INTRODUCTION

Bangladesh is a country of deltas and rich alluvial plains in the eastern part of the Indian subcontinent. Farming, fisheries and other agro-based industries form the backbone of the economy. Among the poorest of the world’s nations, Bangladesh is nevertheless growing steadily, and despite some instability in the political system, it has always provided a free environment for education and development.

Bangladesh receives support from a large number of donor agencies and non-governmental organizations (NGOs), some of which have pioneered the use of information and communication technologies (ICTs) for poverty alleviation.
The first PCs were introduced in Bangladesh as early as 1983, but there was slow growth until the 1990s when the presence of a large number of computer dealers brought the technologies to mainstream society.1

**ICT policies in Bangladesh**

Bangladesh has an ICT policy formulated for human resource development (HRD) that states that the country must prepare itself to compete effectively in the global ICT market. As the demand for skilled manpower in ICT is growing worldwide, the country needs to produce a large number of ICT professionals.

Specifically, policy statements endorse the need for widespread introduction of ICT training in public and private educational institutions as a prerequisite for producing skilled ICT manpower. Facilities are to be built to promote ICT education and computer-aided education at all levels including primary schools and madrasahs (religious schools). Donor agencies, NGOs and other partners will be encouraged to help build the necessary capacity.

The policy envisages that universities, institutes of technology and colleges, both in the public and private sectors, shall be strengthened to produce ICT graduates from four-year Computer Science and/or Engineering courses. Necessary resources will be allocated to these institutions. Out of the three science and technology universities to be established in the fifth Five-Year Plan, one will be earmarked as a centre of excellence in ICT by giving it a higher allocation of resources.

The policy also proposes establishing multimedia institutes up to district level that will produce skilled human resources to exploit the opportunity offered by the growing multimedia market. Diploma and trade courses in ICT will be offered in both public and private institutes including polytechnics, while inservice training programmes will target the upgrading of professionals now employed in the public and private sectors.

The policy also identifies the shortage of trained and qualified teachers and trainers for ICT education and training as an impediment to the HRD plan. It proposes building capacity in teacher training institutions through special certification and inservice programmes to upgrade skills that will create a pool of skilled trainers.

Initiation of programmes that will develop quality ICT professionals and skilled personnel to ensure success in the global software and ICT-enabled services market are a part of the ICT policy too. The formal and informal sector will be encouraged to adopt internationally accepted standards for training programmes.

Distance education is recognised as an important methodology to extend the country’s limited teaching resources and to ensure quality education. To achieve its goals, Bangladesh proposes to invite international faculty in fields where qualified local teachers are not available.

**Current level of ICT access and use**

There are currently 750,000 fixed lines operated by Bangladesh Telephone and Telegraph Board (BTTB), with a projected demand for fixed-line service over the next five years of about 3.5 million. There are now more mobile than fixed line telephones in Bangladesh. While there are four companies providing service in the mobile telephone industry, Grameen is the major player with a subscriber base of 730,000. The company expects to expand this number to 2 million by 2004.

Utilization of ICTs in education is related to access to ICT infrastructure and services. At present, ICT penetration is very limited in Bangladesh, with Internet use estimated at about 1.4 per thousand,2 and restricted largely to the capital, Dhaka, and its surrounding suburbs. The potential for exploiting wireless-based technologies and the opportunities that exist with them are great, given the ever-increasing use of wireless telephones in the country.

**Major initiatives**

Bangladesh has a high level of international donor funding to support its developmental initiatives, with about US$ 1.1 billion secured in 2001.3 There has been minimal use of broadcast media for education, other than the support provided for distance education programmes. Some of the following examples of ICT use are in partnership with external donors.

**Grameen Bank** 4

A number of Grameen Bank (GB) members are poor women from the rural areas of Bangladesh. If they choose they are granted a revolving loan of BDT 15,000 (US$ 310) for a Village Phone (VP) package containing a cellular phone, battery, fast charger, sign board, calculator stopwatch, user guide in Bangla and a price list for calling different locations. The contract requires that the loan be repaid within two to three years through weekly payments while airtime charges are to be paid monthly. After being trained to use the equipment, the women are known as VP operators who begin their own business enterprise by renting out the mobile phones to anyone in the village who would like to make or receive a telephone call.
Nearly 50,000 Bangladeshi women make their living serving as Grameen “phone ladies.” The income derived from the VP by the women was reported to be about 24 to 40 per cent of the household total. A VP operator earns an income of about BDT 14,400 (US$ 300) per year providing telephone services that exceeds Bangladesh’s average per capita income of around US$ 286.\(^5\)

Grameen Bank has targeted 39,346 villages to be recipients of the Village Phone initiative.

**Grameen Telecom and Grameen Phone**

Grameen Telecom (GTC), a non-profit organization, owns 35% of the shares of Grameen Phone Ltd. (GP), a private sector, urban cellular telephone company that was awarded a nationwide cellular licence in November 1996. GTC buys bulk airtime from Grameen Phone and passes on most of the savings to its Village Phone (VP) operators. GTC is using GSM (global system for mobile communication) cellular telephone technology at the village level, taking advantage of the GP-installed urban capacity. GP leases and operates a 1,800 kilometre fibre-optic cable from Bangladesh Railroad, effectively providing a parallel nationwide network to the one operated by the state monopoly, BTTB.

**Grameen Cybernet Ltd.**\(^6\)

Grameen Cybernet Ltd. commenced operations in July 1996, and is currently the largest Internet service provider (ISP) in Bangladesh. It is a joint venture between the Grameen Fund and CITech Ltd., a well-known private computer and information technology distributor. The company boasts over 6,000 clients in various sectors, offering dial-up Internet access, technical support, web consulting and a help desk.

**Grameen Communications**

Grameen Communications is a not-for-profit organization that aims to increase awareness and use of the information available on the Internet for improving education, research, social welfare, health and sanitation in Bangladesh. To accomplish these goals, Grameen Communications organizes regular seminars, workshops, training programmes and projects utilising the Internet. Educational, research, social, non-governmental and governmental institutes are able to exchange academic, statistical and research information at affordable prices.

A pilot Village Computer and Internet Programme was launched by Grameen Communications on June 1, 1999, in Madhupur village, Tangail district. This project provides low-cost computer training to villagers in order to improve their skills and employment opportunities. Grameen Communications rents one room from the Grameen Bank branch and has equipped it with several computers, a modem and dial-up Internet connection using a Bangladesh Rural Telecommunications Authority (BRTA) phone line. Customers are able to send e-mail messages overseas and receive e-mail printouts. Using a scanner, customers may send original handwritten letters or documents, and a digital camera is available to send photographs. Farmers have become interested in how the technology could help them gain information about the market conditions. The major disadvantage at present is a very slow Internet connection.

**The EMIN Project**\(^7\)

The ICT Development Group of RADARSAT International (RSI-Canada), Versatile Mobile Systems (VMS-Canada) and Bangladesh’s Center for Environmental and Geographic Information Services (EGIS-Bangladesh) have designed and implemented the Environmental Monitoring Information Network (EMIN) project that aims to improve planning and management of water and land resources by strengthening two-way information flow between local and national stakeholders. Improving the linkages and tools within water sector organizations will enable delivery and exchange of relevant information to specific users, benefiting management of resources, especially at the local level.

Water is central to life in Bangladesh. There has not been a central communication channel to enable the multiple stakeholders in the water sector to be collectively involved in the management of the resource. The EMIN project provides a common platform to facilitate co-management of water resources helping to mitigate poverty through a better understanding of the complex relationships between water resources, flooding and erosion management.

**Community Development Library**\(^8\)

The Community Development Library (CDL) strives to develop a knowledge network to facilitate the sustainable, effective, appropriate and affordable exchange of information at local, national, regional and global levels; to provide audiovisual services and training to NGO workers and other beneficiaries; to develop a video resource centre on development issues; and to bridge the communication gap that exists between policy-makers, social development activists, programme implementers and people working at the grassroots by providing information on ideas and experiences of innovative and sustainable development efforts.

CDL has been providing development information services at the grassroots level through 25 Rural Information Resource Centers (RIRCs). The RIRCs have library facilities and can organize seminars, workshops, study circles, discussion meetings and video shows to enrich people’s knowledge on development issues. RIRCs maintain a news-clipping service and network with local NGOs and people in the community.
Each centre has an advisory committee comprised of representatives from NGOs and public bodies, as well as teachers, journalists, local government officials and cultural activists. The committee identifies the resource materials, policy matters, priorities, potential topics and organizations with which they would like to link. It meets monthly and provides management support on the basis of the guidelines to enable people in the community and NGOs to be involved in decision-making and programme implementation. As well it attempts to bring the centre towards self-reliance.

**Center for Development Communication**

A group of media activists established the Center for Development Communication to facilitate communication between the government and other development organizations. The objective of the organization is to raise awareness through radio, TV, printed publications, workshops, seminars, study circles and networking activities. To achieve their objective, the Center encourages production of innovative and creative films or TV programmes related to children’s rights, social development, the environment and gender or development issues. The team is comprised of journalists, TV anchors, producers, professional photographers and graphic designers. The Center also provides consultancy services on public awareness programmes for print and audiovisual media.

