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PARADOXES AND DILEMMAS IN MANAGING E-LEARNING IN HIGHER EDUCATION

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ABSTRACT

The new information and communication technologies (ICT) affect currently most spheres of life, including all educational levels. Their effects are most likely to grow in the future. However, many predictions in the last few years as to the sweeping impact of the ICT on restructuring the teaching/learning practices at universities and their high profit prospects have not been materialized; and several large ventures of e-learning undertaken by the corporate world, new for-profit organizations and some leading universities failed to yield the expected results. This paper examines eight inherent paradoxes and dilemmas in the implementation process of the ICT in various higher education settings worldwide. The paradoxes and dilemmas relate to: the differential infrastructure and readiness of different-type higher education institutions to utilize the ICTs' potential; the extent to which the "old" distance education technologies and the

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new ICT replace teaching/learning practices in classrooms; the role of real problems, barriers and obstacles in applying new technologies; the impact of the ICT on different student clienteles; information acquisition versus knowledge construction in higher education; cost considerations; the human capacity to adapt to new learning styles and the ability to conduct research in face of the rapid development of the ICT; and the organizational cultures of the academic and corporate worlds. Understanding these inherent paradoxes and dilemmas is essential for policy makers at institutional and national levels of higher education systems in the process of planning a macro-level comprehensive strategy for the efficient and effective applications of the new ICT.

Introduction

Over the past decade the new information and communication technologies (ICT) have had a huge impact on the world economy, corporate management, globalization trends and education at all levels, including higher education. In the last few years dozens of conferences were devoted to examining a broad spectrum of uses enabled by the ICT, hundreds of scholarly articles and books were published on various aspects of e-learning, and multiple ventures have been undertaken by many actors in the academic and corporate worlds aiming at implementing a variety of uses and applications of the new technologies' potential. The fact is that the ICT are complex in nature and serve a rich array of functions. Quite often the discourse on ICT suffers from "The Tower of Babel Syndrome" – a confusing language and misleading conclusions, emanating from the fact that people refer to totally different functions and roles while using the same generic terms (Guri-Rosenblit, 2001a). Not only the meanings attached to specific terms are unclear, but also the language used in the relevant literature to depict the nature of the new study environments shaped by the ICT is blurred and confusing. The new study environments are defined by a long list of terms such as: web-based learning, computer-mediated instruction, virtual classrooms, online education, e-learning, e-education, computer-driven interactive communication, open and distance learning, I-Campus, borderless education, cyberspace learning environments, distributed learning, flexible learning, etc. (AFT, 2000, 2001; Bates, 1995, 1999; Collis, 1995; Collis & Moonen, 2001; Daniel, 1996; Fetterman, 1998; Guri-Rosenblit, 2001a; Harasim et. al., 1995; Khan, 1997; Littleton & Light, 1999; Matkin, 2002; Ryan, 2002; Selinger & Pearson, 1999; Somekh & Davis, 1997; Tiffin & Ragasingham, 1995; Trow, 1999). The multiple terms reflect the lack of a standardized language in the discourse on the ICT uses in educational environments, as well as portray different foci in relating to the various functions of the ICT that cover a vast range of activities.

In addition to the confusing language in the discourse on the new electronic technologies, there seems to be also a wide gap between the rhetoric in the literature describing the sweeping effects of the ICT on educational environments, and particularly on higher education settings, and their actual implementation. A few years ago many analysts, such as Morgan Keegan (2000), projected a multi-billion dollar e-education and e-training market globally. Virtual networks of colleges and universities have become a marker of a new economy. Several years on, the euphoria surrounding high technology industries has subsided, and the potential of e-education as a profit-making activity has become questionable (Matkin, 2002; Ryan, 2002). Costly experience has caused many higher education institutions to question the increasing costs of their commitments to digitization and wired campus programs.

Some inherent paradoxes and dilemmas in the process of implementing the ICT in higher education settings explain part of the misconceptions and failures of many e-learning ventures. This paper examines eight such paradoxes and dilemmas that relate to: the differential infrastructure and readiness of different-type higher education institutions to utilize the ICTs' potential; the extent to which the "old" distance education technologies and the new ICT replace teaching/learning practices in classrooms; the role of real problems, barriers and obstacles in applying new technologies; the impact of the ICT on different student clienteles; information acquisition versus knowledge construction in higher education; cost issues; the human capacity to adapt to new learning styles and the ability to conduct research in face of the rapid development of the ICT; and the organizational cultures of the academic and corporate worlds. Understanding these inherent paradoxes and dilemmas is essential for policy makers at institutional and national levels of higher education systems in the process of planning a macro-level comprehensive strategy for the efficient and effective applications of the new ICT. The paper concludes with projecting some leading future trends of the ICT implementation in higher education systems.

Paradox # 1

Those higher education institutions that are well equipped to utilize the ICT efficiently – either less need it or are reluctant to use it on a wide basis in their teaching/learning processes.

Those higher education institutions that can greatly benefit from the ICTs' potential – are ill-equipped to use their broad spectrum possibilities.

Higher education systems worldwide are vastly diverse and are composed of different type institutions. There are: elite research universities, mass-oriented universities, professional institutes, liberal arts colleges, community colleges, mega distance teaching universities, for-profit training institutions, etc. The academic goals, potential clienteles and organizational infrastructure of each of these institutions are diverse, and these profound differences shape the ways in which the new technologies are mobilized in each context to achieve different end-products (Guri-Rosenblit, 1999a).

Elite research universities around the world are relative newcomers in the distance education field, but paradoxically they are better equipped to utilize some of the ICT abilities and qualities as compared to many long-standing distance teaching institutes (Guri-Rosenblit, 1999b), as will be elaborated further on. Nevertheless, most of the research elite universities feel reluctant to use the new ICT to supplant the face-to-face interaction in a residential university setting. The new technologies are applied mainly to enhance the teaching/learning processes in the classroom rather than substitute the face-to-face interaction. Rarely do the research universities offer full online courses or programs. On the other hand, distance teaching universities, as well as some mega universities, that teach dozens of thousands of students, can benefit greatly from the ICTs' potential, but most of them lack the appropriate infrastructure and human capital to use the new technologies efficiently.

