Education in and for the Information Society

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PREFACE

UNESCO has fully supported the World Summit on the Information Society (WSIS) preparatory process from its beginning, and has succeeded in defining and promoting its positions while setting the ground for its contribution to the Declaration of Principles and the Plan of Action that the Summit is expected to adopt. UNESCO's proposed elements for inclusion in the Declaration of Principles and the Plan of Action are based on its mandate, which leads it to promote the concept of *knowledge societies*, rather than that of global *information society* since enhancing information flows alone is not sufficient to grasp the opportunities for development that is offered by knowledge. Therefore, a more complex, holistic and comprehensive vision and a clearly developmental perspective are needed.

The proposals are responses to the main challenges posed by the construction of knowledge societies: first, to narrow the digital divide that accentuates disparities in development, excluding entire groups and countries from the benefits of information and knowledge; second, to guarantee the free flow of, and equitable access to, data, information, best practices and knowledge in the information society; and third, to build international consensus on newly required norms and principles.

Knowledge societies should be firmly based on a commitment to human rights and fundamental freedoms, including freedom of expression. They should also ensure the full realization of the right to education and of all cultural rights. In knowledge societies, access to the public domain of information and knowledge for educational and cultural purposes should be as broad as possible providing high quality, diversified and reliable information. Particular emphasis should be given to diversity of cultures and languages.

In knowledge societies, the production and dissemination of educational, scientific and cultural materials, the preservation of the digital heritage, the quality of teaching and learning should be regarded as crucial elements. Networks of specialists and of virtual interest groups should be developed, as they are key to efficient and effective exchanges and cooperation in knowledge societies. ICTs should be seen both as educational discipline and as pedagogical tools in developing effective educational services.

Lastly, these technologies are not merely tools, they inform and shape our modes of communication, and also the processes of our thinking and our creativity. How should we act so that this revolution of minds and instruments is not merely the privilege of a small number of economically highly developed countries? How can we ensure access for all to these information and intellectual resources, and overcome the social, cultural and linguistic obstacles? How should we promote the publication on line of increasingly more diversified contents, potentially a source of enrichment for the whole of humanity? What teaching opportunities are offered by these new means of communication?

These are crucial questions to which answers must be found if knowledge societies are to become a reality, and offer a world-wide space for interaction and exchange. They are also questions which the actors of the development of these technologies – States, private enterprise and civil society – must answer together.

On the occasion of the World Summit on the Information Society, UNESCO intends to make available to all participants a series of documents summarizing some of the most worrying questions which have just been mentioned. These will help participants to take the measure of the upheavals brought about by the emergence of the new information and communication technologies (NICTs), and will deal with the potential for development, the difficulties encountered, possible solutions, and the various projects implemented by UNESCO and its many partners.

Abdul Waheed KHAN
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1. Introduction: Global Commitments

The goals of reducing poverty and building more just and equitable societies underpin a global vision enshrined in 2000, when the UN General Assembly[1] adopted the Millennium Development Goals, aimed at creating an environment at the national and global levels that will stimulate economic and social development. The eight goals, signed by 189 nations, include commitments to education, health and environmental sustainability. They call for a global partnership for development, and include a target to "make available the benefits of new technologies, especially information and communications" by working "in co-operation with the private sector."[2]

These technologies are engines of growth and tools for empowerment. They offer unlimited access to information and invite a profound rethinking of the purpose of education and its relevance to national development. They have the potential to widen access to education at all levels, to overcome geographical distances, to multiply training opportunities, and to empower teachers and learners through access to information and innovative learning approaches – both in the classroom, from a distance, and in non-formal settings. Specialists widely agree that without judicious use of technology, defined in the broadest sense to encompass radio, television and computers, many developing countries will be unable to satisfy the basic educational needs of all children, youth and adults, nor will they be in a position to meet the rising demand for higher and continuing education.

The overriding importance of education as a human right and a decisive factor in social and economic development has been reiterated by the United Nations for over a decade. The World Conference on Education for All, held in Jomtien, Thailand, in 1990, was convened largely in response to a major education crisis that was undermining the earlier achievements of many developing countries. Jomtien introduced an expanded vision of "Education for All", covering early childhood care, adult literacy, training for youth and adults, and the "knowledge, skills and values required for better living and sound and sustainable development." This vision anchors education into a local, national and global context. It recognizes that one learning model

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1. Millennium Summit, New York, 6-8 September 2000.
2. Goal 8, target 18.

does not fit all, and underscores the importance of alternative paths to schooling. The Jomtien World Declaration on Education for All recommended that "All available instruments and channels of information, communications, and social action could be used to help convey essential knowledge and inform and educate people on social issues. In addition to the traditional means, libraries, television, radio and other media can be mobilized to realise their potential towards meeting basic education needs of all."[3]

Despite progress throughout the 1990s in expanding enrolment of children in formal schooling and reducing gender disparities in education, Jomtien's objectives were not met in many countries. The possibilities of reform were affected by declining levels of international financial aid, the redrawing of the global map after the end of the Cold War, the emergence of crises and conflicts, rising numbers of refugees and displaced persons, and the devastation caused by HIV/AIDS. Over the same decade, the revolution in ICTs continued to transform virtually all human institutions, exacerbating divisions that already existed between those with access to technology and those on the margins of the information highways.

Building upon the Jomtien vision, 164 governments committed themselves at the World Education Forum in Dakar (April 2000) to ensuring that by 2015 all children would complete a full course of good quality primary education, significantly expanding learning opportunities for youth and adults, halving illiteracy levels and eliminating gender disparities at all levels of education (see box). It should be noted that two of the objectives – achieving universal primary education by 2015 and eliminating gender disparity in primary and secondary education, preferably by 2005, and at all levels of education no later than 2015 – were incorporated as Millennium Development Goals. Both these goals were defined as critical to the elimination of poverty.

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3. Article V of the World Declaration on Education for All: Meeting Basic Learning Needs, World Conference on Education for All, Jomtien, Thailand, 5-9 March 1990.

The Six Goals of Education For All

1. Expand and improve comprehensive early childhood care and education, especially for the most vulnerable and disadvantaged

2. Ensure that by 2015 all children have access to and complete free and compulsory primary education of good quality

3. Ensure that the learning needs of all young people and adults are met through equitable access to appropriate learning and life skills programmes

4. Achieve a 50 per cent improvement in levels of adult literacy by 2015, especially for women, and equitable access to basic and continuing education for adults

5. Eliminate gender disparities in primary and secondary education by 2005 and achieve gender equality in education by 2015

6. Improve all aspects of the quality of education and ensure its excellence so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skills

Participants in Dakar pledged to "harness new information communication technologies to help achieve Education for All goals". As the Organization's Director-General Koïchiro Matsuura later noted at the World Economic Forum in Davos in January 2001, "there will be no *information for all* without *education for all.* This is top priority. For the public and the private sectors alike."[4]

Education for All is the foremost priority of UNESCO, because education is both a fundamental human right and a key to sustainable development and peace within and among countries. Achieving the goals set in Dakar and at the Millennium Development Summit requires a commitment above all else to access, equity and quality in primary and secondary education. It means ensuring that the digital divide does not further marginalize the poorest sectors of the population, and it entails finding creative, alternative paths to learning. It also calls for continuous reflection on ensuring that education does justice to the local context – particularly cultural, linguistic and economic needs – and the global one, in light of the reality of growing interdependence between nations. Beyond the primary and secondary level,

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4. UNESCO, Address by Koïchiro Matsuura at the Special Session on the Global Digital Divide Initiative, annual meeting of the World Economic Forum, Davos, Switzerland, 29 January 2001.

rising demand and the rapidly evolving global context are also spurring a profound reflection on how higher education can cater to growing numbers of students and respond more effectively to wider developments in education systems, notably through research and teacher training.

Depriving children, youth and adults of quality education is effectively to bar them – and their societies – from a better future. No country has succeeded without educating its people. This is all the more true in our societies, where knowledge is a leading generator of wealth. Modern information and communication technologies have a role to play in advancing educational performance. They must be better understood and exploited in order to improve educational quality and broaden the reach of education, in particular to underprivileged groups.

The relationship between ICTs and education, however, is a complex one, confronting policymakers, educators and the international community with a new spectrum of ethical and legal issues. This publication aims to bring to the attention of a broad audience the potential of ICTs to expand and improve teaching and learning in a wide variety of contexts, with a specific focus on developing regions and UNESCO's initiatives. It will draw attention to issues that have arisen in the context of globalisation, involving cultural diversity, ownership of knowledge and equity. Finally, it is underpinned by UNESCO's core mission "to promote the free exchange of ideas and knowledge," and the Organization's renewed focus on upholding education as a fundamental human right, improving educational quality, encouraging innovation, enhancing capacities and acting as a catalyst for international co-operation.

2. Towards Knowledge Societies

Education is first and foremost a fundamental human right, spelt out in Article 26 of the Universal Declaration of Human Rights (1948), which declares that 'elementary' education shall be free and compulsory, and that higher levels of education will be equally available on the basis of merit. This pledge was reiterated in several major international gatherings throughout the 1990s, and most recently in the Dakar Framework for Action (2000), which reaffirms education as "the key to sustainable development and peace and stability within and among countries, and thus an indispensable means for effective participation in the societies and economies of the twenty-first century, which are affected by rapid globalisation."[5] An array of compelling evidence shows education's direct impact on health, fertility rates, life expectancy, productivity in rural and urban self-employment, and per capita income growth. A recent study by UNESCO and the OECD[6] on 16 emerging economies finds that investment in human capital over the past two decades may have accounted for about half a percentage point in the annual growth rates of those countries. The study emphasized the rich dividends reaped from investing in secondary and tertiary education – not just primary. A broader benchmark for judging development success, advanced in the past two decades by Nobel laureate Amartya Sen, emphasizes the extent to which people's capabilities are enhanced and their choices widened by specific policies. This approach stresses that education is intrinsically valuable both as an end in itself, and as a "constituent component of development." In addition, the capabilities approach recognizes that education plays an important role in empowering the disadvantaged, and can be instrumental in tackling other injustices if it is both provided and enforced: compulsory primary education will reduce child labour, for example.[7]

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5. Dakar Framework for Action. Adopted by the World Education Forum. Dakar, Senegal, 26-28 April 2000. Article 6.
6. UNESCO/OECD.*Financing Education – Investments and Returns*. 2002.
7. Education for All Global Monitoring Report 2002. *Education for All: Is the World on Track?*, pp. 31-33.

2.1 The education divide

The map of education across the world, however, reveals extreme inequalities, which prevent millions of children, youth and adults from exercising their most basic rights. Despite a huge expansion in enrolment over the past decades, 115 million children, most of whom live in sub-Saharan Africa and southern Asia, still remain out of school. Close to 60 percent of them girls. According to the *2002 Education for All Global Monitoring Report*, 70 countries out of 128 for which data is available will not achieve the three measurable Dakar goals – universal primary education, closing the gender gap in education and halving adult literacy by 2015 – without a significant change in policy. At the secondary level, access remains inequitable in many countries, especially for girls. The shortfalls in universal education are even more keenly felt now that enrolments at primary level have expanded. Half of sub-Saharan African countries have transition rates from primary to secondary that are below 50 per cent. Educational authorities are grappling with issues of low quality, low retention, poor academic performance and an inadequate match between curricula and the path of national socio-economic development. The impact of the HIV/AIDS pandemic is compounding this crisis in education.

Secondary Education
(Gross enrolment ratio, 1999/2000)

Region	Male	Female
Arab States	62.6	57.7
Central and Eastern Europe	79.3	79.7
Central Asia	43.7	43.3
East Asia and the Pacific	66.9	62.9
Latin America and the Caribbean	79.6	85.9
North America and Western Europe	104.3	107.2
South and West Asia	58.8	44.3
Sub-Saharan Africa	26.4	22.4

Source: Education for All Global Monitoring Report 2002, *Is the World on Track?*

The current United Nations Literacy Decade (2003-2012) is placing the spotlight on the world's 860 million illiterates, two-thirds of whom are women. Giving them the resources to participate in society is a precondition

for reducing poverty. In its proclamation of the Decade, the UN General Assembly stated that creating literate communities was essential to eradicating poverty, achieving gender equality and ensuring sustainable development. But the problem of literacy is not limited to poor and marginal groups. Illiteracy is a moving target: the second report from the OECD's Adult Literacy Survey, which focuses on industrialized and emerging countries, found that between one quarter to more than one half of the adult population fails to reach the level of aptitude considered to be a suitable skill threshold for coping with the demands of modern life and work.[8]

The second half of the twentieth century will go down as a period that witnessed the most spectacular expansion in the history of higher education: student enrolments increased over six-fold worldwide, from 13 million in 1960 to 82 million in 1995. But over this same period, the gap between industrially developed, developing countries and the least developed countries widened in terms of access and resources for learning and research. Tertiary enrolment stands at three percent in the least developed countries, compared with 50 percent in North America, Western Europe and parts of Asia. At all levels, but especially at the secondary and higher levels, education systems are now faced by rising demand and high expectations on the part of parents and students. It is widely agreed that conventional strategies – doing more of the same – will not meet current and future needs within reasonable time. A developing country has to find more flexible, diversified and affordable modes of delivering education in order to make dramatic improvements both in its children's schooling and in its continuing education systems.

2.2 A new vector of wealth

The transition to knowledge societies confronts countries with the challenge of raising their educational standards. The pivotal contribution of education in securing development objectives is all the more apparent in a world where the ICT revolution has deepened the interdependence between nations. No field of human endeavour has been left untouched by

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8. Cited in Haddad, Wadi D & Draxler, A. "The Dynamics of Technologies for Education," in *Technologies for Education*, UNESCO/AED, 2002.

technological forces, from manufacturing and financial services to politics, science, health and culture. The market place is global and highly competitive, forcing individuals, firms and entire nations to adapt and improve their skills continually in order to compete effectively. Knowledge, both basic and applied, is being generated at an unprecedented pace and is growing exponentially. As societies move away from an industrial economy model, the competitive edge belongs to those with the capacity to create new knowledge and apply it rapidly through information and telecommunications to a wide range of human activities.

Globalization, which is largely driven by the ICT revolution, is placing an ever higher premium on knowledge as a vector of wealth. The importance of knowledge as the cornerstone of economic progress has led governments into taking greater interest in forming highly skilled workforces. The job market calls for computing, communication, problem solving and entrepreneurial skills. Technology is spurring the emergence of more flexible work organizations, and calling for continuous upgrading of skills to keep pace with the speed of the transformation. The fast changing patterns of trade, coupled with technical innovations, make it difficult to predict what skills will be needed in the future. Globalization, however, is not only economic; it is also the internationalization of human exchanges and the circulation of ideas, as witnessed for example in the emergence of a global civil society. As such, globalization could well provide a gateway to unprecedented opportunities for learning.