**Amader Gram**

Amader Gram is a model project of integrated rural development achieved through capacity-building of disadvantaged people, conservation of biodiversity, sustainable use and mobilisation of natural resources, and encouragement of environmentally sound income-generation activities.

The project was founded in 1996 by a group of development activists who believed that poverty could be eliminated through capacity-building of poor people and sustainable use of natural resources. Amader Gram originated out of this vision and is a project of the Bangladesh Friendship Education Society (BFES), an organization that provides technical know-how to poor grassroots people to assist in poverty reduction. Since 1996, Amader Gram has helped improve the lives of disadvantaged people in 20 villages of the Bagerhat (Rampal) and Khulna (Paikgacha) districts in Bangladesh.

Amader Gram’s programme includes creation of a village information, communication and knowledge centre; a comprehensive database to preserve, update and ensure long-term use of village resources by the community; guidelines and simple village-level monitoring indicators for analysing data and information by the villagers; resource manpower through skills development training in ICT uses for youth groups and adolescent girls; behavioural and skills development training to underprivileged people through a rural training programme; micro-credit support for undertaking viable income-generating activities; provision of environmental education; homestead gardening training aimed at providing nutritional support; health education; and monitoring, research, publication, demonstration and replication of its projects in other parts of the country.

**Examples of training**

**Network Learning of Bangladesh**

Network Learning of Bangladesh was awarded a project funded by Pan Asia Networking (PANASIA). The approach was initially concentrated on a village network that had been established by The Learn Foundation. The Foundation’s network, connected to the Shahjalal University, was comprised of 10 schools situated in the rural area around Sylhet, some 200 miles northeast of Dhaka. The first stage was a feasibility study that was conducted by a team led by Dr. Shahidul Alam (DRIK Multimedia, Bangladesh), and several international experts. As well as conducting the feasibility study, the team was asked to consider recommending up-to-date ICT tools and networking systems.

**Private Sector Initiatives**

There are a large number of private sector computer and ICT training institutes in Bangladesh, many of which are franchises of similar institutes in India. These institutes provide training in basic and advanced computing skills. Alumni seek employment in the industry at home or move abroad to enter the global ICT market. Market demand for trained personnel is great but the ability of governmental institutions to meet it lags behind. The amount of allocated public funds available does not match the actual costs of training. As well, the private sector does not find involvement in ICT projects an attractive investment opportunity.

**Constraints on the use of ICT**

Constraints affecting the use of ICTs in Bangladesh are partly technological, but to a larger extent they result from a lack of policy formation, implementation and inter-agency role definition and collaboration. Constraints also exist as a result of the variance between the need for access and the actual access, and between market demand for trained personnel and the actual courses being offered.

ICT penetration at primary, secondary and postsecondary levels is very limited, with only a limited number of urban
Bangladesh
South Asia

239

schools having ICT facilities available for education. Initiatives for increasing penetration are generally hampered by a paucity of funds, as are many initiatives for creating information networks in educational institutions. Take, for example, the case of the Bangladesh National Scientific and Library Information Network (BANSLINK), which is not working because of a shortage of funds.

There is a huge discrepancy between market demand and the ICT training courses being offered. On-the-job training is provided to a small extent, but given the limited presence of software companies in the country, long-term training is difficult to provide. Because of the many limitations in the system there is an alarming trend towards outward migration of ICT specialists and students. 10

There is exponential growth in private ICT training institutions in Bangladesh. It would be an advantage to the country if these institutions could cater to the demand for ICT training, but instead they are concentrating their efforts on software development. Graduates from these institutions prefer to seek employment outside the country, largely in the Middle East.

Analysis

Interesting opportunities for development exist in Bangladesh as a result of the rapid advances in the ICT sector. For instance, if the GSM mobile phones of the “phone ladies” were replaced with a Global Packet Radio Service (GPRS) system, added to a low-end computer, linked through a partnership with an ISP where connectivity could be provided at a minimal rate, then the benefit of the convergence of wireless technologies with the power and potential of the Internet could be brought to villages for a fraction of the current price. Add the income-generation possibilities of e-governance or e-post activities, and an interesting model of applying ICT for all kinds of developmental activities emerges from simple e-mail to sophisticated mobile learning.

Similarly, if the technological and content development capacity of the Bangladesh Open University were combined with the distributed transmission capabilities of Bangladesh Television, equally innovative possibilities for using broadcast technologies for education could emerge.

To take advantage of the synergy of such possibilities, Bangladesh requires support at all level; assistance in the development of policy frameworks, plans and blueprints for deployment of ICTs in education; and demonstrated best practices and pilot projects within the country that can be scaled up (but with sustainability as a major factor built in to reduce dependence on donor funding and support).

ICT infrastructure needs to be built up or created to provide the springboard for further use. There is also need for a comprehensive regulatory, financial and environmental policy to support the use of ICTs. Currently, the lack of high-speed Internet access, the poor telecommunication infrastructure, the lack of a legal and financial environment to support e-commerce and the inexperience in catering to the global software market all limit use of ICTs in the country. At the same time, a clearer role definition of the public and private sectors in development, including public-private partnerships should be developed. Recognition of the importance of the private-sector role has to be given so that its contribution becomes greater. For example, private-sector representation is allowed on the Bangladesh Telecommunications Regulatory Commission (BTRC) as outlined in the original plan and intent, but somehow this has been overlooked. Currently, there are nine commissioners on the BTRC who are all retired BTTB employees or government officials.

There is also a critical need for intervention at the policy level through a series of policy dialogues among legislators and parliamentarians who are responsible for effective and proactive legislation. Bureaucrats and government officials need to become familiar with the potential of ICTs for serving educational needs through exposure to best practices in other similar countries. As important as exposure to the technologies is, exposure to governance practices in an ICT-enabled society is perhaps more so, so that there can be a better balance between the potential of technologies and their actual application and implementation.

NOTES
2 See note 2 above.
3 See www.telecommons.com/villagephone/gbfamily.html.
4 See www.grameenphone.com.
5 See www.citechco.net.
7 See www.cdlbengladesh.org.
8 See www.bfes.net/projects/projects.html.
9 See www.bfes.net/projects/projects.html.
10 From Tech Bangla Survey 2000.
Bhutan

ICT USE IN EDUCATION
Ms Usha Vyasulu Reddi, Ph.D.
Ms Vineeta Sinha

INTRODUCTION

Bhutan has only recently emerged from a long self-imposed policy of isolation from the rest of the world. King Jigme Singye Wangchuk relinquished absolute power in 1998 to rule in tandem with the government, an assembly and a royal advisory council (including locally elected members). Now under a policy of limited modernisation, Bhutan is tentatively acquainting itself with outside influences in all areas of activity in general and information and communication technologies (ICTs) in particular.
Increased globalisation has been a double-edged sword for Bhutan as the government faces the problem of rising unemployment for Bhutan’s well-educated and young population. Education has meant that the young Bhutanese are no longer satisfied with the traditional engagement with agriculture, and the need for new avenues of development has assumed importance.

Bhutanese radio broadcasting, begun in 1973, is owned and operated by the state-owned Bhutan Broadcasting Service (BBS). BBS radio broadcasts 12 hours per day and gives a daily news bulletin in four languages. First introduced in 1999, television is aired to the Bhutanese via BBS (two hours per day in Dzongkha and English) and through a number of competing cable operators. BBS television is currently limited to residents of Bhutan’s capital Thimpu, but it has plans to become a national service. Bhutan has no private terrestrial television or radio services.

Internet came to Bhutan in 1999. Druknet, Bhutan’s only Internet service provider (ISP), was initially conceived purely as a domestic e-mail service, keeping Bhutan sealed off from the rest of the world; but the king then decided to give Bhutanese citizens limited access to the World Wide Web.

**Master plan**

The ICT master plan for Bhutan was prepared soon after the introduction of Internet in 1999. The Department of Information and Technology (DIT) was set up under the Ministry of Communications. The master plan, known as BITS (Bhutan IT Strategy), takes several key issues into consideration:

- **Infrastructure:** Infrastructure development to improve national telecommunications and establish data networks in all government departments is needed. A sound infrastructure is also necessary to enable ISPs to increase in number and improve services. Currently teledensity is only 2.2 per cent, lower than the average for low-income countries. A survey in 2001 reported that there were 2,550 computers in total, the majority of them owned by corporations.

- **Institutional arrangements:** Government bodies must co-ordinate and regulate ICT-related activities. The DIT was established to promote ICT in the country, while the Bhutan Telecom Authority has responsibility for telecommunication services. The policy planning division of the ministry provides policy guidance and directions.

- **Human resources and training:** The Royal Government of Bhutan wishes to facilitate electronic communications for all citizens, and it recognises that trained people are needed to do that. The policy states that all the communication would be done electronically, and to provide e-governance services to the people, information management and content development is required. The plan therefore calls for capacity-building with a priority for employees, high school dropouts and unemployed youth. The ICT training centres and schools are the main providers for this type of training. The Royal Institute of Management (RIM) and Sherubtse College have been producing ICT graduates, but the number is still not sufficient to meet the public and the private demands.