Why are research universities well equipped to use the new technologies efficiently, and why do they feel reluctant to use them?

The elite research universities have a favorable ratio of faculty-students and rich

financial resources, and therefore they can use the new ICT most effectively for the benefit of their student clienteles and academic faculty. Stanford University, for instance, has a ratio of 1:8.2 of faculty to students (Stanford, 2002) and UC Berkeley of 1:14 (Douglass, 2001), as compared to 1:100 and even more in mass oriented universities (Daniel, 1996). The new technologies have highlighted the enormous importance of the human interaction in teaching/learning processes. No expert teacher can interact with hundreds, and even dozens, of students. Most successful online programs, like the University of Phoenix Online and UMUC (University of Maryland University College), create very small virtual classes composed of 9 to 15 students (Ryan, 2002; Twigg, 2001). Obviously, many distance teaching universities that employ a very small faculty cannot afford creating small virtual classrooms in which the expert professors will communicate with hundreds of students (Bates, 2001; Guri-Rosenblit, 2001b). The continuous interaction between students and faculty and amongst students is a most attractive idea and is enabled by the new ICT, but at the same time most difficult, if not impossible, to put forward in highly populated universities with a small number of academic faculty.

The elite research universities have richer resources to lean on and are also much more attractive to the corporate world as compared to mass-oriented and distance teaching universities in developed countries, and even more so in developing countries. Corporate and business enterprises are interested in cooperating with universities in order to enhance research on the new information technologies, and to design tailor-made professional and upgrade training programs for their working force (Adelman, 2000; Ryan, 2002; Xebec McGraw & Training Magazine, 2001). When such corporations as Microsoft or Hewlett are willing to explore and examine in depth some of the ICT applications, they naturally approach universities such as Stanford, MIT, Harvard and Cambridge, and rarely do they refer to mass-oriented and distance teaching universities, which by their very nature have less prestigious research capabilities and facilities, and lack the reputation of the leading research universities.

In spite of the fact that research universities can design efficient online courses for distant students, they are less interested in doing so. First, they are not interested in widening access to large numbers of students and in broadening their boundaries through the ICT. By their very nature they are inclined to stay selective for the few and well-to-do students. Second, they have no real need and no will to supplant the overall classroom teaching by electronic devices. MIT is currently a leading institution in ICT applications (Olsen, 2002; Robinson & Guernsey, 1999). Its president, Charles Vest, stated clearly in his 2000/1 annual report that: "The residential university will remain an essential element of our society, providing the most intense, advanced, and effective education. Machines cannot replace the magic that occurs when bright, creative young people live and learn together in the company of highly dedicated faculty" (Vest, 2001). There is no wonder then that most applications of the ICT in well-established campus universities are used to enhance classroom interaction or to substitute part of the teaching/learning activities, not to replace them.

Why are the ICT so attractive to distance education institutions, and what kind of difficulties do they encounter in the implementation process?

The ICT have a potential to overcome three major problems of distance teaching institutions: to "rescue" the isolated students from their loneliness by providing interaction with teachers, professors and tutors, as well as with other peer-students; to

provide easy access to library and other information resources, which was nearly impossible in the past; and to update the self-study materials on an ongoing basis. But the very basic infrastructure of most of the large distance teaching universities hinders the possibility to substitute their current teaching/learning infrastructure by the new ICT, in spite of the latter's huge appeal and attraction.

One of the main areas in which the distance teaching universities choose to excel is the development of high quality study materials. The well-articulated materials replaced the ordinary textbooks and the low-level correspondence courses, and have been used extensively not only by the distance teaching universities' students, but also by many students at conventional universities. The production of such courses is tremendously expensive (Bates, 1995, 2001; Daniel, 1996; Guri-Rosenblit, 1999c; Peters, 2001). But the distance teaching universities succeeded in providing economies of scale by trading the high expenses of developing the self-study courses for a drastic reduction in the size of the permanent faculty and by employing many part-time professors from other universities to develop both the materials and provide tutoring. The academic faculty is much less involved in the actual teaching process, and many junior academic staff are responsible for the actual tutoring of the students. The simple formula applied by many distance teaching universities has been to invest high amounts of money in producing high quality study materials for the use of large numbers of students, and to employ a small academic faculty (Peters, 1994, 2001). The underlying assumption of this formula is that as the number of students increases, the cost per student decreases.

The ICT challenge this very basic formula, as well as the whole organizational infrastructure of the distance teaching universities. The shift to the new technologies demands a major overhaul of their whole operation, and another huge investment in setting up a totally new infrastructure for developing and delivering their courses (Bates, 1999, 2001; Guri-Rosenblit, 1999c, 2001b). Most of the distance teaching universities, which are based on relatively small academic staffs, cannot afford the hiring of many more academics in order to facilitate student-professors interaction in most of their large courses, studied frequently by thousands of students.

The egalitarian philosophy of most distance teaching universities, which requires them to provide equality of opportunities to all of their students, constitutes an additional problem in the adaptation process of the ICT. Their catering to large numbers of students, many of whom lack the ability or opportunity to reach Internet facilities and information resources, hinders the distance teaching universities from substituting part of their courses, or part of any given course, by online materials, and by a built-in reference mechanism in the pre-prepared textbooks. This accounts for the duplication phenomenon. Many distance education institutes develop currently both printed and online versions of courses, and enable their students to choose their preferred mode of study. Such a policy adds on substantial costs to the already very expensive process of developing self-study materials.