2.3 Rethinking education systems

These economic and social changes have wide-ranging consequences for education systems. Following the spread of this new economy, based on "intangible" capital, UNESCO has encouraged a profound reflection on the changing role of education and the knowledge, skills and values that are required to participate fully in our societies. The International Commission on Education for the Twenty-first Century, headed by Jacques Delors, recognized that our societies must overcome tensions between the global and the local, the universal and the individual, tradition and modernity, and between the extraordinary expansion of knowledge and the capacity of human beings to assimilate it. As a result, the Commission emphasized four pillars that it describes as the foundations of education: *learning to live*

together, *learning to know*, *learning to do* and *learning to be*. The Commission also stressed that learning throughout life is the lifeblood of society, and discussed the need to expand the number of opportunities and entry points for learning. From being rigid and closed, the Commission argued that education systems must become more of a continuum that is adapted to a seamless to-and-fro between continued learning and the world of work. The Commission's report adds that "traditional responses to the demand for education that are essentially quantitative and knowledge-based are no longer appropriate. Each individual must be equipped to seize learning opportunities throughout life, both to broaden her or his knowledge, skills and attitudes, and to adapt to a changing, complex and interdependent world."[9]

It is hardly surprising that every major education conference in the 1990s has called for a new or renewed vision of education, based on a profound reconsideration of the conventional model. Most experts agree that education in the twenty-first century needs to focus more sharply on the ability to communicate, to work in teams, to think critically, to adapt to change, to be innovative, creative and familiar with new technologies. Alongside these cognitive outcomes, training in life-skills is increasingly viewed as an essential tool for life, enabling young people to tackle a range of issues, from HIV/AIDs prevention and teenage pregnancy to environmental awareness.

Ever higher levels of education are needed to enable people to participate effectively in society, making quality secondary-level education and vocational training opportunities more vital than ever for personal and national development. As societies become more complex, more sophisticated skills are required for social integration and economic participation. It is imperative that all young people, in or out of school, have access to technological tools and knowledge-sharing networks, not only to improve their job opportunities, but for the broader purpose of gaining access to an ever-expanding fount of information concerning health, water, agriculture and other fields of development. In terms of both knowledge acquisition and mastery of information technologies, individuals who have

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9. Delors, Jacques. *Learning: The Treasure Within*. Report to UNESCO of the International Commission on Education for the Twenty-first Century. UNESCO Publishing, 1996.

passed the necessary skill threshold are in a position to gain more, while others are left out.

Of all the sectors of formal schooling, secondary education is the one that is expanding most rapidly today across the world. This trend is bound to continue given the current expansion in primary schooling. The hope is that secondary education will expand to mass provision, and redefine its objectives and functions in the process. As a recent international conference on secondary education stressed[10], efforts must be made to accommodate all those who are eligible through alternative forms of provision, greater flexibility and choice for learners, and stronger links to the world of work. In their Revised Recommendations for Technical and Vocational Education and Training for the Twenty-first century, UNESCO and ILO emphasize that "an initiation to technology and the world of work should be an essential component of general education… This initiation should be a major concern in educational reform and democratisation. It should be a required element in the curriculum, beginning in primary education and continuing through the early years of secondary education."[11]

The goal for higher education, meanwhile, is to provide as many young people as possible with relevant, quality training that opens the door to employment and offers the chance to update skills and knowledge throughout life. As the 1998 World Declaration on Higher Education for the Twenty-first Century stated, "without adequate higher education and research institutions providing a critical mass of skilled and educated people, no country can ensure genuine endogenous and sustainable development." The Declaration also stressed that "higher education institutions should lead in drawing upon the advantages and potential of new information and communication technologies by creating new learning environments ranging from distance education facilities to complete virtual higher education institutions and systems, capable of bridging distances and developing high-quality systems of education, thus serving social and economic advancement and democratisation as well as other priorities of society."

10. International Conference on Secondary Education for a Better Future: Trends, Challenges and Priorities. Muscat, Sultanate of Oman, 21 December 2002.
11. *Technical and Vocational Education and Training for the Twenty-first Century*. UNESCO and ILO Recommendations. 2002. Part IV, Article 19.

2.4 Fighting exclusion

More than ever before, lack of education is a synonym for exclusion. The Delors Commission drew attention to the danger of creating fast and slow tracks within societies, dependent on each individual's ability to access technology. The emergence of information societies, the Report suggested, is a challenge to the closely integrated values of democracy and education. Developing countries are particularly vulnerable because citizens need a certain level of basic education – beyond primary – to take advantage of training and knowledge opportunities. As noted by the Fifth International Conference on Adult Education (Hamburg, 1997), ICTs are nurturing new forms of exclusion, hence the need "to ensure greater access to and participation in the means of communication for all cultures and social groups" through adult learning.[12] The Cologne Lifelong Learning Charter (1999) recognizes the challenge every country faces in becoming a learning society, and the importance of ensuring that citizens are equipped with the knowledge, skills and qualifications they will need in the twenty-first century.

As the UN Agency with special responsibility for education issues, UNESCO's policies on ICTs are guided by an overriding concern for access, quality and equity. Very early on, UNESCO drew attention to the potential benefits of using technology and media in education. In 1960, UNESCO's General Conference adopted a resolution noting the obvious impossibility of abolishing mass illiteracy through traditional means alone, and urging Member States to consider other approaches. In 1993, a joint initiative on distance education was launched with the support of UNESCO, UNICEF and UNFPA by the world's nine most populous nations.[13]

More recently, the second international UNESCO Congress on Education and Informatics (Moscow 1996) recommended a detailed agenda of future research and action. The Conference stressed the importance of high quality case studies and research on the use of ICTs in teaching and learning. In particular, participants appealed to "governments, educational authorities, business and industry, to strengthen their joint efforts in this field by seeking

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12. Paragraph 30, The Agenda for the Future. CONFINTEA V, 1997.
13. Bangladesh, Brazil, China, Egypt, India, Indonesia, Mexico, Nigeria and Pakistan.

new patterns of co-operation to ensure the availability of adequate ICTs at all levels of education." The subsequent establishment of the Moscow-based UNESCO Institute for Information Technologies in Education marked a further step in building capacity related to policy advice, training, research and monitoring on the use of ICTs in all aspects and at all levels of education. UNESCO's International Institute for Capacity Building in Africa (IICBA), set up in Addis Ababa in 1999, marked a specific concern to enhance and strengthen Africa's educational institutions. Among ICCBA's priority areas is the provision of programmes to enable teacher education colleges and faculties in Africa to use ICTs in order to enhance the quality of education in cost-effective and affordable ways. The Institute also offers distance education degree programmes to upgrade and update the staff of teacher education establishments in a number of countries on the African continent, which is the top priority region for UNESCO.

All the Organization's initiatives in the field of education and ICTs aim to provide evidence-based information and examples of innovative best practices, facilitate policy dialogue, provide technical support, and promote regional/international partnerships and networking.

Five Areas of Expertise

In spreading knowledge and use of ICT in education, UNESCO relies on five key areas of expertise to carry out its mission:

Laboratory of ideas: Identifies emerging problems, seeks strategies to solve them, creates space for dialogue, and tests innovative solutions.

Standard setting: Develops new standards in key areas such as technical and vocational education and the recognition of higher education qualifications.

Capacity-building: Expands the capacities of governments, experts, civil society and communities through policy advice, developing training material and conducting training workshops, international conferences and information sharing.

Clearinghouse: Gathers and shares information, especially best practices and innovations.

International catalyst: Stimulates international cooperation in education.

Underpinning all these activities is the goal of building knowledge societies that are genuinely open and inclusive, that ensure cultural diversity and provide diverse pathways to education. In light of these objectives,

closing the digital divide is an overriding priority. One of the thrusts of the Organization's current Medium-Term Strategy (2002-2007) is that of "promoting empowerment and participation in the emerging knowledge society through equitable access, capacity-building and sharing of knowledge." The greatest challenge is to reach historically underserved groups: girls and women faced with cultural and economic obstacles, geographically dispersed rural populations, minority groups, refugees and the disabled. An additional hurdle is that of widening participation in secondary and higher education, a key to building a skilled and knowledge-based workforce.

2.5 A technology continuum

ICTs are commonly viewed as tools that facilitate open-ended inquiry through interactive discovery and exchange. They are not, however, synonymous with the latest generation in hardware and software. Technology must be viewed along a broad continuum, from books, blackboard, radio, television and film to videoconferencing, web-based communication, and CD-ROM instructional resources. It is rare for a single medium to solve all educational needs. Recent years have witnessed remarkable developments in both hardware and software, and their convergence with other technologies. The central issue is how to choose technology that is best suited to a particular context and purpose; technology itself is merely a tool at the service of specific objectives.

Several characteristics distinguish digital ICTs from previous technologies: they can integrate multiple media into single educational applications; they are interactive and flexible enough to offer freedom from rigid scheduling, time barriers and locational constraints; and through connectivity, they provide access to nearly unlimited information sources.[14] Community radio, for example, is an immensely powerful medium whose potential has been enhanced by new technologies such as portable, low-cost FM transmitting stations and digital radio systems that transmit via satellite. The establishment of the WorldSpace digital satellite radio in Africa has

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14. Blurton, C., "New directions in education." In *World Communication and Information Report 1999-2000*. UNESCO Publishing.

brought a flood of information relevant to development: the satellite broadcasts over 100 channels of clear digital radio signals across the whole of Africa.

ICTs such as satellite communications, large capacity optical fibre communications and the Internet are spawning a revolution in distance and open learning, offering new and more flexible learning opportunities. They provide the tools needed to extend basic education to underserved geographical regions and groups of students, and have the potential to empower teachers and learners through vastly improved access to information. Yet at the same time, every advance brings into sharper focus the gulf between those on the periphery of the information society, with few entry points to reap its benefits, and those in a position to profit from the opportunities for advancement granted by easy access to technology.

The Digital Divide

Lack of infrastructure – a simple phone line – is a giant hurdle to making ICTs work for education, even though fixed line density increased rapidly in the 1990s. The average number of fixed telephone lines varies dramatically between regions. Developed countries have 588 fixed telephone lines per 1 000 people, compared to sub-Saharan Africa, with just 14. In Rwanda and Niger, there are only two telephones per 1 000 people. In Chad, it is less than one. Over the past decade, mobile telephones have partially overcome infrastructure constraints, spreading as widely as main lines in some countries.

OECD countries contain 79% of the world's 400 million Internet users – 14% of the world population. Africa has less international bandwidth than São Paulo, Brazil. Latin America's bandwidth is roughly equal to that of Seoul, Republic of Korea. Internet use, however, is exploding in many developing countries: between 1998 and 2000, it rose from 1.7 million to 9.8 million users in Brazil, 3.8 million to 16.9 million in China, and 2 500 to 25 000 in Uganda.

Source: UNDP Human Development Report 2001, World Bank Development Indicators 2001.

A majority of the world's schools still do not have electricity. The whole of Africa barely has more telephones than the city of Tokyo. South Asia is home to over 20% of the world's population, but has less than one percent of the world's Internet users. Even within countries, large disparities prevail between urban and rural areas. In developing countries, the Internet is often far too expensive to be accessible to ordinary citizens and most public

service institutions, and is often available only in urban centres. The divide is all the more unacceptable insofar as ICTs have been shown to play a pivotal role in tackling development problems in poor and/or marginalized communities. In short, they are not a luxury. Countries cannot afford *not* to use them if they are to design more efficient, flexible and diverse education systems.

What role are ICTs playing in opening up new opportunities for learning? What potential do they have to improve learning and increase the efficiency of education systems? To what extent are governments developing policies to use ICTs as a lever for educational change?

New technologies are not a panacea for achieving education for all. Political will, clear educational objectives, well-trained teachers and managers, technical expertise, relevant contents and community support are all critical inputs if ICTs are to have a lasting impact. Technology is a tool: like any tool, it requires training for it to be used to its best advantage. Adopting the premise that education is a public good and a human right, ICT policy must be grounded in equity, so that such a powerful set of tools is not used to foster more polarization and exclusion in our emerging knowledge societies.

3. ICTs as Catalysts for Innovation

3.1 Historical pointers

From the invention of printing techniques enabling cheaper textbook production to the rise of global networks, education systems have repeatedly attempted to harness technology in order to expand learning opportunities. In the mid-nineteenth century, railway systems and national mail services spread teaching materials to geographically dispersed learners, marking the advent of the first correspondence courses. The invention of radio in the early 1900s spawned radio-led courses, generally presented as a series of talks accompanied by set books and study materials – the BBC ran its first education programmes in 1924.

Radio, used by a high percentage of people living in the poorest regions of the planet, continues to play a pivotal role in bringing both formal and non-formal educational opportunities to marginalized communities. In Latin America, radio schools, mostly supported by government and the Roman Catholic Church, were set up in almost all the region's countries from the mid-40s onwards, and have played an important role in rural community education and the provision of school-equivalency programmes. Since the mid-1970s, Interactive Radio Instruction has been used in Latin America, Asia and Africa, in formal and non-formal education, to improve the quality of learning and teaching within the classroom. Besides use in classrooms, radio also remains a powerful and cost-effective medium for distance education. Indonesia has attached special importance to radio in reaching a population scattered throughout its archipelago, while Mongolia, in cooperation with UNESCO (see below), used radio programmes in the 1990s to provide women with new micro-enterprise and marketing skills.

Television also paved the way for a host of new learning methods in the 1950s. In 1960, China became the first country to use radio and television to produce single-mode distance higher education. Brazil for its part created state educational television networks in the late 1960s and early 1970s. In the 1970s, it was thought that TV might help developing countries to "leapfrog" over their problems of low quality. With support from international agencies, secondary instructional programs based on TV were developed in Côte d'Ivoire and El Salvador. But results were disappointing: teachers resisted centralized institutions and their programmes, costs per

student were too high, and the projects ended as soon as external financing was discontinued.[15] There are lessons to be learned from these experiences. As Larry Cuban, a professor of education at Stanford University points out in an analysis of efforts to use technology to promote school reform, these "attempts failed to adequately address the real needs of teachers in classrooms. (…) Teachers were provided inadequate assistance in using the technology and the technology itself was often unreliable."[16]

In contrast, Mexico's *Telesecundaria* is a survivor from the era of large-scale television projects. Launched in 1968, the project aimed to use the television format to extend lower secondary school learning to remote and small rural communities. Centrally produced television programmes covering the same secondary school curriculum as that offered in ordinary schools are beamed via satellite throughout the country on a scheduled daily basis to *Telesecundaria* schools in two shifts. Each hour focuses on a different subject area, and students are exposed to a variety of teachers on television while one home teacher is based at the school for all disciplines in each grade – as opposed to eight or nine in the conventional system. Airtime was donated to the Ministry of Education by public networks. Following the introduction of satellite transmission, the numbers of learners grew sharply. As technology advanced, the programmes were improved, lessons became more interactive, dynamic and action-oriented. In 2000/2001, *Telesecundaria* boasted over 963,000 students, spread over 16,000 schools. According to evaluations, dropout rates are slightly lower than those of general secondary schools.