- **Regulations, guidelines and legislation:** It is important to institute a system of e-government and to enact legislation to enable the necessary changes to the way the government operates.

- **Public access and awareness:** Public access points should be established throughout the country, accompanied by a promotional and awareness programme to inform the public about the benefits of ICT.

- **Private sector development:** The government should encourage the establishment of ICT companies, computerisation of private businesses, export of ICT services and the development of e-commerce.

**Current level of ICT access and use**

ICT access and use is still very limited in Bhutan. Both radio and television are limited to the capital and its surroundings. Telendensity figures show Internet access at a mere 7.4 per 1,000 in 2000, showing that there is much to be done. Despite the aim of DrukNet (Bhutan’s major ISP) to provide access to all of Bhutan’s Internet users with the hope that more schools, businesses and government offices go online, access has been limited by the high cost of Internet usage. Consequently, the use of the Internet in the school system is negligible. Clearly, the primary challenge for ICT use in education is to create an enabling environment.

**Major initiatives**

Providing access and capacity-building among potential producers and users of content are the two areas in which initiatives and interventions in ICT can be categorised.
Building a Networked Nation

E-mail and e-post: A project supported by the Universal Postal Union, International Telecommunications Union and Bhutan Post and Telecom is intended to bring e-mail and e-post services to post offices. The project envisages the establishment of simple kiosks in 38 postal outlets with about half of them in remote and isolated areas. Each household or individual will be issued a unique e-post address that will enable them to walk in to any of the 38 post offices to send and receive mail. Since printing of messages is done at the local post office near the point of delivery, e-post messages can be delivered quickly. Bhutan Telecom will provide the communication access from local exchanges.4

PAN Bhutan: The main objective of this project is to build a national intranet infrastructure and provide international e-mail access. Both intranet and international e-mail will be provided as public services alongside the existing telephone services provided by the Division of Telecommunications. The project will develop a national intranet comprising a central server and gateway point in Thimphu with local points of access in initially two other locations in the country. Intranet services at the domestic level will include e-mail, computer conferencing and document-handling based on the World Wide Web technology. The international e-mail gateway will be accessible to users of the national intranet service. The project will build training capacities within the Division of Telecommunications on networking technologies to manage and expand the network. It will also build training capacities within the Royal Institute of Management to provide training in intranet and e-mail services to the wider community including government, research and business. It will provide direct assistance to certain research and development institutions to become connected with the network, and will establish a content-development function to serve the needs of those institutions in line with the Pan Asian Networking (PAN) Program of IDRC.5

Multipurpose Community Telecentre (MCT) at Jakar: Bhutan Telecom established a telecentre at Jakar in central Bhutan with ITU and United Nations Development Programme (UNDP) assistance in 1998 as a pilot project. The telecentre has been particularly successful in providing basic information technology training to over 450 people. The second phase of operations envisages the support of UNESCO in converting the Jakar telecentre into a community multimedia centre where Internet access is coupled and integrated with broadcasting programme production to maximise the information services accessible to the local community. The media production centre will take advantage of telecommunication facilities available at the MCT to deliver locally produced content for daily radio and television broadcast offered by the Bhutan Broadcasting Service (BBS). Combining the media production centre and the MCT would enable BBS to offer more participatory programmes, besides using content based on the regular field visits conducted in central Bhutan. The media production centre is expected to eventually introduce local broadcasts through its own transmitter. Such broadcasts would include regular radio-browsing programmes to promote rural access to the Internet through the Jakar MCT.

Radio-browsing programmes: Bhutan is served by the state-sponsored Bhutan Broadcasting System (BBS). Its main objective is to inform, educate and entertain the public. With low literacy and a small percentage of electrical grid coverage, radio is a very popular medium. Internet was introduced to Bhutan in 1999 but it has been restricted to urban areas. In 2000 UNESCO sparked the idea of radio-browsing programmes to provide information from the Internet to the disadvantaged and illiterate people and to increase awareness of new ICTs.

Building Capacities and Competencies

Several initiatives have been undertaken, with support from various donors, to increase the pool of people in Bhutan who have the requisite skills to bring the government’s plan to reality. The following are examples of these initiatives:

UNITeS programme: The United Nations Information Technology Service (UNITeS), in collaboration with the UN volunteer service, has been providing support for the integration of ICT within government, part of which involves the provision of information to the public. The volunteers are part of the UNITeS team and work in the context of an overall project sponsored by the Government of Japan, focused on institutional strengthening and training. In addition to the work they do in implementing systems, they also train master trainers who train others in ICT-related skills and knowledge.6

Building capacities in intranet and Internet technologies: The long-term objective of this project is to capture the potential of modern ICTs for sustainable development and poverty alleviation by building capacities in information management and outreach capabilities in government, academic research and non-government organizations in Bhutan. The short-term objectives are to build the capacity of the Royal Institute of Management (RIM), Bhutan, to enable it to provide short courses in intranet and Internet technologies, train up to 10
Trainers from RIM and elsewhere who will in turn train others and to create a modern computer laboratory at RIM that will serve as a resource centre and facility for training others.7

Training at schools and tertiary levels: Given the severe lack of properly trained ICT specialists in Bhutan, the Division of Information Technology (DIT) has developed guidelines for ICT training institutes and ICT training courses at school and tertiary levels. These guidelines help the development of ICT specialists in the country by ensuring high and consistent training standards. Institutes have to fulfill minimum requirements to ensure quality instruction. Moreover, a number of standard courses are being developed to provide clients with the appropriate knowledge for their needs. These standard courses also make it easier for employers to gauge the knowledge of their (potential) employees.8

Constraints in the use of ICT

Shortage of ICT personnel is a big issue in the Royal Government departments. There are volunteers and consultants who are helping through different training activities. However, the local technical capacity needs to be built for establishing networks of MIS systems for e-governance issues.

Besides the lack of trained people, there are the predictable constraints faced by most developing countries. These include lack of adequate infrastructure, cost of accessing the infrastructure that is in place, lack of content, particularly in the local language and, perhaps most significantly, lack of capital to invest in the development of ICT.

Analysis

Given that both policy and political will seem to be in place, support for ICT initiatives in Bhutan could include capacity-building initiatives that would demonstrate and support the development of ICT professionals and computer literate employees. In the short term, capacity-building must take place for officials involved in governance and policy implementation processes. In the longer term, ICT needs to be included in the regular school curriculum with a parallel emphasis on teacher training initiatives. What appears to be essential for education is that ICT initiatives focus both on infrastructure development such as satellite and wireless technologies in order to make connectivity possible and on the development of content that is appropriate for Bhutanese learners.

NOTES

1 See www.dit.gov.bt.
4 See www.upu.int/coop_tech/bhutan_bridging_the_digital_divide.pdf.
5 See www.idrc.ca/pan/pr02398_e.htm.
7 See www.apdip.net/projects/cisco.asp.
8 See www.dit.gov.bt/training/index.htm. This site lists the government and private ICT institutes in Bhutan and provides information on ICT workshops and training conducted by DIT.
India

ICT USE IN EDUCATION

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National policies, strategies and programmes

India is a country of grand contradictions. While it is a global leader in the knowledge economy, it is also home to more than half the world’s poor and illiterate people, most of whom are women. Urban India has problems of excess, while in the rural areas there is deprivation. The challenge that the country faces is to arrive at a policy that maintains its global position while also providing opportunities for access and services to the rural hinterland.
The confusing but rich picture of the Indian education system becomes clear when it is recognised that in the Indian federal system of governance, education is a subject addressed by both the central and state or provincial governments. The result is that there are both central government departments and state and district authorities, all working in tandem or independent of each other. There are also private sector educational initiatives in India.

India actively promotes the use of information and communication technologies (ICTs) in education in the formal education sector today, as it has in the non-formal sector for more than 40 years. From the use of radio to spearhead the green revolution, to satellite-based, one-way and interactive television for rural development in some of the most backward districts, to today’s thrust for the use of open and distance learning models to serve the larger populations, India has tried it all, with varying degrees of success. In fact, since the early 1950s, Indian policy documents have identified the need to use all media for promoting development and, implicitly, for education. The subsequent policy and plan documents on education, prepared from time to time, have chalked out a role for technology applications, especially in the non-formal education sector.²

Today, the country’s decision-makers, at both the central and state levels, have chosen to explore the use of newer computer and Internet based ICTs for education, along with broadcast ICTs, and have been promoting the use of open and distance learning for both the formal and non-formal education sectors. The launch of a dedicated broadcast education satellite, EDUSAT, is scheduled for early 2004, with capacity for specialised educational channels and up to 5000 FM community broadcasting stations for use by educational institutions. This infrastructure will be available to all sectors of education, but primarily to publicly funded and implementing agencies that will be responsible for transmission and programming for their defined audiences. For instance, a state government will be able to use the channel capacity for governance, an open school for transmission of its own programmes, agricultural agencies for agricultural extension, etc.

