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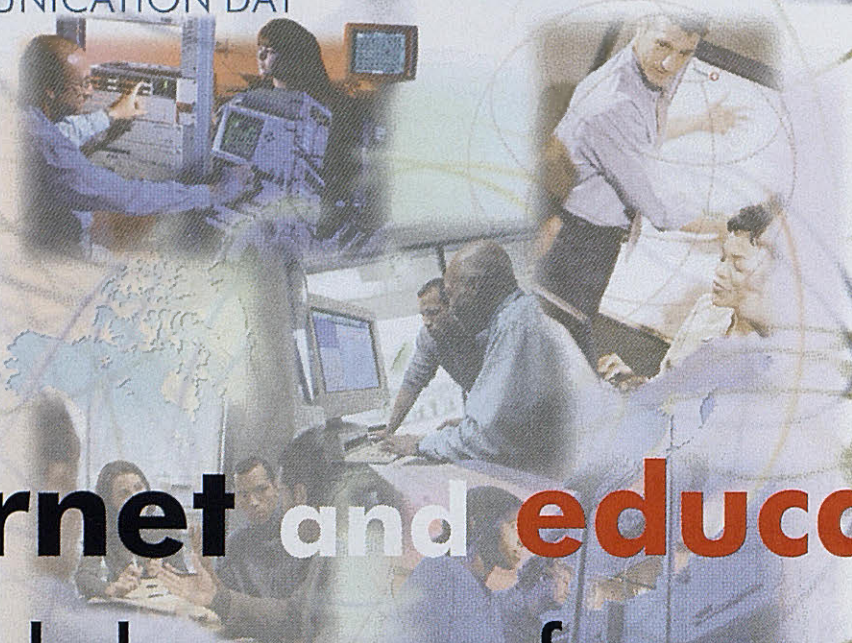

Internet and education

Virtual classrooms for everyone?

A dusty, one-room schoolhouse on the edge of a village. An overworked teacher trying to manage a room full of boisterous children. Students sharing schoolbooks that are in perpetual short supply, crammed in rows of battered desks. Children worn out after long treks to school, stomachs rumbling with hunger. Others who vanish for weeks on end, helping their parents with the year-end harvest. Still others who never come back, lacking the money to pay for school uniforms and school supplies. Such is the daily dilemma faced by many young people in the developing world as they seek to obtain that most precious of all commodities, an education.

With the global economy relying more than ever on brainpower and innovation rather than raw materials and manual labour as generators of wealth, a good education has become the key factor determining who will succeed and who will be left behind. With countries in the developing world stretching their budgets to the limit, and with education ranking low on some governments' list of spending priorities, the odds seem to be stacked against their favour. The United Nations Educational, Scientific and Cultural Organization (UNESCO) estimates that there will be more people to educate in the next thirty years than have ever been educated up to this point in history.

Figures for 1995 show the sad effect educational neglect is having on the poor. While 70 per cent of children in low-income countries were enrolled in primary education, the enrollment figure for secondary education was only 17 per cent. In comparison, industrialized countries retained nearly 100 per cent enrollment in both primary and secondary schools. The erosion continues in higher education, where only 6 per cent of students in low-income countries continued their education compared to 57 per cent in the industrialized world. The result? Entire generations of children and young people that are not able to enjoy face-to-face education are condemned to poverty if conventional education remains the only avenue of bringing knowledge and skills.

One way in which governments have tried to expand educational opportunities to as many people as possible while keeping down costs is through distance learning. For those too far away from schools or universities, too busy helping out at home to attend school on a regular basis, or too poor to pay tuition, distance learning has proven to be an attractive alternative.

With the rise of the Internet, the distance-learning experience has been completely transformed. In the past, distance learning was largely a lonely experience, in which the student was confronted with a pile of mailed learning material and sporadic and structured interaction with an elusive and remote tutor. In this kind of world, the student not only had to overcome a number of difficulties to interact with the tutor, but he/she also faced extended periods of time between the sending of a request and receiving a reply. Furthermore, interaction was restricted to that between individual students and their tutor, since no type of communication existed with other students.

In contrast, the Internet is a virtual classroom in which intense interactivity and the sharing of resources and information constitute its essence. This is not to say that there were no virtual classes before the rise of the

Internet. For some years, a number of educational institutions struggled to develop and sustain distance-education programmes that were designed for tele-conferencing systems. The extremely high cost of the service, however, constrained its growth. For most developing countries, the technology was far beyond their reach. A selected few were able to implement the system in a limited fashion for a small elite. Furthermore, the need of real-time presence made the system quite rigid and not very adequate for a time in which flexible education hours are crucial.

Education officials in countries such as Canada, the United States, France, Germany and Italy have already made commitments to wire all or most of their schools up to the Internet. In the developing world, South Africa launched its *SchoolNet* project in 1997 designed to pool expertise and resources in developing partnerships in areas such as Internet connectivity and curriculum development in order to build a national educational network. In 1999, SchoolNet partnered with *Telkom Foundation* to train over 2000 teachers in 1035 schools throughout South Africa. The Catholic University in Chile launched the "Enlaces" programme in 1992, which started out connecting a half-dozen schools in remote, indigenous areas with two computers each equipped with 2400 bit/s modems utilizing wireless technology.