3.2 New learning environments

The rationale underpinning many technology-driven projects is the same: to broaden access to education at all levels, offer more flexibility in terms of class hours and location, and reach isolated or marginalized populations. The significance of the current information revolution lies in the convergence of computer, telecommunications and audiovisual technologies, and the tremendous growth in data processing power. This

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15. Wolff, L, de Moura Castro, C., Navarro, J.C., & Garcia, N. "Television for Secondary Education: Experience of Mexico," p. 145. In *Technologies for Education*, op. cit.
16. Cited in "The Dynamics of Technologies for Education", *Technologies for Education*, op. cit.

convergence has facilitated new pedagogical approaches built around interactive learning. ICTs can not only present information using all possible audiovisual formats, but they can also receive information from the user. Digitalization – the storage of texts, images and sound in the same digital form on compact discs – has also opened up new frontiers for packaging and disseminating knowledge to the user.

The World Wide Web was specifically designed for collaborative work on documents by groups of dispersed researchers. Interactive WWW technologies are creating a new educational platform, and reconfiguring the way students learn. Course materials can be dynamically updated. Students have access to a wealth of information that was inconceivable in the classical model. Networked learning – providing access to libraries, scholars, networks and information worldwide – has encouraged the rise of virtual learning communities. Many distance learning institutions, such as the groundbreaking British Open University created in 1969 and emulated in many other countries since, have evolved with developments in informatics and telecommunications, introducing integrated multimedia materials alongside traditional correspondence tutoring and face-to-face tutorials.

By breaking through the constraints of space and time, ICTs can in principle allow learning anywhere and at any time, making them a supremely powerful lever for educational change. For many educational experts, new digital technologies are making a learning revolution possible by enabling children to become more active and independent learners through the newfound opportunities for collaborating on projects across frontiers and cultures, learning from one another, and accessing a wide range of information. In parallel, they are changing the role of the teacher, from that of an exclusive fount of knowledge to a guide helping students navigate through new information, inquire, make choices and solve problems. ICTs are also regarded as crucial to bringing about more democratic access to educational resources. In many African countries, for example, teacher training institutions lack access to library books due to limited funding for educational materials. In response, the UNESCO International Institute for Capacity Building in Africa has established an Electronic Library Series, with a special emphasis on science, mathematics and language teaching, targeted at teacher educators and teachers and beginning at primary school level. Nine libraries have been completed in

four languages (Arabic, English, French and Portuguese). Work has recently begun on setting up a similar series on secondary school science, girls' and women's education and HIV/AIDS. The Institute is simultaneously preparing a collection of videos on current teaching practice, to be used as a basis for discussion on how to improve teaching.

3.3 Computer literacy and beyond

Computer literacy has come onto the national agendas of developed countries and a number of developing ones, but it is merely the tip of the iceberg of a more ambitious mandate encompassing improved educational quality, relevance and overall performance of education systems, all of which draws upon the particular strengths of different technologies.

Many developed countries have plans to equip all schools with computers and connect them to the Internet. Over the past decade, a large number of developing ones have made efforts to introduce ICT in schools, but the global picture is difficult to capture and is evolving rapidly. Countries are at very different stages of ICT development, and have opted for diverse strategies to facilitate access and use. Some simply lack much simpler 'technologies' such as pens, pencils, rulers, blackboards or textbooks.[17]

In China, the Application of Modern Educational Technology Project aims to introduce computers and the Internet into schools. Brazil has introduced computers and informatics to public elementary schools through its National Programme for Informatics in Education (Proinfo). Over the past three years, Egypt has led a drive to improve the use of ICTs in high school mathematics and science teaching. Bangladesh has recently procured 10,000 computers for schools at secondary level, many of which are schools for girls. In some cases, countries provide access via mobile units equipped with satellite and computer equipment. Lebanon for its part has adopted a new curriculum featuring the teaching of computer skills from Grade Six onwards.

There are many reasons for introducing ICTs into primary and secondary schools, from equipping students with basic computer skills in areas such as

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17. Perraton, H. & Creed, C., *Applying New Technologies and Cost-Effective Delivery Systems in Basic Education*. Thematic study prepared in association with DFID for the UNESCO World Education Forum, Dakar, Senegal 26-28 April 2000. pp. 13-17.

word processing, databases, spreadsheets and graphics applications, to enriching curricula and allowing students to communicate with other schools if a school network exists, to giving students the chance to search for information from the Internet. Websites for primary school learners and teachers offer a range of Internet-based educational services to download and use in the classroom. Educational software for teachers allows them to enrich their presentations, particularly via the simulation or manipulation of models in science classes. Global classrooms, learning networks and virtual communities offer opportunities for collaborative projects and sharing information. Forging such links between individual schools, regions and nations is also a bold way to promote learning about living together, one of the pillars of the Delors Report. The World Links for Development programme, for example, which involves the private sector and NGOs, connects 400 schools and 40,000 teachers and students in developing countries to their peers in industrialized ones.

The successful integration of ICTs, however, is still in its infancy. Progress is often hampered by the cost and scarcity of quality, relevant software, high connection costs, lack of trained teachers and insufficient technical support. The OECD has found that even in the most advanced countries, ICTs are being used to do traditional things in different ways, and have not driven a rethinking of learning objectives or teaching methodologies.[18]

Not surprisingly, this situation is mirrored in developing countries. All too often, as an initial cursory survey by UNESCO's Bangkok office has found, ICT projects are developed on an ad hoc basis without interdepartmental coordination. Policies are sometimes initiated from outside ministries of education by telecommunications companies, commercial firms and international funding agencies, and are not systematically integrated into school curricula. Much of the current use of ICTs in the classroom still focuses on the drill and practice type of learning, where computers are seen as tutors rather than as tools towards engaging students in critical and interactive learning. Even when teachers are trained in the use of ICTs, the absence of systematic management support, integration into existing

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18. OECD. *Learning to Change.* 2001.

curricula and text books, and a lack of ICT-based materials are common problems experienced throughout the Asia-Pacific region.

There are also nuts and bolts issues to consider, namely, how to obtain the computers in the first place. To support the Lebanese government's plan to increase computer literacy, UNESCO's Beirut office has helped to collect old personal computers, refurbish them, equip them with a low-cost software enabling mastery of basic ICT skills, and distribute them to schools in deprived areas. This ongoing project relies strongly on building partnerships with banks, industries, foundations, NGOs and municipalities. The project also involves a training component for teachers.

In most developing regions of the world, the issue of making ICTs an integral component of the education system rather than an "add-on" is a serious challenge for policy-making and planning. Documenting innovative and successful strategies which can serve as benchmarks is vital to guide programme planning and implementation.

3.4 Widening access

There is a relatively long history of technology being used to extend access to education, notably through distance education programmes. Such programmes typically use a mix of technologies, including printed material, videos, video-conferencing, CD-ROMs, e-mail and the Internet. As education systems cater to ever larger numbers, strategies for improving access are building on experience with ICTs, especially at the junior secondary and higher levels.

The E-9 initiative provides a telling example. As previously mentioned, these countries are home to more than half of the world's population. They share certain common features and problems: major demographic pressures, substantial remote populations and unwieldy education systems. They all face demands for more primary school places, an expansion of junior secondary schools, and for more and better qualified teachers. Since these countries began working together in 1993, all have committed themselves to using distance education as a means of addressing some of their basic education needs. Open and distance learning approaches are now widely seen as complementary to conventional ones: they create a wider range of

opportunities for learning, and help overcome barriers such as geographical distance, cultural and social constraints and lack of educational infrastructure. Open learning means a more learner-centred approach, allowing students greater flexibility, choice of content and the freedom to organize their education programme.

There are promising models to go by. In contrast to the rigidities of formal schooling, open and distance learning has proved able to reach out to school-age populations, especially at the junior secondary levels, as well as to individuals with special needs, migrants, and cultural and linguistic minorities. During the 1990s, open and distance learning moved away from its status as the poor relation of the education system, and started to be regarded as a legitimate part of the mainstream. There are now closer links, at all levels, between conventional education and open and distance learning.[19] In response to an unmet demand for places at secondary level, countries such as India, Indonesia, the Republic of Korea and Zimbabwe have created alternative systems for young learners unable to attend mainstream schools.

Since being set up in 1989, India's National Open School has established a tradition of providing good quality, mass, flexible and lower-cost education for learners from basic to university-level education, using analogue technologies of print, audio, video, radio and television. ICTs are now also used for course development, administration and testing, while more extensive use of the newer technologies are planned through tele- and community-learning centres. The school reaches approximately 400,000 post-primary students, mostly from socially disadvantaged groups and isolated populations, such as women and girls, scheduled castes and tribes, rural and urban poor and the unemployed. It offers four different types of self-instructional programmes prepared by highly qualified teachers in English and Hindi: secondary, senior secondary (10th-12th grade), bridge courses (around grade 8) and vocational courses. Income is derived from student fees and the sale of books and materials. The cost per student is US$44, as compared with a cost of US$71 for regular schools.[20]

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19. Perraton, H. & Creed, C., op. cit. 11.
20. Ibid., p. 24.

The Open Junior High Schools in Indonesia are likewise aimed at serving the disadvantaged. Children follow the same curriculum and examinations as regular schools, and attend centres that are often attached to such schools or located in a community building near their home. Malawi, Zambia and Zimbabwe have all developed student-centred programmes in which buildings are provided, or shared, allowing young people to follow correspondence lessons backed up with radio broadcasts and help from a tutor supervisor.

Open and distance learning programmes also offer school equivalency courses and programmes for young people, adolescents and adults who might have dropped out of the formal education system. Brazil's *Telecurso 2000* is the largest pre-tertiary distance education programme for adults in the world. Started by an industrial consortium and the Roberto Marinho Foundation (the education branch of *Globo* Television), *Telecurso* employs a mix of television, printed materials and tutoring to provide courses at primary, secondary and vocational levels, with progression through them depending on exam success. Students participate in the course in study groups that meet two hours a day with a tutor in a special room equipped with a television set and reference books. They can also watch the television lessons alone, and meet once a week in a tutored group. The third option is self-study. In 1999, 200,000 students attended *Telecurso* classes. Costs and pass rates do not differ significantly from those of regular schools.

Many of the problems faced by conventional education, however, are shared by open and distance learning. Lack of infrastructure, funding and professional competence are major obstacles. Yet these forms of education delivery have come to stay, and many countries, supported by UNESCO and other development partners, are looking at open and distance learning as a centrepiece of their strategies to expand access and raise quality. With the aim of building capacities, UNESCO supports co-operative efforts and activities to enhance policies, planning, administration, financing and staff training, all of which are essential components in establishing and managing efficient open and distance learning systems.

To this end, the UNESCO Institute for Information Technologies in Education (IITE) has commissioned the preparation of a specialized training course *Information and Communications Technologies in Distance*

Education, aimed at supporting and promoting skills development in distance education. Designed to serve the interests of developing societies, the course covers issues such as the application of ICTs to distance education, teaching requirements, effective policies and the current state of research on learning through distance education.

Open and distance learning represents a critical medium for expanding access to basic education, but it is not the only option. Community learning establishments could also potentially extend the reach of education, provided such alternatives are sustainable, adequately staffed and equipped with locally relevant course materials. Interactive radio instruction (IRI) remains an attractive educational strategy in this context. In Zambia, for example, an IRI series is being developed for out-of-school children. The Ministry of Education's Educational Broadcast Service (EBS) has produced and airs daily 30-minute lessons for Grade 1, with the production of programmes covering higher grades currently underway. The US-based Education Development Centre, meanwhile, is helping to train teachers and facilitators to run community-based learning centres.[21] As we shall see later, these centres can be magnets for disadvantaged groups and regions seeking to benefit from lifelong learning opportunities that harness ICTs for sustainable local development.

3.5 Improving quality

There is broad consensus that expanding access to education will only have a beneficial impact upon individuals and societies if the education is of good quality. Quality, however, is a multi-faceted concept, referring to how learning is organized and managed, course contents, learning environments and final outcomes.[22] There is no doubt that improving the quality of education systems, in all their guises, is of utmost importance. In over half of the countries of sub-Saharan Africa, more than one pupil in ten repeats at least one grade in primary school. This occurs to a lesser extent in the Arab States, Latin America and the Caribbean.

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21. Bosch, A., Rhodes, R. & Kariuki, S. "Interactive Radio Instruction: An Update from the Field," in *Technologies for Education*, op. cit., p. 145.
22. Education for All Global Monitoring Report 2002, op. cit., p. 80.

The Delors report placed great emphasis on 'learning' per se, and highlighted the urgent need to reform curricula at all levels of education so that citizens can be better prepared for the new millennium. UNESCO has always underlined the importance of curricula, arguing that they should promote life-skills, human rights, respect for diversity and a culture that helps people learn to live together. As spelt out earlier, knowledge societies call for new skills such as the ability to solve problems, communicate effectively, work in teams, think critically and synthesize and interpret large amounts of information. The capacity to inquire and explore has taken precedence over mastery of facts and concepts. Most experts would agree that technology creates a new learning environment, favouring a more interactive, collaborative, student-centred style of education that is firmly rooted in real-world contexts. Current evidence shows that ICTs enable students to learn at their own pace, engage more actively in the learning process, inquire and explore. They allow students to visualize abstract concepts more directly, by way of dynamic images and animation (see box).

Interactive Educational Programmes on Science for Africa

To date, there is next to no educational software specifically targeted at Africa's particular education context. The UNESCO International Institute for Capacity Building in Africa (IICBA) initiated work with UNESCO South Africa and a private computer programme development company in Pretoria to develop interactive educational programmes for secondary school science. The rationale is that using virtual reality to teach science is now affordable: computers have become reasonably low-cost, compared with the high expense of a fully equipped laboratory. IICBA set up a competition for science teachers to provide lesson plans and story boards for the development of interactive computer games to teach science. The idea is to identify innovative science teachers who will then be eligible for training in making interactive computer games for educational purposes. The top five winners attended a five-day workshop in Pretoria where they worked on incorporating their lesson plans into interactive computer game form. The output is being developed into a CD-ROM for science teaching, an initiative that shows the potential for other subjects, such as literature and history. A similar programme is planned for Francophone countries.