As a result of a policy announcement made by the Prime Minister of India in the First National Conference of Information Technology Ministers, the Task Force on Human Resource Development in Information Technology was set up under the aegis of the Ministry for Human Resource Development. Through a process of consultation among different stakeholders and institutions, the task force report set out major recommendations to develop the core competencies and expertise of the country and to develop innovative technologies. This represents the master plan that India has in place for the use of ICTs in education, human resource development and in the capacity-building of institutions.

The task force made a number of recommendations designed to create a sustainable competitive advantage in order to maintain India’s global leadership position in knowledge-led businesses. A re-engineering of the technical education and training system of the country, with a focus on ICT education, was proposed under the umbrella of a National Program for Human Resource Development in IT (NP-HRDI). Actions emerging from the policy include creating public awareness; documenting best practices through a clearinghouse; identifying and developing institutions of excellence; promoting technology-mediated learning; supporting capacity-building initiatives for faculty, curriculum and content development, research; and promoting private-public partnerships.

The interventions proposed focus on the most cost-effective options with short gestation periods and with an emphasis on critical infrastructure such as computer and networking facilities, faculty training, curriculum and courseware development, promotion of innovations and initiatives throughout the educational system by an open exchange of ideas and a system of recognition through awards and rewards for innovative practices among educators.

It is very difficult to accurately determine the government’s funding allocations and expenditures for ICTs, since the money comes from both the overall educational allocation of 4.1 per cent of the GDP in the national budget and from ministries dealing with different subjects. For instance, the investment for technology may come from the budget of the Indian Space Research Organization, allocations for the agricultural channel are likely to come from the Agriculture Ministry’s budget and funding for content for the broadcast channels will come from the Ministry for Human Resource Development.

Overall, India’s policy and strategies have been to build a self-reliant indigenous capacity. There has been a strategic shift from being a country seeking external assistance in its initiatives to one that is driven internally while still competing in the global marketplace and providing assistance to other countries.

**Current level of ICT access and use**

There has been a dramatic shift from the 1980s to the present day in terms of access to technology by the population in general. Deregulation of the airwaves and the telecommunication industry has spurred the revolution in basic telephony and Internet services. Technologies like Wireless in Local Loop (WLL) and Very Small Aperture Terminal (VSATs) are being used for Internet and intranet purposes. Data on teledensity reported in the UNDP Human Development Report, 2003 can no longer be considered accurate. The current annual rate of growth in the telephone sector is at 48 per cent for mobile telephony. Radio has a
penetration of 100 per cent in the country while satellite and terrestrial television cover nearly 80 per cent of the country.7

Theoretically, availability of ICTs is widespread in large parts of the country, with pockets of saturation. In other areas, availability is lower due to terrain or extreme deprivation. With the availability of cyber cafes, people can get access to government documents (such as birth and death certificates, land registration and government schemes) for only INR 15 (US$ 0.3) each. Farmers can get daily updates on market prices of locally produced food grains and vegetable crops from around the district for INR 5 (US$ 0.1).

However, access to ICTs is still limited because of physical infrastructure constraints such as lack of electricity, poor maintenance of telephone lines and distance from the kiosk or cyber cafe; economic constraints such as extreme poverty; educational limitations such as illiteracy and the lack of relevant content in the local language; and social constraints of gender, class, community and caste. Data are not readily available to indicate the extent to which such social constraints limit access to technology.

India has extensive experience in the use of broadcast technologies for both formal and non-formal education. This includes using radio and television for agriculture and rural development, for non-formal education and out-of-school children, and school telecasts from 1983 onwards in national and regional languages. Satellite-based teleconferencing (one-way video, two-way audio) for formal and non-formal education has been operational since 1992 at a national and regional level.

These efforts have culminated in the launch of Gyan Darshan,8 a dedicated satellite-to-cable educational television channel, and Gyan Vani,9 a dedicated educational radio project. The launch of EDUSAT will add a 70-channel capacity for use by all state governments and publicly funded educational institutions.

Although deregulation of the airwaves has taken place in the country, the Indian government retains its role as the major player in the use of broadcast technologies for education, holding control over allotment of frequencies. Thus, community radio is nascent and has not had any effect beyond a few localised interventions. Private sector broadcasting has not ventured into education.

**Application and models of ICT use**

There are many projects across the country that address the digital divide and gender issues. Other projects cater to the poor and try to reach the unreached. There are examples of audio-video conferencing and the use of multimedia instructional materials as well as examples of e-learning, e-governance and e-services. The projects also cover the country’s geographical spread. There are a variety of applications, from an intranet e-governance portal to an online teacher’s forum where teachers are able to plan their classroom sessions and share and learn through each other’s experiences.10

Two aspects of these projects stand out, particularly in terms of assessing effectiveness. First, there is little or no data on the extent of use that enables any effective analysis of the situation on the ground. Second, there is the question of the extent to which such projects, which are often “one-off,” are sustainable in the long term after donor funding is over.

The various projects and initiatives tend to cluster into two categories insofar as their use of ICT is concerned: broadcast technologies and digital technologies. Given the range of applications in India, it is impossible to discuss any of them in detail, but the examples provided in Tables 1 and 2 provide an overview of the kinds of activities that are underway.

**Broadcast Technologies**

Except in a very few instances, broadcast technologies are owned and operated either by the government directly or by publicly funded institutions established for the purpose. Table 1 provides some illustrations of the various ways the broadcast technologies are being applied across all sectors of education covered by this report. Note the importance of these technologies in the non-formal education sector.

**Digital Technologies**

Table 2 shows that some of the initiatives using digital technologies are spread across the country and not restricted to any one region:

- The Government of India’s efforts in providing multipurpose community information centres in the northeast of the country has parallels to a similar joint effort by the Uttarakhand state government in co-operation with the Indian Institute of Technology. The Gyandoot Project is a district-level effort, which seeks to provide intranet services in one backward district, Dhar, of Madhya Pradesh.

- Madhya Pradesh is also home to the Headstart Programme, which provides computers along with multimedia learning kits for students and teachers in rural community schools that are set up under the Education Guarantee Scheme. The Government of Goa is also involved in an initiative to provide Goa schools with computers for use by students.

- Public-NGO (non-governmental organization) partnerships include the COLLIT, India project, a partnership of an international agency, the state
resource centres in Indore and Jaipur and an NGO in Tamil Nadu engaged in applying ICTs for livelihood.

The Government of Andhra Pradesh is actively engaged in a partnership with Tataliteracy.com, a portal designed to provide literacy in some of the poorest districts of the state. Similar initiatives with MediaLab Asia, on the outskirts of Delhi, and in the interior of Tamil Nadu (Baatchit, Infothela, and Sari projects), seek to provide access and content to rural populations.

Project Vidya, a partnership between the government of India and Intel, seeks to improve the quality of educational input in selected government schools throughout the country by providing both ICT access and training to students and teachers.

**Table 1: Broadcast technologies in India**

<table>
<thead>
<tr>
<th>Project</th>
<th>Project Partners</th>
<th>Outcomes</th>
<th>Remarks</th>
<th>Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Countrywide classroom</td>
<td>University Grants Commission (UGC), Consortium for Educational Communication (CEC) and 17 universities where media centres are located</td>
<td>10,000+ programmes produced and telecast on National Television from 1984 to date</td>
<td>A programme of UGC-CEC, which is involved in the educational programmes for telecast on Doordarshan, India’s national TV channel</td>
<td><a href="http://www.consortiumeducomm.org/Index.htm">www.consortiumeducomm.org/Index.htm</a></td>
</tr>
<tr>
<td>School Television in India</td>
<td>Central Institute of Educational Technology &amp; 6 state Institutes of Educational Technology</td>
<td>Programmes produced and telecast on National Television from 1984 to date</td>
<td>General non-formal and curriculum-based programming for school children and school teachers</td>
<td><a href="http://www.cier.nic.in/">www.cier.nic.in/</a></td>
</tr>
<tr>
<td>Gyan Darshan</td>
<td>Ministry of Human Resource Development, Information &amp; Broadcasting, the Prasar Bharti and Indira Gandhi National Open University (IGNOU)</td>
<td>Also broadcasts the programmes of National Open School and Central Institute for Education Technology, National Council for Educational Research and Training</td>
<td>IGNOU had the nodal responsibility for transmission; today the programme runs 24 hours</td>
<td><a href="http://www.ignou.ac.in/">www.ignou.ac.in/</a></td>
</tr>
<tr>
<td>Gyan Vani</td>
<td></td>
<td>Reaching the backward rural communities by radio</td>
<td>Mixed content of programme, both non-formal and distance education curriculum-based programming and counselling</td>
<td><a href="http://www.ignou.ac.in/">www.ignou.ac.in/</a></td>
</tr>
<tr>
<td>Namma Dhwani (Voices)</td>
<td>Boodikote community in Kolar district, UNESCO</td>
<td>Brings the voices of the marginalised from the periphery of information and awareness and gives them the opportunity to make informed choices and decisions</td>
<td>Unique partnership because of the skill sets of each of the organisations; content is largely non-formal education and development oriented</td>
<td><a href="http://www.voicesforall.org/communityradio/namma_dhwani.htm">www.voicesforall.org/communityradio/namma_dhwani.htm</a></td>
</tr>
<tr>
<td>Jhabua Development Communication Program</td>
<td>Space Application Center (ISRO), Government of Madhya Pradesh</td>
<td>Five years of narrowcasting for NFE and capacity-building of district functionaries engaged in rural development through teleconferencing</td>
<td>Content consists of literacy, health, non-formal education, watershed management</td>
<td><a href="http://www.mcbisinti.com/booklet/drs/jdcp1.html">www.mcbisinti.com/booklet/drs/jdcp1.html</a></td>
</tr>
</tbody>
</table>
NGO initiatives include the TARAHaat, a project of Development Alternatives. Private foundations like the Azim Premji Foundation are undertaking similar efforts in Karnataka.