Therefore, in spite of the apparent attractiveness of the new ICT to distance teaching universities, as well as to many mass-oriented universities in developed and in developing countries – most of these institutions lack the appropriate infrastructure and necessary conditions, as well as the human capital to utilize the full potential of the ICT. There is no wonder thus that most of the large distance teaching universities have incorporated the new ICT so far to a very limited extent (Bates, 2001; Curran, 2001; Ryan, 2002). The UK Open University, for instance, continues to value print- and video-

based distance learning. More than 150 courses of the UK Open University are now said to utilize various aspects of the new technologies, although only fourteen are currently delivered entirely online.

Paradox # 2

The “old” distance education technologies were simple, and they replaced totally the learning/teaching processes in conventional classroom.

The new ICT are complex and offer a rich spectrum of uses, but they are mostly used for add-on functions, and do not replace most of the learning/teaching practices either in campus or in distance teaching universities.

The media through which distance education or distance communication have been operated throughout centuries were quite simple. In ancient times, paper or papyrus carried by messengers were used to transfer instructive or didactic correspondence from monarchs and rulers as well as religious leaders like the Apostle Paul to communities throughout the world. The invention of print, the advent of postal services and the development of professional publishing houses have further stimulated the use of the written text for education purposes (Daniel, 1996; Guri-Rosenblit, 1999c). Radio was added as a distance education medium at the beginning of the twentieth century, and television has been incorporated by a few distance teaching universities, notably the UK Open University, since the 1960's (Bates, 1995; Guri-Rosenblit, 1999c). All of these media have clear-cut and transparent characteristics and have replaced almost totally the teaching/learning encounters in classrooms, lecture halls, seminar settings and other face-to-face activities (except for some tutorial meetings, lab attendance or summer schools).

The new ICT are much more complex than the old distance teaching media, and they open up possibilities to design new study environments that have not been feasible beforehand – for both on-campus and off-campus students. Their capabilities go far beyond the ability to transfer content of textbooks and lectures to students at a distance. But paradoxically, as stated before, they are used mainly for enhancing classroom teaching or for substituting small portions of the functions performed at class (Bradburn, 2002; CHEPS, 2002; Guri-Rosenblit, 2001b; Harley et al., 2002; Matkin, 2002; Olsen, 2002; Ryan, 2002; Scott et al., 2002; van der Molen, 2001; Vest, 2001).

The range of ICTs' uses and applications is enormous. They are applied in a variety of domains for: information retrieval, course design, simulations and multi-media presentations, communication with instructors in and after classrooms sessions, communications amongst students, practicing exercises and tests, reading notice boards, classroom administration, etc. Furthermore, the ICT have a huge impact on other important activities of universities, such as library management, registration and loan administration, enhancement of research communities, academic publishing, mobility and cooperation between institutions.

The National Academies of the USA launched in early 2000 a study on the implications of the information technologies for the future of the nation's research universities (National Research Council, 2002). The panel members of this study concluded that the impact of the information technologies on the research university will be profound, rapid and continuous. The new technologies will not only influence the intellectual activities of

the university (learning, teaching and research) but also change how the university is organized, financed and governed. Nevertheless, they emphasized that the campus, as a geographically concentrated community of scholars and a center of culture, will continue to play a central role. Most of the ICT applications will take place in the framework of the campus-based university, and they will add on new functions or substitute part of the activities in classrooms, but altogether they will not replace the face-to-face encounters.

The needs of humans to socialize is a most essential one, and it explains why most students prefer to study in classrooms and lecture halls, even when provided the opportunity to get videotaped lectures, exercises and intimate tutoring through the electronic media. The need to socialize explains why most of the predictions of Alvin Toffler failed when he projected in his famous book, *The Third Wave*, the restructuring of the human society and economy into an "electronic cottage" (Toffler, 1980). He predicted the return to the cottage industry on a new, higher, electronic basis, and a new emphasis of the home as a center of society. In reality, only a handful of people choose to work at home. Most prefer to work outside their home, and even to commute for that purpose many hours per day. In other words, most people do not consider space and time as limits to overcome. Just those that have real problems to attend regular classrooms and campuses, choose distance teaching modes. Most others prefer the hybrid types of courses, which combine the attractive features of the new technologies with conventional learning/teaching methods.

Many academics in Israel participated in a wide national study in Israel that purported to enhance the use of the ICT in Israeli universities through special funding and incentives provided by the Council for Higher Education. At Tel-Aviv University more than 1,000 faculty members reported using various forms of e-learning in their classes in the last three years, but only 1% of them used the electronic media to substitute for class encounters (Guri-Rosenblit, 2002). There are many more studies that substantiate this trend (CHEPS, 2002; Collis & Moonen, 2001; Collis & van der Wende, 2002; Curran, 2001; Fetterman, 1998; Harley et al., 2002; Scott et al., 2002; Somekh & Davis, 1998; van der Molen, 2001).

Not only students in campus universities, but also many students at distance teaching universities prefer face-to-face tutorials as compared to online tutoring. For instance, in the University of Phoenix, a subsidiary of the giant Apollo Group, the largest accredited private distance teaching university in the USA which has operated since 1976 – the online programs constitute only about 10% of its student population (Ryan, 2002). The University of Phoenix appears to have no intention of downscaling its physical learning centers in favor of online provision. On the contrary, a "bricks and clicks" model, offering both online and distributed face-to-face option is regarded as the best solution for the working adult market.

Even in the business world, many prefer hybrid courses. There is an apparent resistance by many students to the notion of exclusively online education. One demographic group targeted by many universities is the busy professional unwilling to commit to weekly classes and highly mobile in work patterns. Specifically for this group, a hybrid model has emerged, combining online communication/resources with intensive residential periods on campus to engender group cohesion and social learning. A prominent example is the Global MBA from Duke University's Fuqua School of Business (Ryan, 2002). There is accumulated evidence that elearning is rarely used as a stand-alone

model in the corporate world. A European Study found that only 15% of companies using e-learning preferred a stand-alone approach, with the majority opting for greater online interaction and use of e-learning to prepare for and reinforce face-to-face provision (Xebec McGraw & Training Magazine, 2001).