The International Telecommunication Union, through its Telecommunication Development Bureau in partnership with UNESCO, has also become involved in long-distance learning projects. One of the objectives of these projects is to tackle a phenomenon common in the developing world — school teachers who have been on the job for years, even decades, and whose skills have eroded because they have been left to fend for themselves. Distance learning and the use of the Internet offer great opportunities to improve the quality of teaching, and therefore learning. For example, statistics from the Education Foundation Trust, a non-profit trust based in South Africa, show that, in 1991, forty per cent of all teachers in that country were under-qualified. But through a number of energetic measures adopted by the Government, including the implementation of distance-learning projects in partnership with private organizations, the situation has improved dramatically and the number of under-qualified teachers dropped to 25 per cent in 1999 — despite an overall increase of seven per cent in the number of teachers since 1991. Two such projects, planned for India and Morocco, will focus on re-training primary school teachers in order to bring them up to date on new

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teaching practices and methodologies. The pilot projects will lead to the establishment, in the two countries, of fifteen to twenty learning centres in classrooms that can handle up to forty teacher-students. Each of these learning centres will be connected to the main training centre, where the studio facilities and instruction staff are based, using a very small aperture terminal (VSAT) hookup.

In Morocco, each learning centre will be equipped with a screen and simplified telephone terminal allowing the student-teachers to see and follow the lessons of the instructors and enter information on a keyboard, identify themselves or respond to questions and answers. In India, the project will be more advanced. A full video-conferencing facility will be established using a VSAT hookup with a 2 Mbit/s outbound and a 384 kbit/s return transmission speeds, thus allowing for more interactive, real-time exchanges between the instructors and the teacher-students at the learning centres.

In the initial stage, both projects will rely on VSAT technology, with limited use of Internet capabilities. The decision to limit the scope of available Internet capabilities is based on economics. With less than fifty learning centres, the most cost-effective approach is to limit some of the capabilities offered by the Internet (for example through the collective use of only one personal computer per learning centre, no browsing capability, etc). "With so few centres involved, full Internet capabilities would be prohibitively high and would be a deterring factor to the deployment of Internet-based tele-education solutions", says ITU's Petko Kantchev. "The cost of the hub is very costly if all Internet capabilities are enabled. What is important is first to demonstrate the benefits of such applications to create the demand and then expand the functionalities", he said.

The expectation is that once the projects are expanded to around 100 to 150 learning centres, the switch will be made to Internet Protocol-based VSAT networks. "As the number grows to over 100 learning centres, the investment cost per centre decreases and greatly offsets the required investment in the hub. When this threshold is reached, the economies of scale make an IP-based VSAT system financially attractive in addition to enabling the full range of Internet

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capabilities and allowing the number of learning centres to grow rapidly. Cybercafés for use by the population in underserved areas can even be envisaged at little incremental costs", Kantchev explains.

For both projects in India and Morocco, hundreds or even thousands of learning centres are expected to be established after the two-year pilot phase.

The projects are expensive — approximately USD 50 000 for each learning centre and around USD 800 000 to 900 000 for each main centre, including studio facilities and information management systems. But the cost looks reasonable when compared to the alternative — bringing in thousands, if not hundreds of thousands, of teachers to regional or national capitals for retraining, or allowing the educational rot to continue. In the case of Morocco, most of the cost for the pilot projects will be covered by a World Bank development loan. In India, most of the cost will be covered by the Department of Elementary Education, the Ministry of Human Resource Development and the Department of Telecommunication. UNESCO, for its part, is responsible for the supervision of all education-related aspects of both pilot projects. ITU contributed USD 250 000 to help get the programmes of each pilot project off the ground. India's project is already in the implementation stage, while, in Morocco, an ITU technical team is currently working to help set up the design of the system architecture and its implementation.

It is perhaps at the higher education levels where the Internet may be most effective. Obtaining a university degree through distance learning is already an established practice, with possibly the most well-known example being the Open University in the United Kingdom, which has more than 200 000 students. In Mexico, the Monterrey's Institute of Technology and Higher Studies (ITESM) established a Virtual University that started offering courses via satellite in 1997 and which is now moving towards Internet-based instruction. In Thailand, *Sukhothai Thammathirat Open University* has launched a pilot Virtual Campus programme which offers distance learning over the Internet. The African Virtual University project, which counts two dozen universities throughout Africa as participants, has offered distance-learning courses through the *INTELSAT* network but is now moving most of its learning activities into cyberspace.

Education via the Internet still faces considerable hurdles in many parts of the developing world, the first and foremost being the poor state of the internal telecommunication infrastructure and the prohibitively high cost of telephone and Internet access charges. Educators also face the challenge of designing and supplying suitable instruction materials, which can be adapted to the Internet. Most educational content now available online was designed in Europe or North America, and is therefore not altogether appropriate or suitable for students elsewhere. But the fact that many universities are now shifting their existing distance-learning programmes to the Internet shows its potential as a tool for expanding educational opportunities. With strong backing from both the public and private sectors, Internet education can contribute to the fight against one of the greatest threats facing the developing world today, that of educational neglect. ■