Source: IICBA Report (1999-2001) and Work Plan (2002-2003)

More than any other technology, the Internet has created new opportunities for collaborative work: it can connect classrooms to research

centres, and students to actual scientists. Several developing countries have established broad Internet access for schools through nationwide networks. Subscriptions to digital libraries, collaborative projects with peers outside the classroom and access to a much wider field of knowledge make lessons richer in content, and learning more stimulating. *Global Learning and Observations to Benefit the Environment* (GLOBE) is a project supported by NASA and other partners that aims to improve mathematics and science education across the globe, raise environmental awareness and contribute to a worldwide scientific database. Approximately 9,500 schools in more than 90 countries participate in the programme, including many in sub-Saharan Africa.

Several developing countries have devised comprehensive policies that make explicit use of ICTs to improve educational quality. The Costa Rican Computers in Education programme was launched in 1988 with the aim of raising the quality of education in primary schools. The programme specifically sought to adopt a constructivist approach that would encourage collaboration between learners and raise cognitive skills. Chile has also launched an ambitious educational reform programme to improve the quality, efficiency and equity of primary schooling. One of its main components is a telecommunications network for underprivileged schools called *Enlaces* (Links).

As a result of this project, Chile has equipped all of its secondary schools and about half of its primary schools with computers. Most of these primary schools are situated in the country's poorest communities and are characterised by low standardized test scores, late primary entrance, high repetition and above average dropout rates. Through the introduction of computers and connection to learning networks, *Enlaces* gives teachers access to more information resources and allows them to share experiences across the network. The project also brings students in contact with more collaborative ways of learning and enables schools, regardless of their location, to become part of a wider learning community. Evaluations have documented positive changes in teachers' attitudes towards their work, computers and the benefits of the network. These assessments also found

significant changes in student attitudes, and a notable increase in creative initiatives by individuals and groups of pupils.[23]

ICTs eliminate the premise that learning time equals classroom time, bringing efficiency gains and allowing schools, particularly those in developing countries, to cope with large enrolments. Students may attend school for half a day and be required to watch an educational radio or television programme, complete related activities, or work on a computer-assisted lesson in a community learning centre. For areas with low-population density, ICTs make multi-grade schools a more viable alternative. While more advanced students listen to an educational programme on the radio or watch a television broadcast, the teacher can attend to students who are at less advanced levels or vice versa.[24]

Even if the network age has not reached thousands of schools, more conventional technologies like television and radio are being tapped to improve educational quality. Interactive radio began as a tool to improve educational quality, especially in rural and low-income areas characterized by low achievement and inadequate teacher training. Successive evaluations have demonstrated its impact on student achievement, power to reduce rural/urban inequalities, and contribution to teachers' professional development. In a significant number of cases, however, IRI has proved unsustainable beyond a pilot stage because Ministries of Education cannot meet the costs of curriculum development.

Typically, IRI consists of ready-made 20-30 minute direct teaching and learning exercises covering core subjects such as maths, science and language, which are broadcast to the classroom on a daily basis.[25] Learners have to react to questions and exercises through verbal responses to radio characters while the programme is on air. With assistance from UNESCO, the Netherlands government and USAID, Portuguese-speaking African countries are involved in the joint development of interactive radio curriculum materials in mathematics and Portuguese as a second language. In South Africa, meanwhile, the Open Learning Systems Education Trust

23. *Information and Communication Technologies in Teacher Education*, UNESCO, 2002. pp. 101-102.
24. Haddad, Wadi D. & Jurich, S., "ICT for Education: Potential and Potency," in *Technologies for Education*, op. cit., p. 32.
25. Perraton, H. & Creed, C., op. cit., p. 15.

(OLSET) runs an interactive radio programme series entitled "English In Action" targeting remote under-resourced schools. The daily half-hour radio lessons introduce primary school pupils to English through activities such as stories, music and songs. The lessons are supported by printed materials for pupils and a well-planned language curriculum for teachers, who take part in training workshops organized by visiting programme coordinators. Since its creation in the aftermath of the fall of apartheid, OLSET has become one of the largest providers of distance learning programmes by radio to the country's poorest schools: by mid-2001, the lessons were being used in an estimated 11,000 primary school classrooms across South Africa, and had firm support from teachers and school principals. The Trust designs programmes aimed at engaging learners more actively through the use of music, drama, games, songs, etc., and has negotiated airtime with numerous community radio stations to ensure daily broadcasts to schools in seven provinces, covering both urban and remote marginalized rural communities. As the director of OLSET writes, "Radio is an eminently capable medium for making interventions by way of distance education programming for learners and teachers alike, at an affordable cost and in the context of accruing economies of scale."[26]

In Brazil, *TV Escola* aims to improve the quality of classroom learning by providing primary schools with a kit comprising a television set, video recorder and a satellite dish. Some of the air-time is used for in-service teacher training, the rest for programmes to support classroom activities. Each programme lasts three hours and is re-transmitted four times per day. Following its introduction in 1995, the project now reaches all Brazilian states. Any school with more than 100 elementary students is eligible to apply for resources to buy the "technological kit" needed to download and record the programmes, delivered through the Brasilsat satellite.

The successful introduction of technology into an educational setting can only be achieved by taking into account an interconnected set of factors, of which teachers are the most critical. They must have the confidence to adopt new technology, the skills to help students navigate through information, and the confidence and training to adopt a more learner-centred approach.

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26. Naidoo, G. "Effective Community Radio in Education," in *Community Radio Case Studies*, published by the Commonwealth of Learning and UNESCO/BREDA, 2002.

They must also have access to high quality software which is relevant to the local context. Once again, this field of study is an emerging one: further research is needed on cases of best practice, via a thorough monitoring of the impact of ICTs on educational reforms, teachers and changes in the learning process.

The establishment of a regional clearing house in support of ICTs in education in the Asia-Pacific Region by UNESCO's Bangkok Office is a step in this direction. The project will establish a Web-based clearing house, where data and information from ICTs in education programmes in the region are collected, processed, analysed, repackaged and disseminated in various formats, from printed to electronic/digital to multimedia formats, for use in various components of the project. The end result will be the creation of knowledge portals promoting free and equitable access to information and learning resources.[27]

UNESCO supports various other projects aimed at making better use of ICTs in school. In 2003, UNESCO Bangkok, in partnership with a group of agencies, launched a three-year project to create equal opportunities in education within the ASEAN countries by exploring and demonstrating how ICTs can be used in schools to improve educational quality. The project also involves testing innovative models of ICT use, improving connectivity and access to the wealth of educational resources, training teachers in computer literacy and using ICT-based materials in Science, Mathematics and Language curricula.[28]

In a similar vein, UNESCO's Institute for Information Technologies in Education has developed a specialized training course entitled *Multimedia in Education,* which is intended to build up knowledge and competence on all aspects of integrating ICTs into the classroom. In 2002, the Institute ran a five-day seminar followed by a two-month e-learning period for teachers and teacher trainers from Cyprus. In Africa, IICBA has organized several workshops for Anglophone, Francophone and Lusophone countries on the use of ICTs for education. These workshops play a critical role in promoting relevant, creative and cost-effective ways to introduce ICTs into education systems in sub-Saharan Africa.

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27. See www.unescobkk.org/education/ict
28. See www.unescobkk.org/education/ict

3.6 Training more teachers and training differently

Educating teachers is a huge challenge for governments and international agencies. The world needs more and better teachers if it is to achieve the target of making quality education available for all by 2015, and enjoy the social and economic benefits that should follow. Indicators suggest that a minimum of 15 million new teachers will be required by 2015, although the ravages of HIV/AIDs may well make this figure an underestimate, particularly in sub-Saharan Africa. In Zambia, for example, the estimated number of primary-school teachers who died from AIDS in 2000 was equal to 45 per cent of all teachers trained that year.[29] While school enrolments grew in the 1990s, teacher numbers only just kept pace with them.

There is a broad body of evidence showing that teaching quality is one of the most important factors determining student achievement. Too many of the world's 60 million teachers are untrained and unqualified. Many countries in Africa, where the education challenge is greatest, have retained archaic teacher education systems, in which primary school teachers may themselves only have primary education or at best two years of high school. Girls' education in many countries is hampered by a shortage of women teachers – a critical element in any effort to reduce the gender gap. Sub-Saharan Africa, for instance, has the highest number of countries in which women represent less than half the teaching staff.

While educational reforms seek to introduce a more student-centred, interactive and constructivist approach to learning, teachers are in many ways the "make or break" factor behind these plans' success or failure. Investing in information technology without financing teachers' professional development is a zero-sum game. "The result of underfunding teachers' professional development is that a lot of technology provided to schools is never used – it sits in boxes or closets, gathering dust and becoming obsolete."[30]

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29. *Education for All Global Monitoring Report* 2002, op. cit., p. 84.
30. Carslon, S. & Tidiane Gadio, C. "Teacher Professional Development in the Use of Technology," p. 125. In *Technologies for Education*, op. cit.

Some countries (United Kingdom, Singapore) have developed policies requiring all initial teacher education programmes to include compulsory courses in ICTs. In other countries, however, there is no such policy. In some cases, the facilities to back up these reforms are lacking. The Costa Rican experience in introducing technology in primary and secondary schools is instructive: budget outlays for training and pedagogical support were almost equal to those for computer hardware. As a result, both face-to-face and virtual delivery modes now co-exist. Over the course of 12 years, more than 15,000 teachers and administrators have been trained, using both face-to-face and distance methods.

ICTs have important implications for both improving teacher training methods, and more broadly, for ensuring that teachers are in a position to take on new roles suited to education in knowledge-based societies. If IT is integrated into curricula, teachers must acquire a basic level of computer literacy, know how to use hardware and software to enhance the learning process, and learn new skills to encourage collaborative learning, creativity, research and richer interaction with students. They may find themselves faced with students who are already skilled in computer use, and feel their authority threatened by this "shared" learning scenario. Required skills fluctuate, meaning that more in-service professional training opportunities are needed. Yet this area currently receives little attention: on average, countries spend around one per cent of their annual education expenditure on the continuing professional development of teachers.

ICTs can improve pre-service teacher training by providing access to more and better educational resources, and offering multimedia simulations of good teaching practice. The Commonwealth of Learning has developed the "Suitcase Radio", a broadcasting concept that can be used to train teachers in remote areas. These stations fit into an airplane carry-on suitcase, broadcast up to a 50 km radius, run on a car battery and can be modified for solar power. Some schools of education, meanwhile, employ videotaped sessions to prepare novice teachers for the classroom: student teachers observe their experienced peers in action, and analyse different strategies for interacting with students. Egypt, for instance, uses a videoconferencing network to train teachers. ICTs allow for greater interactivity between student teachers and tutors, giving learners the opportunity to proceed at their own pace, and often combining video, audio and text to improve the

quality of instruction. They can also break down teachers' isolation, by connecting them to colleagues, mentors, curriculum experts and the global teacher community, or via the creation of teacher resources centres equipped with computers and Internet facilities. In Brazil, for example, Educational Technology Centres are spread around the country to provide technical and pedagogical support to teachers, and maintain hardware and software installed in the schools.

By learning with ICTs, it is more likely that teachers will make effective use of them on the job. Chile's *Enlaces* programme developed an on-line teacher training programme consisting of seven modules on education and ICT application that has yielded promising results. Students download teaching materials from the Web, interact with tutors and with other students through special software, and develop a collaborative project on the use of ICTs in school. The average cost per student of this programme and its face-to-face equivalent were roughly equivalent, though teachers participating in the online programme benefited from the development of a 'network communication culture' through constant use of the virtual working environment.

Since it is highly unlikely that conventional teacher training approaches can meet the growing needs of both formal education and literacy effectively and in a timely way, many specialists agree that only distance education can reach larger numbers of trainees while lowering costs. UNESCO was a pioneer in the field through its UNRWA/UNESCO Institute of Education, which began training teachers for refugees forty years ago.

A range of technologies is used to provide distance education training, including print, radio, television, and face-to-face meetings in formal settings. In Brazil, *Proformação* trains primary school teachers in the North, Northeast and Midwest regions through a distance learning course. In French-speaking Africa, a start has been made on using computer and satellite-based technologies for in-service education of teachers and school administrators.

China has trained over three million teachers and headmasters through a national distance teaching institution, the China Television Teachers College (CTVTC), since 1986. Distance education features in China's strategic plans

for teacher education, and plays a significant role in initial teacher education and continuing professional development. The government is currently implementing an ambitious project to provide 240 hours of non-degree in-service training, including computer literacy, to all kindergarten, primary and secondary teachers in most regions over three years. Some multimedia packages have recently been developed, and the government has begun to implement national plans for the provision of ICT-based distance education.

UNESCO is deeply involved in these reforms, by providing assistance to enhance the training and professional development of teachers in the use of ICTs. The Organization's current Medium Term Strategy (2002-2007) emphasizes the contribution of ICTs to building networks between teachers and teacher training institutions, and more generally, to adapting teaching methods to the emerging knowledge society. In order to strengthen teacher education, notably in-service teacher training, but also the formation of trainers, UNESCO encourages and assists its Member States in making wider use of open and distance learning techniques, including new technologies such as CD-ROM, interactive multimedia systems, television and radio satellite broadcasting, computer networks and others.

The Asia-Pacific Programme of Educational Innovation in Development (APEID), in close collaboration with partners, is running a three-year project aimed at improving the capacity of teachers to integrate ICTs into their pedagogical work, identifying country and locally-specific models of ICT use, and developing an online network for sharing coursewares and innovative practices. The project includes the development of course materials, pilot training modules in the form of resource kits and workshops for teacher trainers. In Cambodia and Sri Lanka, projects are also underway to enhance the training and professional development of teachers, and design ICT course materials. To complement this programme, the Information Programmes and Services (IPS) has supported the creation of an ICT Teacher Training Portal offering a range of resources and guidelines, including links to websites that discuss the new knowledge, skills and competencies, strategies for using IT in the classroom, success stories, and ready-made lesson plans and curriculum materials for a variety of subjects (see box).

Guiding Teachers through the ICT Challenge

This portal provides information and links to the following areas:

1. *ICTs in Education*: how education is changing to adapt to knowledge societies, and how information technology has contributed to educational reform and improvements in teaching and learning.

2. *Teachers' Role in the ICT Environment*: how ICTs can assist teachers in dealing with specific problems and help them to become more effective educators.

3. *ICT Strategies and Online Courses*: experience in implementing professional development programmes and links to online courses that teachers can join to upgrade their knowledge and skills in using ICTs for teaching.