Among the most successful of private industry initiatives is the Hole in the Wall project of the NIIT. This is an attempt to explore access to and use of Internet-based technologies in urban slums. The project, started in Delhi, has been scaled up to cover several locations in the country.

Despite all the activity, there are parts of India that are not participating in these initiatives. Orissa and Bihar, both backward states, and the interior of Maharashtra still lag behind. As well, Kashmir still has serious problems of access to telecommunications and its consequent benefits.

Table 2: Digital ICT applications in India

<table>
<thead>
<tr>
<th>Project partners</th>
<th>Objectives</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IIT-Roorkee</strong></td>
<td>remarks: Project has just kicked off; for more information contact project through e-mail ID</td>
<td></td>
</tr>
<tr>
<td>UNDP and IIT-Roorkee: <a href="mailto:picaa@itr.ernet.in">picaa@itr.ernet.in</a></td>
<td>E-services</td>
<td>Establishment of 1,000 Suchna Kutirs for information access.</td>
</tr>
<tr>
<td><strong>COLLIT</strong></td>
<td>remarks: Project ended in December 2002 but the partners are sustaining the project through their own efforts</td>
<td></td>
</tr>
<tr>
<td>COL (Commonwealth of learning): <a href="http://www.col.org">www.col.org</a>, and CEMCA (Commonwealth Educational Media Centre for Asia): <a href="http://www.cemca.org">www.cemca.org</a>; implementing partner agencies in India were M.S. Swaminathan Research Foundation, and state resource centres of Rajasthan and Madhya Pradesh</td>
<td>Literacy project integrating ICTs</td>
<td>Enhanced knowledge of appropriate and sustainable use of ICT in literacy education; a cadre of tutors who are knowledgeable in terms of using ICT in literacy education</td>
</tr>
<tr>
<td><strong>TARAHaat</strong></td>
<td>remarks:<a href="http://tarahaat.com/tara/home">http://tarahaat.com/tara/home</a></td>
<td>Literacy through ICTs; quality education at affordable prices right at the learner’s doorstep; TARAHaat learners range from 8-35 years of age, school and college students, unemployed youth, professionals, women</td>
</tr>
<tr>
<td><strong>National Informatics Center-CLC</strong></td>
<td>remarks: The programme is reaching the unreached; ICTs are becoming part of the daily lives in the northeast</td>
<td>E-governance, e-services, e-learning, e-medicine, e-consulting, e-employment</td>
</tr>
<tr>
<td>Department of Information Technology _ Ministry of Communications and Information Technology and state governments of northeastern states: <a href="http://www.cic.nic.in">www.cic.nic.in</a>; <a href="mailto:cic@cic.nic.in">cic@cic.nic.in</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Operation Headstart</strong></td>
<td>remarks: The training of teachers under the Janshala programme – a joint UN-GOI programme that includes imparting quality teacher training through Headstart, including computer-based interactive training and development of TLM</td>
<td>Enhancing empowerment through computer literacy</td>
</tr>
<tr>
<td>A joint UN-Government of India collaboration: <a href="http://www.education.nic.in/htmweb/janshala/madhyapradesh.pdf">www.education.nic.in/htmweb/janshala/madhyapradesh.pdf</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tata Literacy</strong></td>
<td>remarks: The curriculum has been taken from the National Literacy Mission’s primers to develop the Computer-Based Functional Literacy programme (CBFL)</td>
<td>Functional literacy</td>
</tr>
<tr>
<td>Tata Group and Tata Consultancy Services, state government of Andhra Pradesh, Maharashtra, UP and Madhya Pradesh: <a href="http://tataliteracy.com/">http://tataliteracy.com/</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project partners</td>
<td>Objectives</td>
<td>Outcomes</td>
</tr>
<tr>
<td>------------------</td>
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<td>----------</td>
</tr>
<tr>
<td><strong>Sustainable Access in Rural India</strong></td>
<td>remarks:Develops business models for economic uprating of the communities.</td>
<td></td>
</tr>
<tr>
<td>IIT-Madras, Massachusetts Institute of Technology (MIT) Media Lab Asia, Berkman Center for Internet and Society, Harvard University Law School, and the I-Gyan Foundation: <a href="http://edevolution.media.mit.edu/SAR/mainsari.html">http://edevolution.media.mit.edu/SAR/mainsari.html</a></td>
<td>E-services for agriculture, education, micro-finance, health, market conditions</td>
<td>Telekiosks have been set up in rural areas of Tamil Nadu for empowering the communities</td>
</tr>
<tr>
<td><strong>Gyandoot Project</strong></td>
<td>remarks:Online public grievances redressed in a unique system through soochanalayas</td>
<td></td>
</tr>
<tr>
<td>National Informatics Center, Ministry of Communications and Information Technology and state government of Madhya Pradesh: [<a href="http://gyandoot.nic.in">http://gyandoot.nic.in</a>; <a href="mailto:gyandoot@rediffmail.com">gyandoot@rediffmail.com</a>](<a href="http://gyandoot.nic.in">http://gyandoot.nic.in</a>; <a href="mailto:gyandoot@rediffmail.com">gyandoot@rediffmail.com</a>)</td>
<td>E-services, e-governance through establishment of soochanalayas.</td>
<td>Providing access to information such as land records, registration, mandi prices</td>
</tr>
<tr>
<td><strong>Baatchit</strong></td>
<td>remarks:E-governance is done through the Panchayats, the local level administration</td>
<td></td>
</tr>
<tr>
<td>JIVA Institute, Media Lab Asia [<a href="http://www.jiva.org/outreach/baatchit/index.htm">www.jiva.org/outreach/baatchit/index.htm</a>; <a href="http://www.jiva.org">www.jiva.org</a>; <a href="http://www.jiva.org/baatchit">www.jiva.org/baatchit</a>](<a href="http://www.jiva.org/outreach/baatchit/index.htm">http://www.jiva.org/outreach/baatchit/index.htm</a>; <a href="http://www.jiva.org">www.jiva.org</a>; <a href="http://www.jiva.org/baatchit">www.jiva.org/baatchit</a>)</td>
<td>E-services for information access, communication</td>
<td>Baatchit software has been developed and is being used for e-conversation, to address community needs, education purposes</td>
</tr>
<tr>
<td><strong>Leveraging ICT through Market Centre for tribal communities</strong></td>
<td>remarks:The Sawalmedha village of Betul District in Madhya Pradesh has a weekly market where 40 villages assemble to market their produce; reaching out to 10,000 people as the centre is operational during the market days</td>
<td></td>
</tr>
<tr>
<td><strong>Infothela Mobile Centers</strong></td>
<td>remarks:The pedal of the mobile unit generates energy to charge the battery; has facilities for diagnosing blood pressure and blood sugar levels</td>
<td></td>
</tr>
<tr>
<td>Media Lab Asia, IIT Kanpur, UP: <a href="http://www.iitk.ac.in/MLAsia/infothela.htm">www.iitk.ac.in/MLAsia/infothela.htm</a></td>
<td>E-services through mobile unit-Internet, Telephony, weather conditions, education, health services</td>
<td>Mobile PCO with basic health services</td>
</tr>
<tr>
<td><strong>Same language subtitling on TV for mass literacy</strong></td>
<td>remarks:The replication of such projects can have enormous benefits</td>
<td></td>
</tr>
<tr>
<td>Center for Educational Innovation, Indian Institute of Management in Ahmedabad, Indian Space Research Organisation, World Bank: <a href="http://web.worldbank.org/">http://web.worldbank.org/</a></td>
<td>Increasing literacy levels through use of television through subtitling of programmes that are telecast.</td>
<td>The programme also caters to the deaf and hard-of-hearing people by making them exposed to print-literacy.</td>
</tr>
<tr>
<td><strong>Karnataka CLC in Schools Initiative</strong></td>
<td>remarks:Projects have been replicated to improve the retention rates and completion of primary education</td>
<td></td>
</tr>
<tr>
<td>Azim Premji Foundation, Government of Karnataka:<a href="http://www.azimpremijfoundation.org/index.htm">www.azimpremijfoundation.org/index.htm</a></td>
<td>To demonstrate that technology initiatives, such as the use of software to reinforce certain aspects of mathematics, geography, environmental sciences and Kannada, have a positive impact on the interest levels of children and increase their learning achievement levels</td>
<td>The project has been able to increase the retention of the children in schools; motivation levels have increased; community learning centres have been established</td>
</tr>
<tr>
<td><strong>Project Shiksha-Computer Literacy</strong></td>
<td>remarks:Quality of life of these children have improved</td>
<td></td>
</tr>
<tr>
<td>Microsoft and State Education department: <a href="http://www.sjil.edu/shiksha.htm">www.sjil.edu/shiksha.htm</a></td>
<td>Aims to accelerate computer literacy by providing an end-to-end solution, which includes software, comprehensive training for teachers and students, ICT curriculum development, and scholarships for teachers and students</td>
<td>Over 80,000 teachers and 3.5 million students in government schools have an opportunity to strengthen their ICT proficiency over the next five years</td>
</tr>
</tbody>
</table>
Training

