girls' was one example of the synergy that can take place in such environments. Neither group gave

away their ownership of the idea and the project, but kindly agreed to share the credit for a collective work, to which each one contributed their own interests. That is, in fact, how adults work on projects, but very uncommon in school' (Extract from Blikstein and Cavallo, 2002).

This incident brings us to the second major role that ICT can play in a human and democratic educational setting. There is no doubt that ICT use can extend, further and promote human and democratic practices, experiences and structures by offering students and teachers a multiple set of media and tools for expression, interaction, creation, reflection, analysis, construction, communication and creating meaning. In this respect, digital technology is used whenever there is a meaningful purpose for it, when students choose to use it and find it is the best possible tool or medium at hand. Within this line of thinking, constructive, dynamic and expressive technologies, in addition to enabling collaborative, research-based and child-centred ways of approaching teaching and learning, can provide access to controversial contents, contradictory cultures, diverse ideas, values and genders. This enhances and broadens students' window to their universe. They enable students to explore and understand their own social, cultural and historical geographies in comparison to those of other people. Finally, and perhaps even more importantly, digital technologies enable creation, production and dissemination of the students' own contents, knowledge constructions and projections of the world.

Ironically, one must admit that the many liberating and creative capabilities of ICT use have already been realised by a significant number of children around the world. These are the kids and the teens, who talk about themselves and their lives through their own pages published on the Web, who interact, communicate and create virtual communities and brotherhoods by playing games, by participating in discussion groups and chat rooms, who gain valuable, and not only technical, skills and knowledge by just playing with digital contents and equipment and browsing the worlds of technology. Nevertheless, two things need to be pointed out with respect to these children's experiences:

• these are the experiences of a group of children, not of all children;
• most of what these children do, learn, make, and experience with ICT tools does not take place inside school, but outside of it.

This line of reasoning, coupled with the school stories of tape-recorded computer literacy lessons, may lead some of us to conclude that ICT will revolutionise education by causing schools to disappear. To others, the sad story of computer class students is a reminder of how useless can ICT use be when embedded in the practices and structures of a tyrannical and rigid educational establishment. Hopefully, there are other stories too. These are the stories of children like Michael, architect and engineer girls, students from Sao Paolo and teens from Harlem, which encourage us to keep warm the hope and the vision that ICT use in education represents a unique opportunity for school revitalisation, a remarkable chance for human and democratic education.

Bibliography

Apple, M. The politics of official knowledge: does a national curriculum make sense? *Teachers College Record*, Vol. 95, No 2, 1993, p. 222-241.

Apple, M.; Jungck, S. You don't have to be a teacher to teach this unit: teaching. technology, and control in the classroom. In Bromley, H.; Apple, M. (eds). *Education/technology/power: educational computing as a social practice.* New York: State University of New York Press, 1998.

Apple, M.W. Teaching and technology: the hidden effects of computers on teachers and students. In Beyer, L.E.; Apple, M.W. (eds). *The curriculum: problems, politics and possibilities*. New York: State University Press of New York, 1998.

Apple, M.W. *Educating the 'right' way: markets, standards, God and inequality*. London: Routledge Falmer, 2001.

Blikstein, P.; Cavallo, D. Technology as a Trojan horse in school environments: the emergence of the learning atmosphere (II). In *Proceedings of the interactive computer aided learning international workshop.* Carinthia Technology Institute, Villach, Austria, 2002. Available from Internet: http://www.blikstein.com/paulo/documents/ papers/BliksteinCavallo-TrojanHorse-ICL2002.pdf [cited 24.5.2006].

Bromley, H. Introduction: data-driven democracy? Social assessment of educational computing. In Bromley, H.; Apple, M. (eds). *Education/technology/power: educational computing as a social practice.* New York: State University of New York Press, 1998.

Cuban, L. The Technology puzzle: why is greater access not translating into better classroom use? *Education Week*, August 4, 1999.

Cuban, L. *Oversold and underused: computers in the classroom.* London: Harvard University Press, 2001.

Dillon, B. ICTs, e-learning and community development. *European journal of vocational training*, No 27, 2002, p. 58-62.

Drenoyianni, H.; Mylona, I. Commenting on the nature and attributes of ICT in education. In Chang, M. et al. (eds). *Proceedings of international conference on education and information systems: technologies and applications*, July 21-25, 2004. Orlando, Florida: 2004.

Educational Testing Service. *Digital transformation: a framework for ICT literacy*. Princeton, NJ: Educational Testing Service, 2002.

Eurydice. *ICT@Europe.edu: information and communication technology in European education systems.* Brussels: Eurydice, 2001.

Eurydice. *Key data on information and communication technology in schools in Europe.* Brussels: Eurydice, 2004.

Halfpap, K. Towards learning for the future: some practical experiences. *European journal of vocational training*, No 23, 2001, p. 53-59.

Kellner, D. Multiple literacies and critical pedagogies: new paradigms. In Trifonas, P.P. (ed.). *Revolutionary pedagogies: cultural politics, institut-*

ing education and the discourse of theory. London: Routledge, 2000.

Kozma, R.B. Technology and classroom practices: an international study. *Journal of research on technology in education*, Vol. 36, No 1, 2003, p. 1-14.

Murphy, C.; Beggs, J. Primary pupils' and teachers' use of computers at home and school. *British journal of educational technology*, Vol. 34, No 1, 2003, p. 79-83.

Noble, D. The regime of technology in education. In Beyer, L.E.; Apple, M.W. (eds). *The curriculum: problems, politics and possibilities.* New York: State University Press of New York, 1998.

OECD. *Learning to change: ICT in schools.* Paris: OECD, 2001.

Papert, S. The future of school [1980s] In *Works by Seymour Paper [website].* Available from Internet: http://www.papert.org [cited 24.5.2006].

Papert, S. Why school reform is impossible [1996a]. In *Works by Seymour Paper [website].* Available from Internet: http://www.papert.org [cited 24.5.2006].

Papert, S. School's out? [1996b]. In *Works by Seymour Paper [website].* Available from Internet: http://www.papert.org [cited 24.5.2006].

Partnership for 21st century skills. Learning for the 21st century: a report and mile guide for 21st century skills. [website]. Available from Internet: http://www.21stcenturyskills.org.index.php?option=com_content&task=view&id=29&Itemid=42 [cited 24.5.2006].

Pelgrum, W.J.; Anderson, R.E. (eds). *ICT and the emerging paradigm for lifelong learning.* Amsterdam: IEA, 1999.

Reynolds, D.; Treharne, D.; Tripp, H. ICT: the hopes and the reality. *British journal of educational technology*, Vol. 34, No 2, 2003, p. 151-167.

Scheuermann, F. Bridging to the future of education. *European journal of vocational training*, No 27, 2002, p. 3-12.

Sheldon, K.M.; Biddle, B.J. Standards, accountability, and school reform: perils and pitfalls. *Teachers college record*, Vol. 100, No 1, 1998, p. 164-180.

Stone, A. Learning to exercise power: computers and community development. In Bromley, H.; Apple, M. (eds). *Education/technology/power: educational computing as a social practice.* New York: State University of New York Press, 1998.

Tsiakalos, G. *The promise of pedagogy.* Thessaloniki: Paratiritis, 2002 (in Greek).

Williams, D. et al. Teachers and ICT: current use and future needs. *British journal of educational technology*, Vol. 31, No 4, 2000, p. 307-320.

Zhao, Y. et al. Conditions for classroom technology innovations. *Teachers college record*, Vol. 104, No 3, 2002, p. 482-515.