Paradox # 3

The "old" distance teaching methods were used to overcome real problems, barriers and obstacles.

The problems and questions that the ICT assist in solving in teaching/learning practices (mainly in campus universities) are blurred and not clearly defined.

The new electronic media were introduced into the academic world as a sudden thunderstorm without having time to define the purposes and functions that they can fulfill or substitute. The lack of clear problems has turned out to be an acute problem in the adaptation process of the new technologies in universities and colleges.

Traditionally, distance education at university level purported to overcome barriers and difficulties of students that were unable to attend a conventional campus. The obstacles which distance education has enabled to overcome include: lack of formal entry qualifications; physical/health constraints; geographical barriers; working; family obligations; being held in closed institutions, such as prisons and hospitals, etc. The target populations studying through distance education at post-secondary level were considered as distinct and special, usually older than the age cohorts at classic universities, and mostly 'second chance' students according to a variety of criteria. Such was the case of Prof. Knight from St. Andrews University, which is the oldest Scottish university, who decided that women are also entitled to study higher education. He offered between 1877 and 1931 an external higher education degree in arts designed specifically for women that were scattered in over one hundred centers world-wide (Bell & Tight, 1993).

Interestingly, even nowadays when millions of people use the Internet and exploit its distance learning capacities, still the profile of the students studying all or most of their higher education programs through distance education methods resembles the profile of the traditional distant student. In a comprehensive survey which was published by the U.S. Department of Education in November 2002 *A Profile of Participation in Distance Education 1999-2000*, it was clearly found that students who chose to study distance education programs were "those with family responsibilities and limited time. They were more likely to be enrolled in school part time and to be working full time while enrolled" (U.S. Department of Education, 2002, pp. iii-iv). This survey was conducted on all undergraduate and graduate students enrolled in USA postsecondary institutions during the 1999/2000 academic year.

Unlike the clear obstacles and barriers which traditional distance teaching technologies were designed to overcome, the new technologies have offered multiple uses with no clear relation to any existent or future problem in the teaching/learning processes in campus universities. The reactions of many academics asked to incorporate the new technologies into their classrooms have frequently been of the type: "If it ain't broken, why fix it?" or "Technology is the answer - but what are the questions?" (Guri-Rosenblit, 2002).

A large study that was conducted at UC Berkeley from September 2000 to June 2002 on the use of technology enhancement in some large undergraduate courses in chemistry (Harley et al., 2002) constitutes an interesting example of the impact of problem definition on institutional decision-making. In the process of conducting the study, it was found that the technology-enhanced classes in chemistry can save both faculty time and space. Instructors spent less time answering routine questions because students were able to find some of the necessary information online. And it was found that laboratory sessions could hypothetically be reduced from four hours to three per week to better utilize lab space. Such a finding has been most interesting for the UC policy makers in face of the Tidal Wave II, namely an increase in the enrollment (43%) of about 63,000 full-time students for the University of California ten-campus system. If through the use of technology it is possible to save from 10% to 20% of space and faculty time, technology becomes a strategic solution to absorb more students, although it does not save money (ibid).

Many studies in the field of the ICTs' implementation stress that time has come for both governments and institutions to become more focused and strategic in their policies regarding the use of the ICT (Bates, 1999, 2001; CHEPS, 2002; Collis & van der Wende, 2002; Guri-Rosenblit, 2001b, 2002; Harley et al., 2002; Matkin, 2002; National Research Council, 2002; Trow, 1999; van der Molen, 2001; van der Wende, 2002). A macro-level organizational effort is needed for consolidating the multiple findings of the ICT uses into a coherent body of knowledge, available to decision makers in higher education settings.

Paradox # 4

The ICT open up the possibilities of widening access to higher education for new student clienteles.

Second-chance and unprepared students are less qualified to use ICT for their purposes (mainly at the undergraduate level and at distance settings).

A major role of distance education for over a century has been to widen access to higher education. Since the nineteenth century correspondence institutions, extensions and distance teaching universities have opened the gates of academia to diverse student clienteles for higher and continuing education. By doing so, the distance teaching institutions fulfilled an emancipatory ethos (Morrison, 1992), a kind of barrier removal mission. Time, space, prior level of education, social class, working and family obligations were defined as barriers to be overturned by special policies and mechanisms applied by distance education institutes. From the outset, many distance teaching universities have designed flexible access policies, appealing particularly to part-time and second-chance students. Part-time higher education is an essential component of the lifelong, recurrent education concept.

The new technologies, by their very nature, open up the possibilities of widening access to higher education for new student clienteles, and by doing so promote social equity (Gladieux & Swail, 1999). The new potential student constituencies include different groups. One such group consists of adults studying for recreational purposes - those who are willing to pursue fields of study different from their professional careers. Another large group of new student clienteles are professionals willing to upgrade their

professional knowledge and expertise on an ongoing basis. The fact is that the most successful e-learning ventures take place in professional training and professional upgrade programs (Adelman, 2000; Blumenstyk, 2003; Matkin, 2002; Ryan, 2002). Many students in the future are likely to study while they work. Being highly mobile, they will expect to continue studying while they move between different national jurisdictions, and e-learning will constitute an important tool for achieving this purpose in the growing entrepreneurial and globalized economies (Clark, 1998; Enders & Fulton, 2002; Trow, 1999).