Training has been an important element of Indian efforts in deploying technologies for education. Implementation of all projects has involved training of trainers, producers of content, field level facilitators, etc. Generally, training has been provided either in-house or by other publicly funded training institutions, such as All India Radio and the Film and Television Institute of India; the Central Institute for Education Technology and the Development and Educational Communication Unit of the Indian Space Organization. Experts come from within the country, and training takes place on location.

A large percentage of the training is skill-oriented, helping existing staff to upgrade and acquire skills needed for the task at hand. Where large numbers of people have to be trained, such as in the District Primary Education Project, or in-service training of agricultural extension workers, teleconferencing (one-way video, two-way audio) is the preferred mode of delivery.

Broadcast technologies have been used extensively for teacher training. A massive effort in training primary school teachers through teleconferencing has been underway in the District Primary Education Project for more than five years, and agricultural extension workers and government officers have also been trained through teleconferencing. There have also been examples of teacher training and NGO staff capacity-building throughout the country through different ICT pilot projects.11

The capacity-building efforts have also percolated down to the grassroots through these catalysts. Training in the use and applications of ICT has been the major contribution from all the projects, as sustainability of donor-funded projects after the project life is seen as dependent upon the capacity-building of institutions and individuals involved.

Constraints on the use of ICTs

A variety of constraints dog India’s efforts to deploy technology for education. Policy exists, as does government commitment. However, such policy and commitment is often lost on the road to implementation. Educational projects, set up by conventional governments as part of a broad educational agenda, tend to reflect the conventionalism of existing institutions with their hierarchical and bureaucratic systems of administration when the need is for creative and innovative management.

Access and availability of technology also becomes patchy since a piecemeal rather than a co-ordinated effort by different implementing agencies is followed. Lack of stable electric power, non-existent or unreliable telecommunication lines and a mismatch between funding allocation and actual needs all add to the problems. Sustainability is also a major obstacle, with many initiatives failing because donors have not anticipated the cost of maintenance and upgrading of technology and services.

Central models of management and development that are linguistically and culturally relevant to local communities are next to impossible when projects are being implemented nationally or from state capitals in ways that fail to take local needs into consideration. The result is a constant tussle between local requirements and the need to develop local materials with the economies of scale that are possible through more centralised models.

A very large number of local and regional initiatives have failed to increase the knowledge base regarding what works and what doesn’t. There is not enough documentation and sharing of knowledge of interventions of ICT in education. Replication and up-scaling of efforts becomes difficult in the absence of such information. Institutional collaboration is also noticeable by its paucity. Thus, it is possible to have efforts in

the same region working independently and unwilling to collaborate or pool efforts for greater effectiveness.

Economies of scale make India an ideal location for large-scale experimentation. But given its size and cultural and linguistic diversity, solutions need to be specific to location, problem and time. The politics of monopoly and central control do not favour decentralisation and provide the autonomy needed by implementing agencies.

However, there are various dimensions to these issues. First, it is impossible in a country like India to address these challenges through centralised planning and decision-making. Second, central control makes for a cumbersome and slow process of hardware and software acquisition and production and response to problems and issues. Third, a decentralised educational system with multiple players cannot expect to continue to operate with a central monopoly over the control and operation of the delivery of education. Fourth, there is increasing evidence of local efforts succeeding, where nationwide efforts have failed, for the simple reason that local efforts have addressed local needs, local culture and local language. Initiatives such as GyanDoot and the Jhabua Development Communication Project are just two examples of local efforts succeeding. Finally, many local efforts cannot be up-scaled, for the simple reason they address local problems and succeed because they are local.

Analysis

There is a great potential to learn from India’s experiments with the application of ICTs in education. There are few countries that can match India as a test bed for determining what works and what doesn’t. The country has all the situations and conditions of developing countries.

The Indian government has, as a policy, decided to discourage international donor assistance, especially that of a bilateral nature, and to support development and education-related projects within the country. But there is room for supporting Indian efforts.

As a first step, there is a critical need to document Indian efforts for the benefit of its own decision-makers, institutions, NGOs and civil society. It is necessary to know what works and what does not, and what the implications are for policymaking, planning and implementation. A second step would be to inform the capacity-building and training provided to staff in Indian institutions. Specifically, it needs to be understood that any new technology comes not merely with hardware and software, but with a learning and teaching style and grammar of its own, and that management practices need to be adapted in order to use the technologies effectively. As an example, the use of ICTs in education calls for a fundamental shift in the way content is designed and delivered, as well as for teamwork and collaborative practices. New technologies cannot be imposed without enabling teachers and learners to understand these fundamental shifts. Ongoing training is necessary for the trainers in institutions and organizations who are engaged in the design of curriculum, teaching materials and delivery of ICT-enabled education. At the same time, middle-level managers, both in the public service and the NGO sector, need to understand the pedagogy of learning through ICT and the management models that are required.

India has the policy and technology to implement both small and large ICT interventions in education. What is missing and what fails is in the translation of policy and technology into good practice.

NOTES

5 Telephones at 38 per 1,000 and Internet usage at 6.8 per thousand do not reflect user patterns; where usage at a public kiosk or cyber cafe may be much higher as the mobile phone and WLL industry is growing at the rate of 48 per annum. See www.indiachina.org/sectoral_info/pdf/report-telecom-cii.pdf.
10 See, for instance, www.vidyonline.net, a portal designed to provide online support to teachers in India.
11 See www.ignou.ac.in and www.depdpep.org.
INTRODUCTION

Southwest of the Indian subcontinent, the Republic of Maldives is one of the most attenuated countries in the world, with 1,196 islands in 26 distinct coral atolls spread over a total area of 90,000 square kilometres. Less than 0.5 per cent of this area is land, and some 200 of the islands are inhabited.

Until the arrival of tourism, fishing was the main occupation in this nation of seafarers, and the relaxed pace of life seems to have carried over into the 21st century. The graceful sailing dhoni (local boats) of old may have given way to motorised versions, but fishing with pole and line is still a common site throughout the islands.
The Republic of Maldives is today making rapid progress in national development. There is no doubt that significant gains have been secured in various fields, the result of giving priority to social development, education and health services. As an indicator, life expectancy has increased from 46 to 71, and functional literacy has increased to nearly 100 per cent. Yet the country faces many challenges unique to small island states with dispersed populations.

**National policies, strategies and programmes**

The Government of Maldives appreciates the potential benefits of information and communication technology (ICT) to a rapidly growing country. Hence the Ministry of Communication, Science and Technology (MCTS) has been mandated with issues such as ICT policy formulation, ICT management, strategic ICT planning, formulating ICT standards and improving public sector service delivery through ICT.

Accordingly, the ministry has developed a Science and Technology Master Plan which gives priority to issues such as formulating a national ICT policy along with strategies and an action plan for the Government Network of Maldives (GNM) to connect all the public sector organizations in the capital Male’, form a National Computer Center as a support structure for GNM, oversee the implementation of ICT policy, define ICT standards and establish community-owned telecentres.

The National Computer Center (NCC) is to play a central role as it is expected to work with government agencies and the private sector to ensure that information technology policies, strategies and programmes are consistent with national development priorities and requirements. More specifically, the NCC is to:

- Promulgate policies, programmes and projects that will exploit ICT for economic and social development, especially in addressing the needs of the poor sectors of society;
- Carry out policy and technological reviews, studies, and research and development projects to accelerate the development of the local ICT and allied industries;
- Facilitate the development and implementation of a government information systems plan to accelerate the application of electronic governance;
- Develop and promulgate minimum standards and benchmarks for computerisation and other ICT-related activities in government;
- Review (and possibly approve) proposed information systems plans of national government agencies, government-owned and controlled corporations, and government financial institutions;
- Provide ICT advice and related services to other government agencies and institutions;
- Conduct periodic information systems surveys to foster integrated development, implementation and management of computer-based information systems and networks in government;
- Assist, as requested, government ministries and agencies concerned with the review and design of ICT education and training curricula; and
- Develop and implement a continuing national ICT promotion programme to improve public awareness and understanding of the national plan and vision.