4. *Integrating ICTs into Teaching Lessons*: the use of ICTs in classroom teaching and learning, curriculum development and collaborative projects.

5. *Teaching Ideas, Lessons and Curriculum Materials*: ready-made lessons, activities and curriculum materials for teachings various subjects.

6. *Educational Software/Courseware*: computer applications for teaching specific subjects. Some links critically review and rate existing software.

7. *Using Internet Resources*: criteria for critically evaluating Web pages in terms of authenticity, applicability, timeliness, bias and usability. Also discusses privacy, copyright and legal issues.

8. *Electronic Collaboration*: experiences and success stories in communicating with classrooms or professionals around the world.

9. *Bringing Your Classroom Online:* guidelines for going online, setting up Web-based curriculum materials and courseware.

10. *Evaluation and Assessment Tools and Indicators:* discussion of the relationship between using computers and gains in learning, and specific tools for evaluating the effectiveness of ICTs in schools.

Source: http://www.unescobkk.org/ips/ict.htm

In Morocco, an international World Bank-funded project, jointly conducted by UNESCO, the International Telecommunication Union (ITU) and the Moroccan Ministry for Education, aims to upgrade teachers' skills by introducing new teaching methods. Over the next two years, some 600 primary and secondary school teachers will be trained in using ICTs, combining face-to-face and distance training, the Internet, interactive television and off-line techniques.

UNESCO's Regional Office for Education in Africa (BREDA), meanwhile, is developing a multimedia suitcase for in-service training using ICTs. To reinforce the teaching of science, mathematics and technology in

Sub-Saharan Africa, BREDA is also creating a virtual multimedia network aimed at developing teaching materials, improving curricula and encouraging collaborative work. Since its inception in 1999, IICBA has also focused on teacher education as one of its major responsibilities, and has established several programmes to improve the capacities of teacher education institutions in Africa. Teacher education networks have been established in Senegal, Liberia, Ethiopia, Madagascar and Zimbabwe, and new members are being brought on board each year. An inter-country network was launched in 2001, using Internet, e-mail and the postal service for those partner institutions that do not have an Internet link. To strengthen the indigenous knowledge base, ICCBA supports a regional Masters Degree Programme on the use of ICTs for education in the Sudan University of Science and Technology, in partnership with the University of Pretoria. A joint programme run by the ICCBA and the Indira Gandhi National Open University (IGNOU) has similarly enabled over 100 students from Liberia, Ethiopia and Madagascar to pursue a Postgraduate Diploma on Distance Education. This distance education programme is currently being incorporated into national universities in Ethiopia and Liberia. Another masters' level distance education degree programme is run by the University of South Africa (UNISA), and focuses on the teaching of mathematics. The programme offers a creative and practical course to improve teacher education and the teaching of mathematics in primary and secondary schools, with the goal of training mathematics specialists in selected teacher education institutions in five African countries, and eventually incorporating the UNISA training programme into a national or regional university so that it becomes locally available. IICBA is also negotiating with a number of distance education universities both in and outside Africa to use and adapt their programmes to respond to capacity building and training needs in African member-states.

As a means of delivering or supporting initial teacher education programmes, ICTs are still in their infancy. Many developing countries, however, urgently need to upgrade teachers' knowledge and competence in using new information and communication technologies. As current experience proves, ICTs are ideally suited to open and distance learning programmes, both in terms of reaching greater number of potential teachers, and in acquainting them with the new technologies.

UNESCO's recent publications, "Teacher Education Guidelines: Using Open and Distance Learning" and "ICTs in Teacher Education: A Planning Guide," provide guiding principles and resources to help policy-makers, planners in education ministries and heads of teacher-training colleges to plan and implement successful teacher education programmes. The two publications draw extensively on case studies illustrating the variety of approaches and models that may be used.

3.7 Meeting demand for higher education

The field of higher education has been undergoing little short of a revolution in the past decade, chiefly driven by the Internet, and in particular the World Wide Web – the underlying technologies of e-learning. The landscape is complex, comprising universities that provide both on campus and distance education programmes, some of which have existed for over 100 years. About 60 percent of US universities now provide virtual education programmes. Alongside these are single mode open universities, many of which have developed into 'mega-universities' with more than 100,000 students. Founded in 1969, the British Open University, which caters to 160,000 students a year, has served as a model for similar institutions in many other countries. Ten of the largest universities in the world are open universities, and all but one of them are located in developing countries. The University of South Africa (UNISA), for example, operates within South Africa and beyond, with student numbers in excess of 100,000.

The starting point for such institutions is high demand, both for tertiary education and lifelong education, throughout the developing abroad. As Sir John Daniel, UNESCO's Assistant Director-General for Education, recently remarked that "the demography of our contemporary world means that in numerous countries half the population is less than 20 years old. Universities in those countries will face a tidal wave of hopeful youngsters who know that higher education is the key to a future with choices."[31]

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31. Opening Speech, First Global Forum on International Quality Assurance, Accreditation and the Recognition of Qualifications in Higher Education. Final Report. UNESCO, Paris, 17-18 October 2002.

These levels of demand have driven the better students to study abroad, from where they often do not to return to their home country. To counter this trend, the last four decades have witnessed the emergence of colleges and universities dedicated to delivering tertiary-level education off-campus to learners, especially in those countries where the gap between supply and demand is largely unmet. As a result, there are more distance learning courses offered at the tertiary level than at any other. The creation of such institutions is generally spurred by the government's objective of democratizing education, as in the creation of the Open University established in Andhra Pradesh (India) in 1982. Institutions such as Korea's National Open University and the Chinese Central Radio and Television University use mass communications technology, such as print and broadcasting, to reach students who do not have access to conventional universities.

Because of their large student enrolments, open universities bring major economies of scale to their operations. Today, these universities are tapping a wide variety of new technologies. Britain's Open University, for example, has a technology called Stadium, allowing it to hold classes over the Net to an audience of many thousands. Students also use the web for administrative transactions, to consult libraries and museums, and to communicate with each other. Several open and distance learning institutions in Thailand use on-screen interactive and web-based Internet media as core delivery systems for educational material, supplemented by print, audiovisuals and telecommunications.

Higher education has always been characterized by mobility and the ideal, expressed in UNESCO's Constitution, of "the free exchange of ideas and knowledge." Today, the sector has grown into a global enterprise. According to the OECD, the higher education market in its member countries is worth some US$30 billion on a conservative estimate. Services in higher education refer to new providers of higher education, new modes of delivery such as distance learning via the Internet, radio and television, and new activities such as educational testing services. Driven by technological innovations, "borderless" or "transnational education" has assumed growing significance by enabling students in one country to follow courses given by an institution

in some other part of the world – a type of virtual studying abroad. E-learning, after all, recognizes no national boundaries, and defies many of the national and international legal frameworks that were created for a world with frontiers. In response, a number of public and private universities have formed consortia and partnerships with the private sector to exploit their e-learning initiatives globally, or share online teaching resources. Universitas 21, for example, is a network of 17 universities in mainly Commonwealth countries which has formed a partnership with Thomson Publishing to found an 'e-university.'[32] Member States no longer have sole control of education within their borders, and institutions have lost their decision-making monopoly.

Soaring numbers of for-profit providers, 'corporate universities,' alliances between universities and media companies or publishers, along with the spread of trans-border education and the liberalization of educational trade through the World Trade Organization, has opened the lid on a complex set of highly contentious issues related to access, equity, intellectual property and cultural diversity. Critics argue that technology is transforming higher education into a global market, undermining equity, eroding national post-secondary institutions, and imposing excessive uniformity in culture, contents and language. They fear that in the long run, global e-learning initiatives are likely to compete with less well-funded universities and widen inequalities in access to education. While these critics forcefully oppose the treatment of higher education as a commodity or tradeable service, others point to the specific benefits and opportunities provided by the global education market. A further school of thought maintains that increased trade in higher education can help everyone, starting with developing countries, which simply do not have the resources to meet student demand.

There are no clear-cut answers, as numerous initiatives underpinned by a concern for equity and universal access to knowledge go to show. The African Virtual University is one example, reaching students in 17 countries (see box).

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32. Bates, T. *National strategies for e-learning in post-secondary education and training*. Fundamentals of Educational Planning 70. UNESCO International Institute for Educational Planning, p. 60.

The African Virtual University: Reaching 24,000 Students

Created in 1997, the African Virtual University comprises 34 learning centres in 17 countries of Anglophone, Francophone and Portuguese-speaking Africa. Its aim is to increase access to tertiary and continuing education, improve the quality of education by tapping the best resources in Africa and worldwide, improve connectivity in learning centres and host universities, and provide training in engineering, computer science and business. Professors from universities in Australia and the US deliver classes in a studio classroom. Lectures are then beamed by satellite to AVU's learning centres all across Africa, staffed by moderators who guide students through the materials. During class, students can interact with the faculty using phone lines, fax or email. For those universities which have adequate technological infrastructure, the satellite transmissions are supplemented by the use of Internet, CD-ROMs and DVDs. AVU uses international bids to identify the most appropriate, learner-centred quality programmes for its students. The programmes are reviewed by African experts in order to ensure that they respond to learner needs. Since its inception, more than 24,000 students have completed courses, and over 3,500 professionals have attended executive and management seminars.

Other initiatives demonstrating a public commitment to knowledge sharing are to be found in projects aimed at improving access to online learning materials. Brazil's *Biblioteca Virtual*, for example, provides an archive of works in Portuguese that can be used in Brazilian schools or universities. In a groundbreaking move, the Massachusetts Institute of Technology (MIT) launched an open courseware initiative in 2001 to make materials from approximately 2,000 courses freely available for use by faculties and students everywhere in the world. Only commercial applications will require licenses for use. The programme aims to provide access to the materials, and create an efficient standards-based model that can be used by other universities. The launch of MIT's Open Courseware initiative, however, brought into sharp focus issues related to intellectual property rights, assessment of quality, availability and acceptance of appropriate technology, and the cultural relevance of imported materials.

In line with its mission to respond to the ethical and political challenges of globalization, UNESCO has taken the lead in encouraging debate and international co-operation in this area, while never losing sight of an overarching commitment to the principles of access to quality higher education for all on the basis of merit.

Following up on the MIT initiative, UNESCO and its partners launched a project on open educational resources for higher education in 2002. The project will establish an online repository of existing non-commercial educational resources, available for free consultation, use and adaptation by any educational institution or individual learner, anywhere in the world, with a special focus on least developed countries and small island states. The aim is for educational experts to share and efficiently use teachers' expertise and establish a continuing north-south dialogue on the creation and use of open courseware. Support services such as specialized software and methodology, translation and on-line assistance will also be available. Priority will initially be given to higher educational materials, but the repository will be extended to other educational levels, including basic and vocational education.

Another important initiative is the *Global Forum on International Quality Assurance, Accreditation and the Recognition of Qualifications in Higher Education*, set up by UNESCO with the aim of providing a platform for dialogue and empowering the education community to make informed decisions related to new trade agreements, such as the General Agreement on Trade in Services (GATS) and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). The Forum will also look at ways of updating the six existing regional conventions dealing with recognition of qualifications and ratified by 130 Member States to include new developments in education, such as the sale of courses on the Internet or in the form of CD-ROMs and DVDs.

UNESCO is also committed to helping countries draw upon the potential of ICTs by carrying out technology transfer, supporting training and development of course materials, sharing experiences and creating new learning environments, with the reduction of the digital divide as its top priority. UNESCO, for example, is assisting the South Africa Institute for Distance Education in building up a consolidated information system on open and distance learning (see box).

Knowledge on Distance Education for Africa

With support from UNESCO, the South African Institute for Distance Education (SAIDE) is currently developing a consolidated information system and database on Higher Education Open and Distance Learning. The aim is to offer an integrated knowledge guide to distance education and open learning in sub-Saharan Africa. It will include selected readings, reports of good practice and other information tools targeted to help public and private organizations and individuals using distance education as a means of human development in the higher education sector. In partnership with the Commonwealth of Learning, the project has established a technical platform and is developing a search engine allowing users to conduct sophisticated searches for web-based information stored on web servers around the world. The project involves obtaining permission from journals to convert articles into digital format and add them to the database, and country visits to conduct research and collate resources on open and distance learning.

The International Institute for Educational Planning recently published a series of case studies on virtual universities (see box), available online, with the goal of informing and stimulating discussion and debate related to ICT-supported higher education. IIEP will organize an Internet forum on the issue in late 2003.

Learning about Virtual Universities

This web publication is the first outcome of an exploratory study undertaken by IIEP on the phenomenon of the virtual university, an important development in the higher education field. It analyses the main trends affecting higher education, the challenges and opportunities facing the university, and the impact of borderless education. It puts different types of institutions under the microscope – commercial enterprises, consortia of partners, newly created institutions operating as virtual universities or existing institutions that have developed a unit offering virtual education. Among the institutions covered in the case studies are Kenyatta University (which joined the African Virtual University in 1997), the *Université Virtuelle en Pays de la Loire* (a consortium of five partners), Net Varsity in India for IT training, UNITAR in Malaysia (the region's first virtual university, created in 1998), the *Campus numérique francophone*, and the University of Southern Queensland (an example of a traditional university operating as a dual-mode institution).

Key issues raised throughout the cases studies include the importance of 1) leadership and support from the senior level of the institution, 2) appropriate technology infrastructure and sufficient resources for its implementation and maintenance, 3) staff training, support and reward structures, 4) new teaching and learning approaches, 5) programmes appropriate to the technology, 6) quality of the educational product and service, 7) co-operation for sharing of expertise and reducing costs. A first Internet discussion forum will be held in late 2003, based on the cases and lessons outlined in this publication.

Source: *The Virtual University. Models and Messages/Case Studies*. Edited by Susan d'Antoni. UNESCO Publishing/IIEP, May 2003. www.unesco.org/iiep/eng/focus/elearn/webpub/index.html

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The intellectual capacity of UNESCO Chairs-UNITWIN Networks also plays an instrumental role in fostering partnerships and cooperation in the field of ICT and education. Its contribution will be further discussed in Part Four.

3.8 Promoting literacy, life skills and adult education

There are close to 900 million illiterates across the world, making up an extremely diverse group of people. One general characteristic, however, holds across the board: illiteracy is much more widespread among women than among men.