A large group of the traditional distant students have been second-chancers, many of whom have no sufficient entry requirements to conventional universities, are usually less qualified to study independently, and are unprepared to cope with academic study. The accumulated experience of the large distance teaching universities indicates clearly that in order to deal effectively with 'second chance', unprepared students, it is crucially important to back the teaching/learning processes with efficient delivery and support systems. Many of the distance teaching universities provide their students with occasional campus-like grounds within regional and local study centers to meet and interact with each other, summer or residential schools, personal tutors, professional counselors and intensive tutorials.

Unquestionably, the ICT open up the possibilities of widening access to higher education, both in developing and developed countries, but it is important to remember that unprepared and less qualified students are less qualified to use the new technologies' capabilities without an intensive and steady support. Sir John Daniel, who served until 2001 as the Vice-Chancellor of the UK Open University, stressed already in 1996 that the potential success of the innovative electronic technologies depends to a great extent on the ability to provide individual learners with adequate backup throughout their studies. Daniel asked: "Can we through electronic mail, computer conferencing and the World Wide Web, provide the level of individual student support that we think necessary? We are experimenting with that, but despite all the arm waving, I think the jury is still out. If the jury comes back and declares us guilty of being able to provide effective, personal, tutorial support to students on a large scale, then all sorts of things become possible" (Daniel, 1996, p. 38).

It seems that since Daniel had phrased this question, the jury has raised its verdict - such support is possible when teaching online very small numbers of students, and such mode of teaching is most costly. This fact explains why most successful e-learning programs take place at the graduate, post-graduate and professional training levels. Undergraduate students, and particularly weaker students, need a lot of support and reinforcement both in regular and virtual classes. They cannot benefit from the wide plethora of programs put currently on the Internet without constant support and a caring and supportive environment. In other words, the potential of the new technologies to widen access to large numbers of young and unprepared students, mainly in developing countries, is most limited in reality.

Paradox # 5

The ICT provide unlimited access to information and skill training.

But information differs significantly from knowledge. Only expert teachers and professionals can guide novices to construct meaningful and relevant knowledge (particularly at the undergraduate level).

The new technologies provide unlimited access to information of all kinds for all types of students at all educational levels. E-learning offers attractive uses for all learners. Younger pupils enjoy its multi-media games and fun activities, acquiring very basic skills; older students use its endless information resources for preparing homework, assignments and examinations; and millions of people use e-mail, chat groups and other formats of telecommunication as students, as well as in their social and work lives. People frequently complain that they feel lost in the overload of information they get, and sophisticated search engines have been designed to assist in finding relevant information as fast as possible.

It seems that in the sweeping enthusiasm as to the endless possibilities of accessing remote databases and resources, somehow the essential distinction between *information* and *knowledge* has been blurred and confused. The traditional role of educational establishments at all levels has been to assist their students to construct knowledge through guidance, tutoring and personal attention, and not merely to impart information. Children could have studied at home from encyclopedias and books instead of going to school, if the main purpose of education was to acquire pieces of information. There is a huge difference between having a sack of flour and knowing how to transform it into bread.

The role of schools, colleges and universities is to assist their students to develop their learning styles, to construct the relevant knowledge for their lives, and to cope with knowledge, values and norms in a changing world by providing them with adequate tools. Accessible information does not turn automatically into meaningful knowledge without the assistance of a teacher or expert. Novices, particularly at the undergraduate level, need immensely the ongoing support and guidance of expert teachers. The boundless information available on the Internet might enrich the learning/teaching processes, but by no means can it replace them. In some liberal arts colleges which integrate various components of e-learning into their classes, the teaching personnel grows to include some additional experts. For example, in a specialized course on "Arts, Multimedia and the Internet" at Grinnel College, it was reported that a class of no more than 25 students are taught by a professor, a librarian who attends most class sessions and teaches those sessions about the location and assessment of sources on the Web. In addition, the class is also attended by an instructional multi-media teaching specialist (Scott et al., 2002). Thus, the use of media in undergraduate classrooms quite frequently extends that teaching staff rather than replacing the expert teacher.

An excellent example of the inherent limitations of materials put on the Internet is provided by the Open Courseware project of MIT (Olsen, 2002). By putting syllabi and some other relevant materials of about 2000 courses online, MIT had no intention to teach any student beyond its campus students. Its intention has been misunderstood by many. The project purports to provide an example of "intellectual philanthropy". The Open Courseware project will give interested students and faculty members all over the world a glimpse of the MIT curricula. But by no means does MIT intend to enroll large numbers of students, and offer online courses by MIT professors for credit. Already, some professors at other universities indicated that the load of the MIT courses is too heavy for their students, and the materials adequate for a quarter study at MIT will have

to be studied for a whole year by the students of their own institutions (ibid). The adaptation of the materials will be conducted in each setting by expert teachers. Very few, if any, independent students will be able to benefit from the MIT materials and substitute them for registering at a teaching institute. This is particularly true at the undergraduate level.

Paradox #6

Distance education was greatly justified for more than a century for its cost effectiveness and for providing economies of scale.

Most evidence on the applications of the ICT in higher education indicates that they cost more, not less than face-to-face classroom interaction.

One of the major benefits of distance education at university level in the last decades has been its ability to broaden access to higher education by providing economies of scale. This is particularly true since the 1970s, when a new brand of large-scale distance teaching universities has been established. The mega distance teaching universities followed the model of the UK Open University that was founded in 1969. There are about thirty such universities in various parts of the world. All of these large-scale universities were a product of governmental planning set to fulfill national missions, mainly to absorb large numbers of students at a lower cost as compared to traditional campus universities (Daniel, 1996). As discussed earlier, this goal has been achieved through an industrialist model of operation (Peters, 1994, 2001). The division of labor of the academic teaching responsibility into two separate phases constitutes the essence of the industrial model of distance education. The first phase is devoted to the production of high quality self-study materials. The second phase consists of the actual teaching of large numbers of students by lower rank academic faculty. As the number of students increases, the cost per student decreases. Some of the large distance teaching universities teach over 100,000 of students.