Two NCC committees have been created: an Information Technology Advisory Committee to give guidance on policy issues relating to ICT and an Information Technology Standards Group to work on ICT standards.

**Current level of ICT access and use**

In Maldives, as elsewhere in the developing world, there is significant inequality in terms of access to ICT appliances and connectivity. But these island dwellers are particularly isolated because of the distances and sea between the many islands and atolls. Most islands are still economically dependent on the capital, Male’ and islanders must travel by boat for many hours to get there. Currently, inhabitants physically travel to Male’ to initiate transactions, which is an expensive undertaking. Further, as there is less travel between islands, local trade and small businesses have little information about the available resources, products, services and needs in other atolls and islands. Telephone calls between the islands are expensive. Internet connectivity is not readily available in the islands, and even in Male’ Internet prices can reach up to US$ 3 an hour. Island dwellers have few avenues to advertise their small enterprises. The time schedule of transport can be problematic, as information about dhoni is often disseminated only by word of mouth. Information about other private sector services, education activities and events in the neighbouring islands and atolls is not readily available.

The availability of telephone lines is 121 per 1,000 inhabitants, reaching up to 293 per 1,000 in Male’. Waiting time for a line is nearly two years. Despite a fibre optic backbone, access to Internet remains at around 36 users
per thousand population. Patterns similar to other developing countries persist, with much of the usage concentrated in the capital city and at workplaces and institutions. While there are computers in schools provided for by the government, much of their use is restricted to limited office automation with very few schools providing computers for use by the students.

Integration of ICT use in education is stated in the policy, but there is very little that has been done. The country is in its infancy when it comes to ICT use and applications. The MCST, in co-operation with the Ministry of Education and UNESCO, has embarked on a programme to foster basic science concepts among the country’s primary and secondary school children. Under this programme, MCST has procured a wide range of science and technology programmes and materials designed and produced by professional organizations and institutions. The resource materials include video and audiotapes, interactive software and books. Priority will be given to atoll schools in the distribution of these resource materials.

**Major initiatives**

**Digitally Empowered Development in the Island Communities of Maldives**

The purpose of this partnership project between MCST and the United Nations Development Programme (UNDP) is to empower island communities by sharing knowledge and information among islands through a community portal. It will provide information about products and services of the islands to a much wider audience by establishing a community portal and websites in the local language, Dhivehi, as well as English. The project will give national and international exposure to local businesses, enhance access to markets and create awareness of ICT to improve their social and economical life. The project is an add-on to the National ICT Policy Project.

**Multipurpose Community Telecentre**

The multipurpose community telecentre (MCT) concept involves the creation of community telecentres where a variety of ICT services such as telephones, fax, voice mail, Internet (including e-mail), TV and radio for information and recreation can be provided. The ICT policy project will also formulate business models to ensure the sustainability of the telecentres and provide information packages. A more comprehensive content development initiative is to be carried out later on.

**ICT Standards – Thaana**

Thaana has been included in Unicode 3 in close collaboration with MCST, NCHLR, Microsoft and the private sector. The result is that Windows XP is the first operating system to be released that supports Thaana.

**E-governance – Information Technology Development Project**

The government views e-government as one of the initiatives to deliver a better quality of life to the people of the Maldives and to bring the services of the government closer to the people.

The Information Technology Development Project (ITDP) will establish a network that will connect government and parastatal agencies (including Vilingili and Hulhule islands) in Male’ and 20 atolls. It will enable sharing of information electronically. Portals will be set up to enable public access to government information and services through the Internet. The project will also install Internet kiosks in Male’ as well as on the atolls to provide public access to the government network and World Wide Web sites. Telecommunications sector reform, which will be implemented as part of the project, will lower the Internet tariff, making access more affordable.

**Examples of training**

The country has succeeded in achieving near total literacy. There are primary schools up to seventh grade on all the inhabited islands, and primary education is both compulsory and universal. There are a few secondary schools of high quality, and existing secondary schools in the atolls have a boarding facility for students to come and learn.

To improve educational access and quality, the government is establishing learning hubs, called atoll education centres (AECs), in a phased manner. Three are being established immediately. These AECs, similar to multipurpose telelearning centres, will be fully equipped and connected through the use of ICTs.

Technology is seen as an essential support and supplement for improving the learning inputs for school education; however, teaching is likely to remain a face-to-face activity for some time to come. But improving the quality of teaching is a major priority and ways and means have to be found to provide professional development and capacity-building for the teachers, half of whom are currently untrained. It is here that ICTs are seen as being able to play a role in the educational process.

The UNDP Digitally Empowered Development in Island Communities project, described above, includes a substantial training component that is focused on the communities involved. It is recognised that such training is required if the people of the communities are to make use of the facilities and the technologies. However, there is no evidence of ICT training for staff in education per se.
**Constraints on the use of ICT**

Internet access is very expensive and access to telephones is not widespread. Few households have access to a telephone service even if they can afford it, and pay telephones are heavily used.

A means of easy transmission of written information could significantly streamline the operation of the atoll offices and provide more timely information to the various ministries. In some cases, such as with the collection of fines and fees, existing legislation requires that all information be kept in a physical account book.

Automation without procedural amendments to facilitate the use of information technology would serve only to increase the effective workload. The atoll offices are provided with personal computers, which are generally used for word processing, spreadsheets and, occasionally, graphics. The machines are used as standalone devices, however, as Internet access is prohibitively expensive.

No ministries have yet deployed applications that would enable the atoll offices to submit information online. In fact, current legislation often requires a written report, thus limiting the gains from the use of the technology. Better use of information technology, coupled with communication capability, would improve the abilities of the atoll health clinics to gather and report health information.

In education, one of the major constraints to the use of ICTs, once deployed, would be integration into the classroom. There is a distinct lack of awareness of the potential of either broadcast or computer-based technologies to assist the distant teacher in the school. Distribution of materials produced at the facility in the Educational Resources Centre of the Educational Development Centre of the ministry remains inadequate. At the same time, there is need to upgrade the skills and competencies of the teachers themselves, many of whom are matriculates and have come into teaching immediately after completion of their high school examinations. Tertiary education is limited, as are resources for education abroad. Thus, skills and knowledge upgrading among the teachers is limited.

**Analysis**

The needs are great in the Maldives in terms of policy, infrastructure development and institutional capacity-building. Inservice teacher training is critical, both in content and in the application of ICTs for education. The training of people to implement the e-governance projects is also critical.

Maldives is another example of a country with a national policy, but not enough resources to implement their policies and work plans. There is a need to work towards ICT penetration. The country requires intensive help in policy and master plan development, in strengthening infrastructure and connectivity and in teacher training and use of ICT in the classrooms. While the most common problems still relate to infrastructure and telecommunications development, further challenges include language difficulties (most ICT-related software and contents are in English), disparity in the accessibility of ICT between urban and rural areas, lack of motivation and technophobia among teachers, and a critical shortage of trained teachers.

**NOTES**

INTRODUCTION

Agriculture is the mainstay of Nepal, and this is evident east to west on the southern slopes of the Himalayan mountain range. Geographically, the country is landlocked, lying between the two Asian giants, China and India. The problems of poverty, deep gender divides, unemployment and underemployment are compounded by intermittent violence and strife by Maoist guerillas.
National policies, strategies and programmes

Nepal has recently accorded priority to the development of the information and communication technology (ICT) sector. Nepal’s vision is to place this small Himalayan kingdom on the global map of information technology by 2005. With this vision in mind, a series of legislation has been enacted to regulate the ICT sector: the Telecommunications Act, 1997; Telecommunications Regulations, 1997; Communication Corporation Act, 1972; and the Intellectual Property Act.

The Information Technology Policy of Nepal, 2000, aims to build a knowledge-based society and establish knowledge-based industries. The plan is to make ICTs accessible to the general public and to provide employment in the ICT sector. The government has developed a strategy and action plan that includes private sector participation, infrastructure development, provision of technology to rural areas and the creation of an enabling environment for private sector investment in ICT-related service industries, such as e-commerce, e-education and e-health.

Current level of ICT access and use

Only 3.5 million out of 24 million Nepalese have access to electricity, and these people are mainly in urban areas. In the country as a whole there are three PCs per 1,000 people. There are 16 Internet service providers (ISPs), 290 Internet hosts and 50,000 Internet and e-mail users.

The telecommunications infrastructure is good in urban areas, and because it has been installed recently, it is mostly digital. Though the use of ICTs in public administration and government is limited, its potential for driving development and economic growth has prompted the Ministry of Science and Technology to include strategies in its ICT policy of 2000 to further develop its use in the public sector.

Major initiatives

Although Nepal has lagged behind others in the use of computer-based ICTs, it is one of the countries in Asia where the concept and practice of community radio has been successfully tested and tried. Nepal’s experience is quoted worldwide as an innovative and successful model, especially in countries with the similarities of a difficult terrain and a dispersed and isolated population.