Adult Literacy Rate (2000)

Region	Male	Female
Arab States	71.7	47.8
Central and Eastern Europe	98.1	94.3
Central Asia	99.7	99.4
East Asia and the Pacific	92.4	80.5
Latin America and the Caribbean	89.9	87.9
North America and Western Europe	99.0	98.3
South and West Asia	66.4	43.6
Sub-Saharan Africa	68.9	52.0

Source: Education for All Global Monitoring Report 2002, *Is the World on Track?*

In 2000, close to two-thirds of all illiterates were female, and the gap is closing at an exasperatingly slow rate. Unless a much greater effort is made, 79 countries will not be able to halve their illiteracy rate by 2015.[33] Literacy is a major contributor to poverty reduction, and has significant positive impact on family health, children's educational attainment and sustainable management of local natural resources. The issue is how to identify and develop the most effective mechanisms for reaching the excluded.

The use of educational technology to offer out-of-school teaching in areas as diverse as health, agriculture, family planning, rural development and formal qualifications has a fairly long history.[34] As Hilary Perraton of the International Research Foundation for Open Learning explains, these projects typically combine broadcast or print support with group study: radio schools in Latin America and mass-media educational campaigns in several African countries are two such examples. Cuba's Literacy and Mass Communication Media project, run in cooperation with Haiti's Ministry of National Education, relied heavily on radio to bring literacy provision to over 6,000 people in Haiti and train literacy personnel. Radio classes for reading, writing and numeracy were recorded, and guides published for monitors and learners. The project, which builds upon Cuba's experience in

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33. EFA Global Monitoring Report 2002, op cit., pp. 60-64.
34. Perraton, H. *Technologies, education, development and costs. A third look at the educational crisis*. Paper for roundtable on "University and Technology for Literacy. Basic Education Partnerships in Developing Countries." Paris, 10-12 September 2002.

increasing literacy rates, received an honourable mention in the UNESCO literacy awards of 2002.

To boost their effectiveness, basic literacy and numeracy courses are frequently combined with life-skills training aimed to improving people's livelihoods. The Gobi Women's Project, started in the early 1990s following Mongolia's transition from a communist to a market-oriented model, provided nomad women from the desert with literacy and skills training on topics such as health, livestock-rearing techniques and business basics. The project, a three-way partnership between the Danish International Development Assistance (DANIDA), UNESCO and the Mongolian government, used weekly radio broadcasts complemented with printed material and scheduled teachers' visits. Radios as well as batteries and relevant booklets were provided by the project, which served 15,000 women in all 62 Gobi districts and initiated spin-off projects for the women's families.[35]

Community radio has a powerful role to play in non-formal education, and is being creatively used in the fight against the HIV/AIDS pandemic. Forty million adults and children currently live with HIV/AIDS, 28.5 million of them in sub-Saharan Africa. In South Africa, for example, a plethora of community radio stations provide information and education lifelines to marginalized communities, through phone-ins, on-air counsellors and public awareness campaigns using local opinion leaders and public personalities to inform and educate.[36] In Bolivia, the Preventive Health Programme (PARI) has achieved significant gains in children's knowledge, attitudes and behaviour through interactive radio instruction. Broadcasts reach approximately 125,00 students in 69 schools. Besides addressing local needs through locally produced programming, community broadcasting can also offer a tremendous variety of quality educational content freely available for rebroadcast, from national and international sources, via satellite or the Internet. The Commonwealth of Learning, for example, has

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35. Haddad, Wadi D. & Jurich, S., op cit., p. 30.
36. Naidoo, G.. "Effective Community Radio in Education," op. cit.

helped set up low-cost portable, suitcase-size community broadcasting stations in Africa and Central America.[37]

In some cases, universities run outreach projects using ICTs, such as Pakistan's Allama Iqbal Open University, which provides non-formal education through its Functional Education Project in Rural Areas. Group leaders receive audiocassettes and flip charts as resources to lead discussion and study groups. In India, the Yashwantrao Chavan Maharashtra Open University extension department delivers programmes using print, broadcasts and face-to-face support on agriculture, nutrition, vocational skills and entrepreneurial development to illiterate adults, new literates and unemployed youths, using a wide range of local organizational structures.

Recent years have witnessed a flurry of innovative ventures employing ICTs to extend literacy to out-of-school youth and adults. Telecentres, for example, are one promising route for rural communities in the developing world to break out of their isolation. Originating in Sweden around 1985, telecentres experienced fairly rapid growth in Western Europe and other industrialised countries where rural isolation and low quality telecommunications were seen to be a hindrance to participation in the information economy. Today, telecentres are being established across Africa, Latin America and Asia, often with support from international development agencies. Generally run by grassroots groups, they serve as a cost-effective means to enhance basic education, train teachers, develop local business and strengthen governmental and civic organizations. A more advanced version of the concept, Multipurpose Community Telecentres (MCTs), may include facilities such as libraries, training workshops, seminar rooms and office space, and provide services such as distance education, training in ICTs, telemedicine, telehealth and access to databases and environmental information.

UNESCO's programme for Community Multimedia Centres (CMCs), launched in 2001, seeks to bring together in a novel approach two areas in which UNESCO and its partners have already recorded major successes: community radio and Multipurpose Community Telecentres. By combining

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37. Dhanarajan, G. "Objectives and Strategies for Effective Use of ICTs," in *Technologies for Education*, op. cit.

community radio and access to the Internet, library services and other ICTs, the project aims to overcome linguistic, literacy-level and other barriers which prevent the most disadvantaged communities in developing countries from engaging in and benefiting from the exchange of information and knowledge through accessible channels of communication. One such programmes is underway in Mozambique, where UNESCO is helping to transform the country's first two pilot telecentres into fully-fledged community multimedia centres. In India, these centres offer a variety of training modules in local languages. Hubs of learning such as these could potentially cater to the learning needs of several generations under the same roof, familiarize them with technology and tailor courses to local needs. UNESCO ran a training workshop in Burkina Faso in 2002 for future CMC managers, and has launched a collaborative process to produce a multimedia training kit consisting of a series of interactive learning modules covering all aspects of CMC management from organization to content production.

Kothmale Community Radio
A Resource for Teachers and Students

Like several other similar stations in Sri Lanka, Kothmale Community Radio (KCR) came into being during the resettlement of some 60,000 people as a result of the Mahaweli irrigation project. In the mid-1990s, UNESCO identified both the enormous potential of the Internet for access to information and the emerging rural-urban gap in terms of access. Today, the project combines radio and Internet to address the problem of rural access to computers and connectivity. KCR has been set up as a mini Internet Service Provider with a leased line connection to the Internet and seven computers, including three for public access at KCR and two for remote access from public libraries in neighbouring towns. Radio browsing is an important part of the project: listeners, including school children and teachers, send requests to the broadcasters for information on specific subjects. The broadcasters do an Internet search, download the results and make the information available to their audience via a broadcast. Alternatively, they mail it or place it in the radio station or in an open-access resource centre. This mediated access allows for the Internet's information resources to be made available to rural and underserved communities in local languages, and presented to the audience in ways that are appropriate to local social practices. A local multilingual community database has been created, and community volunteers have created 26 local multilingual websites.

While still hampered by costs, lack of technical support and shortage of literacy workers skilled in using ICTs, programmes using radio, television and telecommunications are likely to expand in the next decade as

technology spreads and becomes more affordable. It is more important than ever, given that work is still in its infancy, to build the necessary knowledge base and aid countries designing ICT policies for non-formal education.

One of UNESCO's priorities, in the context of the United Nations Literacy Decade, is to identify and promote good practices, develop resource packages for non-formal educators, encourage gender-sensitive approaches to learning, and assist community learning centres and ICT-based education delivery systems in reaching isolated populations. UNESCO's office in Beirut (Lebanon), for example, has established partnerships with the Ministry of Education, the Ministry of Culture, municipalities and other partners to establish community centres with a special emphasis on ICT. These centres, generally located in isolated communities and rural areas, reach a very broad audience, from students of varied educational backgrounds to teachers, unemployed adults and local managers.

As part of this strategy, UNESCO's Institute for Education is developing a *Literacy Exchange* platform – a state of the art, global level web-based resource forum for educators, policymakers, planners and practitioners in nations with low literacy rates. The platform will include online historical cases of literacy campaigns with examples of the materials used, greatly increasing the knowledge base available to governments and other agencies charged with developing new products for literacy and non-formal educational systems. Practitioners using the platform will be able to download documents, tools, databases and instructional materials essential to developing educational and training activities. Many of the materials are scans of the original documents, while others are in PDF or when possible HTML format for easier online viewing and downloading. During the first phase, the site will offer documents, tools, databases and instructional materials essential to developing educational and training activities. The Literacy Exchange's second phase will provide educators and specialists with low-cost and interactive training opportunities to help developing and transitional nations improve their non-formal education systems and programmes.

The UNESCO Asia-Pacific Programme of Education for All (APPEAL), meanwhile, is running a three year-programme (2002-2005) targeted at disadvantaged rural population groups throughout the region, aimed at

providing them with greater access to context specific education programmes using ICTs. The programme puts a strong emphasis on community empowerment. Capacity building workshops for non-formal education personnel stress that the approach should enable local people to access information and knowledge through ICTs, design and manage their own activities, and develop their own materials. Pilot projects will be organized in selected community learning centres, where local people will shepherd a project from the planning to the evaluation stage, in cooperation with non-formal education specialists at the district level using ICTs. An expert meeting on material development and training will at the same time examine how to convert existing APPEAL resource materials into ICT (digital) formats for wider, direct and more interactive use by community learning centre managers. Prototypes of ICT materials will be developed, along with training manuals on how to make the most effective use of these materials at district and community levels. Online training programmes will be designed to provide interactive learning using the Internet and CD-Rom. In a separate programme, UNESCO APPEAL is developing educational software for use in the training of functional literacy and post-literacy education. This project targets neo-literates – young people and adults who have completed basic literacy training yet who need to strengthen their functional literacy skills.

Projects such as this reflect how the definition of literacy is evolving as higher levels of basic skills are required to "function" in knowledge-based societies. Beyond the acquisition of ICT competency per se, vocational and continuing education are being called upon to take up increasingly important places in the educational landscape so that countries can improve productivity and remain globally competitive. The need for recurrent and continuous updating of knowledge and skills is recognized as a fundamental requirement in today's societies. Continuing education and training is thus an expanding field, in which distance education plays a vital role. Its decentralized and flexible delivery, alongside its modular style of courses and curricula, can empower those most disadvantaged by existing provision, particularly the unemployed, the disabled, women and ethnic minorities, and respond effectively to the growing demands of working youth and adults. Thailand, for instance, considers open and distance learning as the most cost-effective way to educate and train, while a growing number of both public and private organizations are delivering training and education over the Internet.

UNESCO regards technical and vocation education and training (TVET) for the world of work as a priority. The "Revised Recommendation Concerning Technical and Vocational Education," adopted in 2001, offer policymakers and other social partners guidelines for putting in place quality TVET and training policies for all throughout life. The UNESCO-UNEVOC International Centre, based in Bonn, aims to support Member States' efforts to achieve high quality, relevant and cost-effective technical and vocational education and training for all. It concentrates on providing technical advice and training to strengthen and upgrade TVET (especially in developing countries), encourages the exchange of experience regarding best practice and innovative approaches using ICTs, and provides a platform for inter-agency cooperation. Several recent international efforts focusing on Southern Africa and the Asia-Pacific region have explored how educational technologies help improve the quality of TVET.

The above recommendation recognizes that ICTs have the potential to make enormous improvements to people's access to quality education and training, including in the workplace, but warns against the danger of the digital divide. While recognizing the advantages of distance learning methods, the Recommendation advises that it should, as far as possible, "be combined with traditional training methods in order to avoid a sense of isolation of the learner." Finally the Recommendation stresses the need for trainers to master ICT technologies and update teaching methods to accommodate developments in the ICT field. UNESCO's Institute for Information Technologies in Moscow has recently launched an international project on ICTs in technical and vocational training that deals with lifelong learning and information literacy. Its purpose is to identify the needs of Member States in this area, and familiarize specialists with research findings on ICT usage in technical and vocational education.

3.9 Improving educational management

ICTs could in principle bring about major changes to traditional methods of educational planning, management, monitoring and evaluation. Because computers are fast, accurate and consistent, they are a tremendous asset in administration. Long-distance learning systems, such as the world's open universities, could not operate without massive use of ICTs. Computer software programmes are being used in school management to streamline

operations and monitor performance, and to provide managers with accurate and up to date information so that their decisions can be evidence-based. At the system level, technologies provide critical support in areas such as school mapping, automated payroll systems, management information systems, and information gathering, analysis and use. Administrators and policy makers can construct virtual scenarios around different policy options to determine needs and analyse potential consequences.[38] UNESCO's office in Beirut (Lebanon), in cooperation with several partners[39], has initiated a regional project to enhance decision support systems in the Arab States, taking advantage of the tremendous potential of ICTs. The basic thrust is to build capacity for developing comprehensive databases on education at all levels, and to use these databases in all aspects of policy-making, planning, management, monitoring and assessment. UNESCO's office in Santiago de Chile (see box), meanwhile, runs simulation games to improve school governance and encourage evidence-based decision-making.

Simulation Games for Better School Management

Since 1994, UNESCO's Bureau for Education in Santiago, Chile, has been developing training simulation games aimed mainly at school principals. The goal is to improve school leadership and educational quality and to encourage reform at the school level. The simulation games enable principals to make a diagnosis, draw up databases, conduct a strategic analysis of different policy options based on local realities, and finally, carry out a forecasting exercise to assess the impact of different strategies on learning outcomes. The exercise, generally run over four-day immersion courses, enhances data analysis skills and provides participants with a virtual setting for simulating the impact of different policies on their school. UNESCO has run the workshops at both the municipal, state and national level in several countries, including Mexico, El Salvador, Costa Rica, Peru and Chile. The games are an aid in changing decision-making styles in the school towards a less bureaucratic, more participatory model.

ICTs are also a tool for *monitoring*. UNESCO's Asia Pacific Programme of Education for All, with financial assistance from the Government of Japan, has launched an initiative to develop monitoring and evaluation tools in the non-formal education field. The Map-based Analysis for Non-formal

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38. Haddad, Wadi D. & Jurich, S., op. cit., p. 32.
39. The Arab Fund for Economic and Social Development, the World Bank, the UNESCO Institute for Statistics, in addition to participating Member States.

Education Goals and Outputs (MANGO) will develop a database system for monitoring literacy and continuing education at the community, district and regional levels. This system will provide a more uniform system for tracking progress of non-formal programmes, and be disseminated across the region.

In Africa, IICBA supports a distance education degree programme in educational leadership, including school and educational management. The certificate and masters' degree programmes offered by the University of South Africa (UNISA) and supported by IICBA are targeted at principals, deputy principals and heads of departments in teachers' colleges, and cover a wide spectrum of human resources and management issues. ICCBA has also initiated a Women's Leadership in Education Programme to increase the number of women educators in leadership roles and improve their capacities. Women at present constitute an average five per cent of lecturers in teacher education institutions in Africa. The Institute is, in addition, set to support programmes such as the Women's University in Africa, which has recently been established to provide distance education degree programmes for women and short workshops to promote leadership skills.