It seems that the simple formula of the industrial model upon which the large distance teaching universities operate accounts for part of the misconception as to the economies of scale that the ICT were expected to provide. The blurring of meanings between 'distance education' and 'e-learning' led to expectations and predictions that tens of thousands of students will be able to join higher and continuing education programs at lower costs as compared to classroom teaching in campus universities through the new interactive media. But the underlying premises of e-learning differ meaningfully from the industrial model of distance education. Quite frequently, effective e-learning costs more, no less, than conventional face-to-face teaching (Bates, 2001; Guri-Rosenblit, 2001b; Matkin, 2002; Ryan 2002).

In addition to the misunderstanding as to the essential difference between the industrial mode of distance education and e-learning, two additional factors account for the misconception as to the fast and easy profit making from e-learning. One factor relates to the substantial cuts of training costs that took place in the corporate world as a result from cuts of flights and hotel expenses on training. These cuts of costs caused many to assume that such money saving will occur also at universities employing e-learning. Obviously, it is more economical to bring training programs to the work place rather than sponsor the sending of workers for days to remote conference sites and training sessions. It is no wonder then that most of the profit making claims came from the

business and corporate world (Newman et. al., 2002; Keegan, 2000). But cuts in hotel and flight expenses have no relevance at all for students and faculty in the academic world. An additional factor relates to the underestimation of the high expenses of setting up an appropriate infrastructure for e-learning, its ongoing maintenance, and its wastage management.

Setting up an appropriate infrastructure for the effective utilization of the ICT in any university or college requires large investments. The computer hardware is still quite expensive, and its rapid change and the need for its frequent replacement increase the expense of using it. The initial costs of the basic infrastructure needed for operating e-learning is by no means a trivial issue. Bates stressed in his report on *National Strategies for E-learning in Post-secondary Education and Training* that: "E-learning is heavily dependent on appropriate technological infrastructure already being in place for commerce or government reasons. Stable electricity and reliable and moderately priced Internet access is a necessary condition for e-learning" (Bates, 2001, p.113). Until there is a basic and reliable infrastructure in place, e-learning is unlikely to be a realistic or practical choice for learners.

Not only the infrastructure, but also the maintenance of e-learning is costly. As discussed earlier it is of tremendous importance to establish support systems for both students and teachers who use the ICT. The induction of the teaching faculty to the new technologies necessitates ongoing professional and technical support and the establishment of special centers for course development (Bates, 1999, 2001). Ongoing support is also needed for students, particularly weak students (Collis & Moonen, 2001; Guri-Rosenblit, 1999c; Littleton & Light, 1999; Scott et al. 2002; Somekh & Davis, 1997).

In addition to the high expenses associated with setting up an appropriate infrastructure for e-learning and keeping up its maintenance, the wastage of the outdated hardware turns out to be an unexpected additional cost. Getting rid of outdated computers poses financial, environmental and ethical challenges (Carlson, 2003a). Last year the University of Minnesota, for instance, spent more than \$100,000 for the de-manufacturing of old computers - to pull out valuable steel, aluminium, copper and the chips that contain gold, and to get rid of in an appropriate way the many poisons the computers contain. During the boom of technology in education, colleges bought computers by the truckload. Now the institutions have to be careful they how throw those aging computers away. In some USA states, such as California, New Jersey, Massachusetts, Oregon, Virginia and South Carolina, legislators have proposed or passed laws that ban the disposal of electronic waste and outline how to treat large quantities of hazardous materials which include computer monitors, televisions and other electronics. Electronic waste is regarded now as the next big environmental issue. Old computers compose 10% of the solid-waste stream in the USA, but computer-related waste is growing three times as fast as any other kind. The number of computers retired in 2002 was 40 million, and the number of obsolete computers will probably climb to nearly 300 million in 2004 (ibid). Many universities and colleges have not decided yet how to deal with their electronic waste and how to sponsor this activity. In sum, it is definitely not very easy to turn e-learning into a profit-making activity.

Paradox #7

The developments of the new ICT are very fast.

The human capacity to adapt to new habits and new learning styles is very slow, and research in academia necessitates a perspective of time and reflection.

The development of the new electronic media is very fast. It poses difficulties for both researchers and students. Researchers find it difficult to conduct longitudinal studies on the ICT effects and capabilities, and students, as well as their professors, find it difficult to adapt to new learning and teaching styles on an ongoing basis. Martin Trow phrased the main problem of research on the ICT: "We need research in this area because while we can say with some confidence that the new forms of instruction will have large effects, for most part we do not know the nature of those effects, nor their costs, material or human" (Trow, 1999, p. 203). Most of the ICT impacts on educational settings are still ahead of us. One inherent limitation of the current and future research on the new technologies is tied to their speed of development. Research in academia is characterized by the ability of the researchers to examine any investigated phenomenon from a perspective of time and through a relatively long reflective process of deliberation and trials. The speed of the ICT development inhibits this very basic characteristic of academic research. Researchers do not possess the luxury to examine the influences of the new technologies on human learning from a distant perspective and over time, since the entities they are starting to investigate might become obsolete at the time their conclusions are drawn. It follows, that the academics' tendency to examine new phenomena rationally and carefully is strongly reduced by the uncertainties of the future technological developments.

An excellent example as to the inherent difficulty to project definite future impacts of the ICT on higher education is provided by a wide-range study launched by the National Academies of the USA to investigate the impact of the new technologies on the future of the research universities (National Research Council, 2002). In the conclusion section, the panel members of this study apologize for not being able to provide definite recommendations as how to proceed with the ICT implementation in research universities: "Although part of its charge was to make policy recommendations, the panel ultimately decided not to do so in this first phase of activity. One factor in this decision was that information technology is evolving so rapidly that any perspective set of conclusions and recommendations could quickly become outdated. Also, the panel was unable to examine the numerous issues bearing on the topic... with the depth needed for recommending policy changes" (ibid, p. 49).