The Institute of Education Planning, through its Virtual Institute, offers flexible education opportunities, including distance education courses and forums for discussions of key topics, in which educational planners and managers debate topical issues and update their knowledge in discussions moderated by subject specialists. Recent fora focused on planning for education in the wake of HIV/AIDS, reducing repetition and strategies for e-learning. The latter involved some 70 participants from 25 countries in discussions on e-learning readiness, sectors which could benefit, and the conditions needed for e-learning to take place. The distance courses, offered to selected ministries, universities and other institutions, offer flexible training and allow participants to remain at their place of work.

In terms of efficiency gains from the use of ICTs, debate has focused on an array of variables: the policy context, number of learners enrolled, technology choice, costs of developing course materials, training and maintenance. Qualitative outcomes also enter the equation. Radio remains a popular means both for enhancing quality in school education and supporting pre-and in-service training. Most studies find that the use of new ICTs is more expensive than instruction delivered by older technologies like

print and radio, but less expensive than instruction delivered by television.[40] Open and distance learning is often quoted as cheaper than conventional forms of education and training, but this is not systematically the case. Economies of scale are nevertheless achieved in large systems, such as the Chinese Radio and TV Universities. The International Research Foundation for Open Learning advises that "it is much easier to justify the costs of the more advanced technologies when there is a potential multiplier effect. While in many jurisdictions, it is difficult to find an educational justification for heavy expenditure on the technologies in school, it is much easier to see a role for them in the education and continuing professional development of teachers or of extension agents."[41]

40. Blurton, C., op. cit.
41. Perraton, H. "Technologies, education, development and costs. A third look at the educational crisis." Paper presented at the round table "University and technology for literacy/Basic Education Partnerships in Developing Countries." Paris, 10-12 September 2002.

4. Principles of success

Developing ICT-equipped learning environments is a complex undertaking that is still in its infancy in most developing countries. The complexity stems from the number of factors involved, and the need for close collaboration between different government ministries, partnerships with the private sector, and regional and international cooperation, in particular for training and sharing information, research and experience. Even so, this is still an area of educational innovation in which the possibilities appear unlimited.

There is no doubt that the effective use of ICTs is hampered by low accessibility, low connectivity, lack of maintenance training and high infrastructure costs. All too often, state monopolies charge exorbitant prices for the use of bandwidths. But none of these barriers are insurmountable so long as informed and coordinated policy choices are made at the national, regional and international levels.

Different stakeholders each have a role to play in preparing their citizens for participation in an information-based global society. Countries obviously start from different levels of ICT availability, but it is critical that all acquire experience in using technology for educational purposes. The overriding issue today is how to use ICTs to accelerate progress towards Education for All goals, expand access at the higher level and increase lifelong learning opportunities. A critical related issue involves the strategies needed to bridge the gap between the information rich and the information poor.

In making ICTs an integral component of educational policy, the following issues are of particular importance.

4.1 Government leadership

National governments have always been key players in the expansion of educational projects relying on technology. The Open University in the UK, set up in 1969, was a political creation, aimed at increasing access to higher education for adults and using new technologies for learning and teaching. More recently, countries such as Brazil and China have invested massively in infrastructure and financed educational projects to spread

computers into their schools. Brazil's national education plan clearly spells out that ICTs are crucial to securing more democratic access to educational resources and emphasizes the fundamental importance of integrating ICTs into schools and universities.

4.2 Sound educational planning

No technology can fix a bad educational policy. ICTs must be integrated into overall national education plans, which must in turn clearly establish their place within the country's educational strategy. Unless technologies are integrated into the education process, they will remain a marginal and costly accessory. A clearly articulated educational philosophy must be the "road map" for guiding investment in technology. The cost of equipment, training, content development and maintenance are just a few of the variables that enter into the complex equation. How central are ICTs to education policy? How do they fit in with national goals? What is the rationale for investing in ICTs – to promote ICT skills such as word-processing or to improve educational quality? Who is the target audience? What are the costs and benefits of investing in ICTs? A further related question is that of investment sustainability.

The role of *open and distance learning* within education systems must also be carefully weighed, and the resulting policy decisions clearly spelt out. Policymakers have several examples illustrating its significant contribution to meeting demand for junior secondary, higher and continuing education or teacher training. A UNESCO survey undertaken in the E-9 countries on distance education offers insights and an agenda for future research (see box).

A Policy Agenda for the Nine High-Population Countries

The E-9 countries attach great importance to distance education as a means of reaching out to the excluded and providing them with quality education. All have used distance education to offer an alternative to formal primary education or to support primary schools, to provide junior secondary schooling, to meet the needs of out-of-school adults, and to train teachers. A UNESCO survey conducted in partnership with the International Research Foundation for Open Learning, ministries of education and educators drew conclusions about how well distance education is working in the E-9 countries and proposed paths for future action. The authors drew attention to the lack of solid evaluative data on both programme outcomes and costs. Most of the countries have developed large-scale institutions operating at various levels of education. Simpler technologies, especially print and radio, dominate teaching material. There is also evidence that, given sufficiently large numbers, the costs of distance education compare favourably with those of conventional education, so long as the measure is cost per student. It has been possible for Indonesia, for example, to set the costs of its open secondary school at 60 percent of the costs of regular schooling. Where completion rates are high, as in many teacher-education projects, favourable results are being achieved in terms of cost per successful student.

Based on this evidence, the authors advance several conclusions. They recommend a research focus on school equivalence, teacher education and non-formal education. Teacher education at a distance appears to have been successful where tried, but with the exception of China and to a lesser extent Nigeria, it seems to have been on a relatively modest scale in relation to potential need. Little work has been conducted on non-formal education initiatives, especially in relation to health, although strategies exist elsewhere that could be applied in the E-9 countries. There is also scope for expanding school equivalence programmes. The authors point to the pressing need to improve information available to educational policy-makers in the E-9 countries, through, for example, dedicated websites or CD-ROMs with user-friendly databases. The literature should be critically reviewed with the aim of drafting a good practice guide for planners. In other areas, more information must be generated, particularly on costs and outcomes. The authors recommend developing a collaborative programme of research in which researchers in E-9 distance-teaching institutions explore ways of improving educational practices. In each area, it would be necessary to look at the organization model, technologies, costs and learning outcomes of distance education programmes. The results of such studies would then be made available in electronic and print form to policy-makers in the E-9 countries.

Source: *Distance Education in the E-9 Countries*, UNESCO, 2001.

Careful scrutiny should be given to expanding open and distance learning systems, in collaboration with regional and international partners. As several examples in this publication have highlighted, open and distance learning means more freedom of access, allowing learners to overcome barriers such

as geographical distance, lack of educational infrastructure and cultural and social constraints. Specific attention must be given to quality and the recognition of qualifications obtained. Universities have an important role to play in advancing knowledge through research in the field, experimenting with the application of ICTs in education and contributing to courseware development. As the 1998 World Declaration on Higher Education for the Twenty-First Century states, "higher education institutions should lead in drawing on the advantages and potential of new information and communication technologies, ensuring quality and maintaining high standards for education practices and outcomes in a spirit of openness, equity and international co-operation" (Article 12).

4.3 Technology choice

There is much to be said for encouraging a wide range of approaches to technology investment, each tailored to the needs of a particular national system. Governments in each case must identify the most appropriate, cost-effective and sustainable technology to further their educational goals. Some of the more economically advanced countries, for example, are now developing a national e-learning strategy as part of a broader national skills and training policy.[42] National dedicated broadcasting channels and use of television are a possibility for high population countries, but not for small states. Sensible choices between technologies need to reflect both geography and economics. Some of the greatest educational problems are in the most remote areas, where electricity supplies may be irregular or non-existent, telephones scarce and lines difficult to maintain.

Even as recently as ten years ago, the choice of technologies for delivering education was somewhat limited. Today, digital technologies – combinations of hardware and software, media and delivery systems – are evolving and converging rapidly, providing much greater flexibility and possibilities for interaction.

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42. Bates, T., op cit., p. 44.

4.4 Human resource development

Teachers, from basic to higher education, are essential to the success or failure of educational projects, but rarely are they involved in the planning stage of these projects. As the World Declaration on Higher Education in the Twenty-First Century states, "new information technology does not reduce the need for teachers but changes their role in relation to the learning process so that the continuous dialogue that converts information into knowledge and understanding becomes fundamental" (Article 12). Graduates of most teacher training institutions, however, have little experience in using technology, and no information about how to integrate ICTs into curricula and practice. Teachers and trainers above all require support in their use of technology through well-developed and flexible pre- and in-service training programmes. Particular attention must be paid to training female teachers and encouraging them to become technology instructors in community learning centres. Several examples (Chile, Costa Rica) illustrate that integrating ICT into training favours teachers' subsequent adoption of technology and novel learning strategies. At the secondary and higher level, teachers and lecturers require guidance in designing self-instructional materials and online courses, along with skills for tutoring students in a virtual environment.

The provision of onsite technical support is also critical to the success of an ICT-based educational programme. Hardware infrastructure relies on supporting elements such as electricity, maintenance and technical services. It is estimated that annual costs of maintenance can range between 30 and 50 percent of the initial investment in hardware. Such investments should be undertaken by both the public and private sectors, and make full use of collaborative local, national and international networks.

4.5 Curricula, software and cultural diversity

The digital divide is not a pretext for avoiding the introduction of technology in education. Everyone must be in a position to seize the opportunities offered by technology in every field of inquiry, be it farming or health. Initiation in the use of technology should be a required part of the curriculum, beginning in primary education and continuing through the early years of secondary education.

Curricula must be developed to take into account the role of ICTs and promote information literacy. Learning resources must also be adapted to different contexts and cultures, while at the same time encompassing an international dimension, especially at the higher level.

Quality software content is vital if ICTs are to enrich the learning experience, but the cost of developing software is a problem for many developing countries. Free open source software and alternative operating systems suggest one way forward. UNESCO's Open Courseware Initiative (see above) will contribute to making available quality online materials for the academic community.

Collaboration is essential in developing software materials. Institutions may collaborate on material creation, share costs and learn from each other. The International Virtual Education Network (IVEN) for the Enhancement of Science and Mathematics Education in Latin America is forming teams of content experts, graphic designers, instructional designers and programmers to develop educational material focused on mathematics and science for secondary education. UNESCO and partners can play an important role by encouraging exchanges of expertise on curricula for teaching the basics of ICTs, and integrating these methods into different subjects such as science and language.

4.6 Telecommunications policy

The state has a pivotal role to play in creating regulatory frameworks that favour wider access to the Internet and technology investment in education. It has been suggested that only national policy makers have the power to increase by a significant amount access to the Internet and telephone, and that this demands a substantial reform of their telecommunications sector through privatization, competition and independent regulation. The effective use of e-learning for education and training is absolutely dependent on a widely accessible and low-cost national telecommunications infrastructure.[43] According to Bates, "there is strong evidence that both the expansion of Internet infrastructure and the

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43. Bates, T., op. cit., p. 44.

proportion of users of the Internet are closely related to commercially competitive regulatory environments... An unregulated free market will result in higher costs for poorer people, and hence loss of service." Governments can promote technologies for education through tax relief, supporting projects that ensure access to technology for unserved populations, or by using other incentives. Most mega universities have privileged access to telecommunication systems that are controlled or regulated by the government in their base country. If the knowledge gap is to be narrowed, more effort must be put into making available reliable, high-speed information highways and related services to universities and higher education institutions.

4.7 Cooperation between sectors

ICT policies have to take into account other policy areas, such as telecommunications policies, trade and investment policies, and cultural and linguistic policies. In particular, there is a need for closer integration between education and training systems. Businesses, researchers, development partners, local communities, NGOs and other civil society organizations all have a role to play in supporting governments in the use of ICTs to improve the delivery and quality of education. Collaboration, including cost sharing, between education and industry to build ICT infrastructure is becoming commonplace. Policymakers have to assess the role the private sector should play in making ICTs available for educational development, and explore how equipment can be shared with the community at large to reduce costs.

4.8 International Cooperation

No single country or group of countries holds the key to solving problems related to education and the information society, making international cooperation a necessity. UNESCO is serving as a catalyst in this process, in keeping with the ideals enshrined in its Constitution. International cooperation is of paramount importance in sharing experiences, creating synergies at regional and global level, and avoiding costly mistakes and duplication of effort. In all regions, but especially in developing countries facing the greatest education challenges, there is much to be

gained from enhanced regional collaboration on policy issues, development of delivery systems and sharing of materials. UNESCO and its partners also have a fundamental role to play in improving education and training, both in terms of curricula and in delivery modes making use of ICTs.

The core purpose of UNESCO's education programme is to achieve Education for All in its broadest sense: education for all, at all levels, throughout life. In seeking to drive international cooperation forward, it has developed close links with governments, multilateral agencies, civil society and bilateral development agencies. It also provides technical support to expand alternative delivery systems, such as distance and open learning.

Part Three drew attention to numerous UNESCO initiatives aimed at contributing to the judicious use of ICT in education. From these, several priorities can be distinguished which guide the Organization's actions.

4.8.1 The Knowledge Base

ICTs are in and of themselves ideal tools for facilitating the exchange of experiences and collaboration. Numerous projects and programmes now underway include a component aimed at setting up databases allowing for the exchange of best practice, high quality case studies and other materials At the core of these initiatives is an endeavour to build up a research culture on ICTs and education, and knowledge of best practice, particularly in light of the current lack of evaluative data on ICT-based projects. New evaluation and assessment paradigms are required that better reflect the cognitive learning processes and skills resulting from ICT use. The establishment of a regional clearing house in support of ICT in education in the Asia/Pacific region is a valuable resource for policymakers, educational managers, teachers, researchers and ICT specialists alike. Similarly, the Literacy Exchange platform developed by the UNESCO Institute for Education provides a rich resource base for assisting in policy dialogue and programme design. Researchers should be encouraged to compare learning achieved by traditional pedagogy, by an ICT-enriched pedagogy and by an ICT-based pedagogy. Universities also have a pivotal role to play in promoting research and collaboration. The World Conference on Higher Education (1998) stressed the importance of promoting and supporting cooperation involving universities in the North and South with a

view to building knowledge of technology applications. In this respect, the UNITWIN/UNESCO Chairs Programme is a highly valuable and innovative contribution to building the knowledge base.