There is no wonder therefore that the ICT are adapted in higher education settings much more slowly than expected a few years ago. The human capacity to adapt to new styles of learning and teaching is limited and slow, and it applies both to students and teachers. A large-scale comparative study on the applications of the ICT in 174 higher education institutions in seven countries (The Netherlands, Germany, the UK, the USA, Australia, Norway and Finland) (Collis & van der Wende, 2002) was presented at an international conference on "The New Educational Benefits of ICT in Higher Education" that took place in Rotterdam in September 2002. The final conclusions of this study were: "Change in relation to the use of ICT has been gradual and unsystematic. Many experiments and pilot projects have been launched leading to interesting innovations, which are, however, generally not well disseminated. ICT is used mainly to increase flexibility in on-campus delivery of education. Institutions turned out to be only moderately focused on new target groups, such as lifelong learners and international students" (CHEPS, 2002, p. 2).

Both students and academic faculty seem to like the traditional classroom encounters, even when given the opportunity of being exempt from attending a class, and provided with all the needed materials and assignments online. In the UC Berkeley study, mentioned earlier, which purported to examine the impact of technology enhancement in large chemistry courses (Harley et al., 2002), it was found that only 16% of the students would be willing to watch lecture webcasts entirely online instead of going to the lecture hall. 84% of the students indicated that they prefer to attend the face-to-face encounters, even though they could have studied all the materials, conducted all of the experiments and watched the video-taped lectures at home. It seems that many forecasts that predicted the replacement of the campus university by the new technologies have not been substantiated at all in reality, and the traditional styles of learning and teaching still reign dominantly in most higher education settings.

Paradox #8

The costs of applying ICT, as well as its development, justify strong cooperation between the academic and the corporate worlds.

The organizational cultures of these two worlds differ enormously, resulting in many failures of such collaborative ventures.

The growing use of the ICT in higher education led already, and this trend is likely to intensify in the future, to a growing collaboration between the academic and the corporate worlds. There are clear trade offs that these two worlds can offer to each other. Universities have the research facilities and the human capital to both advance the development of the new technologies and to assist in their effective utilization in various societal domains, and the corporate world has the necessary funds, as well as major intrinsic interests to invest in research on ICT.

Many alliances have been created in the last few years between leading companies and universities. One such cooperation was created between Microsoft and MIT in October 1999 to investigate the range of possibilities of an I-Campus for distance learning and for new modes of academic publishing (Robinson & Guernsey, 1999). Harvard, Dartmouth, John Hopkins and Brown universities in the USA, have been investing in recent years in for-profit college companies (Blumenstyk, 2003). Harvard University, for example, is the biggest institutional investor in a \$590 million fund run by Boston's Charlesbank Capital partners, which made its foray into the sector in April 2002 by investing in a school that trains automobile and motorcycle technicians, not exactly the typical Harvard students. Side by side with some successful collaborations, many joint ventures between leading universities and giant corporations failed to yield the initial expected results. Many business models for online programs were predicated on booming employer demand, without establishing end-user demand (Ryan, 2002). And as Matkin put it in 2002: "The roof clearly has caved in on several efforts of prominent universities and colleges that entered the online game early with large investments and big plans. The headlines that two or three years ago announced with great fanfare the formation of large-scale and well-financed online learning partnerships have been followed in the past year with equally prominent headlines announcing 'restructuring', 'refocusing', and 'realignment' strategies in these joint ventures" (Matkin, 2002, p. 1).

Some failures have been dramatic with dire consequences to some universities. High profile failures include: NYUOnline that launched in 1999 a for-profit arm, and

announced that it will close as a separate division of NYU, fold some of its operations back into the School of Continuing and Professional Education, and sell its infrastructure. NYU had invested \$21.5 million into NYUOnline by July 2001 (Ryan, 2002). Temple University abandoned Virtual Temple in July 2001 (Blumenstyk, 2001). Jones International University with the backing of multimillionaire Glenn Jones and the Apollo Group, has not performed to its initial expectations. It attracted only 200 degree students by mid 2001, and graduated only 10 students in total, in 2001 (ibid).

One of the most adventurous and highly funded projects involving top universities, including the University of Chicago and Columbia University - UNext.com, has eaten up in excess of \$200 million with, so far, little or no prospect of return for investors (Matkin, 2002). Another Columbia-sponsored for-profit company, called Fathom.com, closed in 2003 (Carlson, 2003b). In its two years of operation the venture featured materials from a dozen prominent institutions and attracted a widespread media attention, but it was never profitable. It suffered many critics from the Columbia faculty because of the losses it has sustained after an investment of more than \$25 million.

Deep differences between the organizational cultures of the academic and the business worlds explain part of the problem in some of the joint ventures. Their expectations, perceptions and professional lingos reflect distinct working milieux. The research interests of the business sector are different from those of the academic world. The decision-making apparatus in the business world differs meaningfully from that of the universities. Corporations are ready to invest large sums of money both in research and in inviting tailor-made training programs, but they want the end-products to be delivered exactly on time, and decisions made fast. These are not exactly the values and operational procedures that characterize the academic life. Decisions at any given academic department have to be approved by several other committees, and large amounts of time are needed for reflection and deliberation.

In addition, many corporate trainers claimed that they were frequently disappointed by the quality of the programs they got from universities. Some of the generic online courses they have purchased were simply boring and could not engage learners sufficiently to maintain interest. Too often text was shoveled on screen, animated with a few trite graphics, and tested with memory-recall quizzes. But, it is also obvious that more customer-tailored programs increase development costs, and eventually eliminate the savings promised by mass-market distributed learning.