**Transferring knowledge to developing countries
the UNITWIN/UNESCO Chairs Programme**

Set up in 1992, the UNITWIN/UNESCO Chairs programme aims to boost cooperation and solidarity between universities around the world in order to encourage knowledge transfer between North and South. The programme works by initially encouraging universities, higher education and research institutions, both private and public, to twin with each other and sign scientific cooperation agreements. The universities are then asked to extend these agreements to other universities in order to set up networks. This helps some institutions, especially in developing countries, to break out of their isolation and improve their access to and use of the most up-to-date information and communication technology. It also helps forge academic partnerships that direct students towards subjects relevant to the needs of their countries. There are more than 500 UNESCO Chairs in over 500 institutions in some 113 countries. The University of Lomé (Togo) includes a Chair in Distance Education. Most recently, in 2002, a UNESCO Chair in Open and Distance Learning was established at the National Open University of Nigeria (2002). It aims to build up the supply of skilled professionals to manage and design open and distance learning programmes through the use of ICTs.

4.8.2 Capacity building

Enabling policymakers, planners and educational managers to understand how ICTs can contribute to national education goals is the starting point for many UNESCO initiatives, conducted in partnership with a wide range of partners. UNESCO organizes workshops and seminars around the world to assist governments in developing national policies and strategies on ICT in education and to strengthen the training and professional development of teacher trainers and teachers. Since its inception in 1999, the UNESCO International Institute for Capacity Building in Africa has focused on establishing a system of networking with specialist institutions in Africa to provide distance education degree programmes, and to enable teacher education colleges and faculties to utilize ICTs to enhance the quality of education. Several of IICBA's initiatives have been highlighted in this publication. A recent high-level seminar for policy-makers from the Asia-Pacific region aimed to provide a platform for sharing views and experiences from different countries and establishing core

principles for developing educational policies. UNESCO Bangkok and the UNESCO Institute for Information Technologies in Education, for example, provide assistance in developing strategies for integrating ICTs into educational policies and programmes in a more systematic, cost-effective and culturally appropriate manner. Assistance is offered to ministries so that they can develop or improve policies for the effective use of technologies in education, boost fundraising strategies and address implementation constraints. A CD-ROM for decision-makers in the Pacific Islands provides a basic set of modules that can educate and inform non-technical people on the importance of ICTs for national development, and identify steps towards developing policies to enable participation in the information age. It covers issues such as governance, security and networking, the impact of ICTs on culture and their role in upgrading a nation's skills to meet the demands of the information age.

Training and professional development is an essential component of UNESCO's actions around the world. The UNESCO Institute for Information Technologies in Education (IITE) has developed training courses on numerous aspects of ICTs, including open and distance learning, technical and vocational education, people with special needs, and multimedia classroom applications for teachers. One of its main missions is to train and retrain educators to apply ICTs in different school disciplines. The International Institute for Educational Planning transforms its existing training courses into distance learning formats and runs a Virtual Institute offering flexible learning opportunities for planners, selected ministries, universities and other institutions, grouped according to language or region (see 3.9 above). Building up capacity at the grassroots level is an equally important strategy for narrowing the digital divide UNESCO's programme for Community Multimedia Centres, which includes a training component, builds on many years of UNESCO experience in the use of technology to serve development and peace.

4.8.3 Quality Assurance and Intellectual Property

As discussed in Part Three, the rapid development of trans-border or virtual universities and the expansion of private higher education is confronting the international community with a host of new issues. UNESCO began working on conventions on the mutual, trans-border

recognition of degrees in higher education in the 1960s. Six normative instruments to regulate mutual recognition of higher education studies and degrees were adopted during the 1970s and the early 1980s. In response to the impact of globalisation, UNESCO has set up *a Global Forum on International Quality Assurance, Accreditation and the Recognition of Qualifications in Higher Education.* Its task is to establish an international quality assurance framework and a code of good practice for providers of higher education. The Forum will also look at ways of updating the six existing regional conventions dealing with recognition of qualifications and ratified by 130 Member States to include new developments in education, such as the sale of courses on the Internet or in the form of CD-Roms and DVDs. Each new technology brings challenges to existing laws. The Organization also encourages dialogue between key stakeholders on the legal framework of intellectual property to ensure the free flow of information, a basic academic freedom.

5. Conclusion: A Shared Vision

The global shift to knowledge-based societies has profound implications for education systems. They are being called upon to expand, to become more diverse and flexible, and to improve relevance and quality at all levels. ICTs have the potential to meet these challenges. Some observers affirm that ICTs will offer developing countries the opportunity to catch up with richer nations; others point to a widening digital divide between the technology-rich North and the technology-poor South.

Technologies, however, cannot flourish in the wrong context. They are used to best advantage when there is strategic, evidence-based planning and international cooperation. There are many experiences illustrating how ICTs can make learning more engaging and education systems more flexible and diverse, especially at the secondary, tertiary and continuing education levels. They provide unprecedented opportunities for collaborative learning. Technology in education, however, should not be a smokescreen that hides deeper concerns and deficiencies. Its use must be underpinned by a strong educational vision, enshrined in declarations and in a set of international targets to which an overwhelming number of nations have committed themselves. All stress that access to education is a right for all. This entails significant challenges: ensuring that that needs of the poor, the excluded and the marginalized are addressed, putting quality and learning at the heart of the education process, and developing alternative provision modes giving learners greater flexibility and choice, especially with regard to lifelong learning. The cost of connectivity, appliances and software must not be a further barrier to individual learners. There is clearly a need for greater progress if national and internationally agreed targets for poverty reduction are to be met. Investing in education carries high social returns, for individuals and nations. More resources must be mobilized at national level and through external financing, while vital choices must be made on the most beneficial applications of technology in education. Failure to meet educational commitments carries a heavy cost, in terms of widening the gap between haves and have-nots, and increasing polarization within and between societies.

From a fundamental commitment to providing quality education for all, the specificities of each nation can be built upon, through sound planning,

policy dialogue and international cooperation. The question underlying any educational strategy must be its contribution to fostering equity and quality learning. With these aims in mind, several complimentary paths, some of which make use of ICTs, will prove the best option.

Finally, it should be stressed that education is a public good. States have the core responsibility for providing free, compulsory quality primary education, for expanding the provision of secondary and for ensuring that higher education is equally accessible to all on the basis of merit. If this vision of education is a public good is adopted, then equity becomes an overriding concern. The rising trade in education-related goods and services must not happen at the expense of national cohesion, cultural diversity and language. In a context where no nation is an island, international cooperation takes on renewed relevance, as a quest to facilitate access to knowledge, to strengthen endogenous capacities and to make universally available the knowledge that is produced.

Experience in applying ICTs in education is still in its infancy. There are now tremendous opportunities to exploit these tools into order to advance towards societies that are inclusive, in which knowledge is equitably produced and shared to promote cultural diversity, peace and sustainable development. Strong political will and a shared vision of priorities are fundamental to ensuring that these opportunities do not elude us by reinforcing, rather than reducing, today's untenable disparities between people and nations.

Policy checklist

- Ensure that ICTs are an integral component of educational planning
- Ensure that school curricula include initiation to ICTs
- Ensure that teachers are trained in information literacy and know-how to use ICTs to foster more interactive, learner-centred pedagogies
- Foster a telecommunications environment that provides incentives for educational development
- Increase resources for in-service training to provide teachers with the opportunities to upgrade their skills in light of ICT developments
- Draw upon examples of best practice to use ICTs and extend open and distance learning systems, particularly at the secondary and higher levels
- Support grassroots initiatives like Community Multimedia Centres to provide literacy training, support to teachers and the creation of locally relevant contents using ICTs
- Promote international collaboration and dialogue for research, capacity-building of policy makers, school managers, teachers and communities
- Foster stronger linkages between institutions of higher learning and schools to promote ICT use
- Set up internationally compatible high quality assurance standards and foster free access to and circulation of knowledge

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BIBLIOGRAPHY

Bates, T. *National strategies for e-learning in post-secondary education and training*. Fundamentals of Educational Planning 70. UNESCO International Institute for Educational Planning.

Delors, J. et al. Report to UNESCO of the International Commission on Education for the Twenty-first Century. *Learning: The Treasure Within*. UNESCO Publishing, 1996.

Haddad, Wadi D. & Draxler, A. (eds). *Technologies for Education*. UNESCO/Academy for Educational Development. Washington, D.C. 2002.

OECD. *Learning to Change.* Paris, 2001.

OECD/UNESCO. *Financing Education – Investments and Returns*. Paris, 2003.

Perraton, H. & Creed, C. *Applying New Technologies and Cost-Effective Delivery Systems in Basic Education*. Thematic study prepared in association with DFID for the UNESCO World Education Forum, Dakar, Senegal 26-28 April 2000.

Perraton, H. "*Technologies, education, development and costs. A third look at the educational crisis.*" Paper prepared for the round table "University and technology for literacy / Basic Education Partnerships in Developing Countries." Paris, 10-12 September 2002.

Wagner, D. *Literacy and Adult Education*. Thematic Study prepared in association with UNESCO for the UNESCO World Education Forum, Dakar, Senegal 26-28 April 2000.

UNDP. Human Development Report 2001. *Making New Technologies Work for Human Development.* Oxford University Press, New York, 2001.

UNESCO Documents

UNESCO. 1997. *Adult Education in a Polarizing World. Education for All, Status and Trends.* UNESCO.

— 1997: Hamburg, Germany. Fifth International Conference on Adult Education. Final Report. UNESCO.

— 1997: *Open and Distance Learning*. Prospects and Policy Considerations. UNESCO.

— 1998: *World Education Report*. UNESCO.

— October 1998. *Higher Education in the Twenty-first Century. Vision and Action*. World Conference on Higher Education. Final Report. UNESCO.

— October 1998: Conférence mondiale sur l'enseignement supérieur. Débats thématiques. Volume IV. « *Du traditionnel au virtuel: les nouvelles technologies de l'information.* » UNESCO.

— *World Communication and Information Report. 1999-2000*. UNESCO.

— January 2001: Kothmale, Sri Lanka. Seminar on Integrating New and Traditional Information and Communication Technologies for Community Development. Final Report. UNESCO.

— 2001. *Distance Education in the E-9 Countries*. UNESCO.

— 2001. *Teacher Education Through Distance Learning. Technology, Curriculum, Evaluation, Cost*. UNESCO.

— May 2001: Beijing, People's Republic of China. International Expert Meeting on General Secondary Education in the Twenty-first Century: Trends, Challenges and Priorities. Final Report. UNESCO.

— 2002. EFA Global Monitoring Report 2002. *Education for All: Is the World on Track?* UNESCO Publishing.

— 2002. *Technical and Vocational Education and Training for the Twenty-first Century*. UNESCO and ILO Recommendations.

— 2002. *Open and Distance Learning. Trends Policy and Strategy Considerations*. UNESCO.

— October 2002. First Global Forum on International Quality Assurance, Accreditation and the Recognition of Qualifications in Higher Education. "*Globalization and Higher Education.*" Final Report. http://www.unesco.org/education/studyingbroad/index.shtml

— 2002. *Information and Communication Technologies in Teacher Education: A Planning Guide.* UNESCO.

— 2002. UNESCO International Institute for Capacity Building in Africa (IICBA) Report (1999-2001) and Work Plan, 2002-2003.

— 2002. *Community Radio Case Studies*. UNESCO/BREDA-Commonwealth of Learning.

— May 2003. UNESCO International Institute for Educational Planning. *The Virtual University. Models and Messages/Case Studies*. Edited by Susan d'Antoni. http://www.unesco.org/iiep/eng/focus/elearn/webpub/index.html

GLOSSARY

Open and distance learning

Learning opportunities that do not require learners to be at a particular place at a particular time in order to participate. This encompasses the use of open learning materials in campus setting and open learning materials in students' homes or workplaces.

Bandwidth

The width of the range of frequencies that an electronic signal occupies on a given transmission medium. It is a measure of how fast data flows on a given transmission path, and determines the quantity and the speed of information transmitted.

Broadband

Transmission capacity with sufficient bandwidth to permit combined provision of voice, data and video.

Borderless/transnational education

Providers offer learning opportunities beyond their domestic markets, wholly or partly on-line or through satellite campuses.

Browser

Software that allows one to locate, view and retrieve information on the World Wide Web using a graphical interface. Used, for example, in Sri Lanka's Kothmale Community Radio.

CD-Rom

Compact Disc-Read Only Memory. A round, silver plastic disk that comes with massive amounts of information embedded and ready to be used.

Collaborative learning

Learners work together in small groups to solve a problem or complete a project. Within the context of electronic communication, collaborative learning can take place without students being physically in the same location.

Constructivism

The learner constructs knowledge, learning is a personal interpretation of experience; it is active, collaborative and situated in real-world contexts.

Distance education

An educational process in which a significant proportion of the teaching is conducted by someone removed in space and/or time from the learner.

Distributed Learning

A system and process that uses a variety of technologies, learning methodologies, online collaboration, and instructor facilitation to achieve applied learning results not possible from traditional education in a truly flexible, anytime/anywhere fashion.

Dual-mode universities

Institutions which offer both traditional and distance forms of teaching.

Satellite digital audio radio

A satellite-based direct-broadcast radio service in which digitally encoded audio material is broadcast to Earth-based receivers, either directly from an orbiting satellite or from the satellite to the receiver via a repeater station.

Single-mode or open universities

Dedicated distance education institutions that use mass communications technology, such as print and broadcasting, and which operate on a national or international basis.

Open and Distance Learning

An organized educational activity, based on the use of teaching materials, in which constraints on study are minimized in terms either of access, or of time and place, pace, method of study, or any combination of these.

Virtual Communities

A community accessible only online via computer, for example through computer conferencing systems that allow people around the world to participate in public conversations or exchange private messages via electronic mail.

WWW

World Wide Web. A system that allows access to information sites all over the world using a standard, common interface to organize and search for information.

Proposals for advancing the information society

In the area of education in the information society, UNESCO proposes that the following principles be adopted and actions be implemented:

Principles

ICTs must contribute to enhancing the quality of teaching and learning and the Information Society must seize the opportunities of ICTs as innovative and experimental tools to renew education.

ICTs have the potential to introduce in the educational process a higher degree of flexibility in response to societal needs and their potential to lower the cost of education and to improve internal and external efficiencies of the education system must be grasped.

ICTs should be seen both as educational discipline and as pedagogical tools capable of enhancing the effectiveness of educational services.

Actions

Demonstrating the impact of ICT-based alternative delivery systems through pilot projects, notably for achieving Education for All (EFA) targets.

Furthering teacher training in the use of ICTs in education and learning as well as new forms of networking of teachers institutions and teachers.

Promoting the use by governments of ICT-based delivery systems in formal and non-formal education, utilizing different mixes of new and traditional media and appropriate methodologies.