Some other business leaders claimed that the structure of the university courses does not fit their rhythm and needs. The ponderous nature of some for-credit university courses appear to be unattractive to many in the business environment – as NYUOnline found prior to its demise. It reduced its 13-week semester-length courses based on university rhythms, to 6 week modules, in a desperate attempt to cater to short attention spans and fast-finish mentalities. Industry and the corporate world prefer just-in-time training rather than concerted programs of study (Ryan, 2002). Such disappointment led many large corporations to establish their own universities geared to train their personnel in close coordination with their professional demands.

There is no doubt that collaboration between universities and the corporate world will continue to evolve. But in each collaborative venture it is of tremendous importance to define the major goals of each party, the exact anticipated end-products, and the terms

of publishing the final products, results or conclusions, and to take into consideration the immense differences of their organizational cultures.

Concluding Remarks

This paper examined eight inherent paradoxes and dilemmas in the implementation process of the new information and communication technologies in various higher education settings. These paradoxes and dilemmas explain partially the wide gap between the rhetoric in the literature describing the sweeping effects of the technologies on educational environments and their actual implementation. However, it is obvious that the use of e-learning in higher education will grow in the future, and will be based on more realistic expectations and lessons drawn from both successes and failures in this field in the last few years.

The impact of the new technologies on higher education will affect all domains of academic activity - research, teaching and learning, organization, finance and government. It is important to note, that the provision of distance education through the new ICT will constitute a partial function of e-learning applications, and the campus as a center of culture, knowledge generation, and the locus of students-faculty interaction will continue to thrive and flourish. The new technologies are not likely to endanger the existence of the campus universities, but rather enrich, support and enhance many of their activities.

Many studies in the field of the ICT implementation stress that time has come for both governments and institutions to become more focused and strategic in their policies regarding the use of the new technologies (Bates, 1999, 2001; Collis & van der Wende, 2002; Guri-Rosenblit 2001b, 2002; Harley et al., 2002, Matkin, 2002; National Research Council, 2002; van der Molen, 2001; van der Wende, 2002). A macro-level organizational effort is needed for consolidating the multiple findings of the ICT uses into a coherent body of knowledge, available to decision makers and practitioners in higher education settings.

One important lesson that can be learned from past experiences is that if universities are to gain maximum benefit from their digital resources, institutions might be advised to play to their strengths rather than trying to create resources in every discipline and offer every service. It is important also to exchange resources and to change the "not invented here, must invent for sale" approach. Well-planned collaboration between higher education institutions might benefit all participating actors.

There are also distinct differences between countries in the application of e-learning. The most notable differences exist between the developed and developing countries. Paradoxically, the latter can greatly benefit from the new technologies, but most of them still lack the appropriate resources to adopt e-learning. Bates, who was asked by the *International Institute for Educational Planning* of UNESCO to recommend national strategies for implementing e-learning in post-secondary education in various parts of the world, concluded that: "Those countries that are not yet ready for the knowledge-based economy are probably not yet ready for e-learning" (Bates 2001, p. 111), and he suggested that those countries with large numbers of students unable to access the later years of secondary or higher education should adopt the industrial model of the distance teaching universities, that provides the best route for mass education, rather than design

e-learning frameworks. In other words, the utilization of the new technologies has to be based on a careful examination of their costs and the necessary infrastructure for their successful implementation. There is a clear technological divide between developing and developed countries. Most developing countries do not possess the resources and skilled workforce necessary to make e-learning feasible and available on a wide scale. But also large distance teaching universities in the developed world will utilize the new technologies mainly for add-on functions as a supplement to their main core curricula that will continue to be based mainly on printed self-study materials and mass media.

E-learning will promote the growth of both academic trade and academic philanthropy. More universities and new for-profit companies will export academic and professional programs as a commodity to a variety of student populations. There are already some noticeable differences between national policies in this domain. Australia, the UK and Canada are more oriented to the international market as compared to the USA (Ryan, 2002; van der Wende, 2002). Many of their universities try to export their higher education as a commodity to third world countries. The USA universities are more directed inwards, generally preferring campus-based integration of ICT, with a few examples of purchases and partnerships in physical campuses overseas. Concurrently with a growing use of e-learning for profit and commercial purposes, academic philanthropy through the utilization of the new technologies will grow as well. The Open Courseware project of MIT constitutes such an example. Already some other universities, such as Carnegie Mellon, Princeton and Stanford have followed suit (Olsen, 2002).

E-Learning will greatly contribute to a growing flexibility in academic study patterns (Collis & Moonen, 2001). Flexible learning offers students many opportunities to adjust their needs and learning styles to a variety of learning settings and media combinations. Hybrid courses, combining various components of face-to-face encounters with online provision will emerge as a growing pattern in many academic institutions. It is likely that more graduate and postgraduate students will study online, whereas the majority of undergraduates will prefer the more conventional classroom meetings. For-profit institutions are likely to dominate the market of professional training.

The use of ICT will add new roles to the academic faculty. Teaching responsibility will be distributed among several actors. Academics will become more facilitators and mediators between knowledge bases and students, rather than the main vehicle for transmitting bodies of knowledge. The development of online courses and the adaptation of traditional learning materials to delivery through the Internet are complex processes which require teamwork and the participation of many actors. Academics will have to become reconciled with collaborating with other colleagues and professionals in designing materials and in the teaching process. The new technologies will require the academic faculty to assume new responsibilities and to develop a range of new skills. Faculty members will be expected to lead teleconferencing via the computer, be able to lead chat groups, and design computer software. At the same time, teachers will have greater flexibility to choose the teaching styles better suited for their personal strengths and individual preferences.

E-learning will enhance globalization trends (Enders & Fulton, 2002). Universities are at present engaged in becoming partners in inter-institutional schemes: students, academic staff and curricula are transferred and exchanged between institutions; accreditation agencies ensure promptness in accrediting previous learning; and governments append

their signatures to collaborative projects. E-learning will constitute an important tool for strengthening partnerships between academic institutions within any particular country and across national borders.

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