Community Radio and Television

Of the 22 independent radio stations operating in Nepal, four are community stations. One is in Kathmandu (Radio Sagarmatha) and the other three are in western Nepal (Radio Mananpokhara in Palpa district; Lumbini FM, close to the industrial and commercial town of Butwal; and Swargadwari FM in the town of Ghoral). Most of the commercial stations have a strong public service content in their programming.

While the community radio stations are largely self-financing, support is essential for specific programmes. The major block to continued growth of community radio is the lengthy licensing process. Currently, there are more than 25 licence applications waiting for approval before the government.

FM radio has increased the amount of “everyday life” information it broadcasts including information about special events, traffic reports in the city, weather forecasts, flight schedules, bus schedules, market prices for vegetables and fruits, air pollution readings, health tips and horoscopes. FM radio also provides live information on events such as elections, religious gatherings and national celebrations. It also interacts with government officials and politicians, which has added to the collective knowledge of urbanites regarding governance in Nepali society. Similarly, discussions with professional practitioners have helped to demystify specialist knowledge.

More and more radio programmes are becoming available on the Internet, and for those without access, radio hosts are bringing Internet content to listeners.

Radio Sagarmatha. Of the four community stations, Radio Sagarmatha is the most successful. An independent public community radio established in 1997 with a 100-watt transmitter in Nepal, it is the first of its kind in South Asia. It was initially financed through UNESCO grants, and is currently self-supporting but receiving donor assistance for specific projects.

Radio Sagarmatha started its FM broadcasting two hours daily to the Kathmandu Valley. The station’s goal is to create awareness and involve the public in daily issues. The licence holder of the station is the Nepal Forum of Environmental Journalists (NEFEJ). A board of directors appointed by NEFEJ from its executive committee governs the station.

Radio Lumbini. Radio Lumbini, MS Nepal (Mellemfolkeligt Samvirke, the Danish Association for International Cooperation) and the Danish International Cooperation Agency are collaborating to expand the radio station’s programming. Under the agreement, Radio Lumbini will continue to cover local development and construction work, women’s empowerment, ecology and good governance. MS Nepal will make available physical assistance, financial assistance and expertise for institutional
Radio Madanpokhara and Radio Swargadwari. Both of these stations are owned by villages or co-operative societies and have broadcasting committees to oversee their work. Start-up funding and donor support has been necessary for specific projects and activities. Advertising support has since taken care of the issue of sustainability and the stations are now doing well with expansion very likely in the future.

LI-BIRD Ko Chautari radio programme – Nepal. In October 2001, Local Initiatives for Biodiversity, Research and Development (LI-BIRD) initiated a rural participatory radio programme that focused on biodiversity-related issues. The programme was meant to complement the government’s agricultural radio programmes and form part of a wider package of efforts to increase local awareness about the importance of agro-biodiversity.

The programme used materials based on local knowledge and practices collected from farming communities. Technologies developed by the farming community and the research outputs of university and research stations were also used.

Digital Broadcast Initiative-Nepal. Equal Access, an international non-governmental organization (NGO), is working in conjunction with the United Nations Development Programme (UNDP) on a comprehensive initiative to provide critical information on a range of development issues important to the people of Nepal. Out of this, the Digital Broadcast Initiative (DBI) was created. It is a broad partnership of several groups working with the continuing support of government through three project teams: Content Development, Outreach and Assessment. The teams work collaboratively on determining the information needs of underserved communities; writing and producing relevant and engaging audio and multimedia programmes to address these needs; broadcasting these programmes directly to communities via satellite and FM rebroadcast; integrating broadcast programming into existing outreach work being done by partner community organizations; collecting ongoing feedback and input directly from communities and including it in programming; and monitoring and assessing the overall impact and effectiveness of the initiative.

A wide range of programmes are broadcast, including a Nepali Language Service, a 136-episode serial drama addressing HIV/AIDS prevention, women’s and girls’ empowerment and related health and development issues, and “Chatting with My Best Friend,” the first Nepali radio programme produced for young people involving issues such as sex, love, relationships, peer pressure and conflict with parents. Soon the Initiative plans to launch a new programme focusing on human rights, women’s empowerment and sexual and reproductive health, as well as a programme designed to educate women of childbearing age about important issues in early childhood development.

The Initiative also involves capacity-building for local staff, including facilitator training, local radio digital production training and equipment training. The practical and inclusive approach of the project ensures that local needs are genuinely addressed, while Nepalese organizations and local staff are fully involved, creating a sense of local ownership.

Ratna (Srihagar) Cable Television. Ratna Cable Television of Palpa is a local programming and broadcasting facility that arose from the efforts of Mahesh and Boudhha Shakya in their VCR and TV repair shop. The residents of Tansen, a town in the lower Himalayas, watch a two-hour long locally produced programme every Saturday. The service continues because of local volunteers. With some technical and financial support, this service could make a greater impact in promoting the flow of information in the community. Ratna Cable’s experience could be replicated in other areas of the country.

ICT Interventions in Nepal

There are a few, but diverse, initiatives of the application of new ICTs in education. A brief description of some of the more innovative projects follow.

ICT Project 2000. The objective of this project is to bridge the digital divide among the haves and the have-nots. It provides education on computer and Internet technology to students and youths wherever a dial-up Internet connection is available. Each participating school is given Internet access and one teacher from each school is provided training on software applications and computer hardware. The schools run free classes for students during school hours and for other community youths and interested people during non-school hours and on weekends. This project has enabled students and people in rural communities to benefit from Internet technology.

Nepal Internet Exchange. This is a project of the Computer Association of Nepal. It is designed to address the problems associated with routing local computer traffic within Nepal. The exchange also provides a “looking glass” facility for researchers to ascertain the size of Internet infrastructure in Nepal.

Women Empowerment through ICT. Having identified the root cause of social crime as poverty and lack of education, the group Advancing Girls and Women in Nepal (AGWN) initiated this project with the belief that by working with women as learners the family will ultimately benefit. In the first phase the goal was to achieve 10,000 computer literate women in Nepal. After one week of computer training, self-help groups were established to
enhance the women’s learning with the hope they might design instructional materials or set up their own businesses.

**Computer Association of Nepal.** Established by a diverse group of professionals and industries in the computer and information technology sector in December 1992, the main objective of the Computer Association of Nepal (CAN) has been to encourage and assist in the utilisation of computers and information technology by developing strategies to promote computer skills in the population.

**Nangi Village School Project.** This project is a grassroots initiative by an individual educational pioneer, Mahabir Pun, to try to break the cycle of poverty in his mountain village of Nangi by taking it into the computer age. Having founded Himachal High School, he sees the Internet as the way to improve children’s education.

To connect the village to the Internet, Pun installed two small hydro-generators in the stream near his village for a power supply to the school. Then he had computers donated from Australia, Singapore and Malaysia and used parts from the United States. From the parts, Pun assembled the first computer while the students and teachers assembled the remaining ones after his demonstration. At present there are 15 computers in the school for 300 students from six neighbouring villages.

The village got a telephone in 1998 with the intention of obtaining Internet access. However, it was found that the quality of the line was not good enough to carry the signal. Since then the villagers have been attempting to rectify the situation. In the interim the only option is to walk down for a full day to the nearest city where Internet service is available.

**Training**

While there have been some early initiatives of human capacity-building in ICTs in education, for NGOs around using ICTs for communication purposes and for the community radio’s non-formal community education programmes, there has been little activity in training.

**Constraints on the use of ICT**

The fact that there is little demand for ICT in Nepal is not surprising considering the number of constraints existing in the country. These include the lack of infrastructure, high up-front costs, widespread illiteracy, language barriers, absence of local content, poverty and the lack of public awareness about the Internet and its use.

Other constraints, of lesser importance include inadequate human resource development and the brain drain of qualified specialists, lack of sufficient funds needed for the huge investment required to create a telecom infrastructure and inadequate numbers of computers in schools.

**Analysis**

Nepal’s experience in community broadcasting, enhanced with the use of ICTs, could be leveraged so that convergent technologies could become the factors that are the critical input to telescope decades of change into a short span of time. Instead of proceeding with traditional ways of building line-of-sight and terrestrial systems, and high-cost media infrastructure, a combination of wireless and satellite-based telecommunications with low-cost Very Small Aperture Terminal (VSAT) apparatus for downlink of data and images could transform Nepal. However, all of this would need to be supported by a coherent and comprehensive policy, collaborative mechanisms between all stakeholders and local capacity-building by indigenous institutions.

NOTES

1 See www.nepalmedia.org/radio/interview_bd_koirala.htm.
3 See www.nepalmedia.org/tv/community_tv.htm.
4 See www.interconnection.org/coppades Current_Projects.htm.
5 See www.can.org.np/.
6 See www.lbef.org/we.htm.
7 See www.can.org.np/.
INTRODUCTION

The first country in South Asia to liberalise its economy, Sri Lanka stands out as an interesting example of a developing nation trying to incorporate information and communication technologies (ICTs) into an overall development and educational policy.

The country has faced formidable challenges. It has a powerful continental neighbour, India, and the society has been ravaged by civil war for nearly two decades. Despite these challenges, the country’s literacy exceeds 90 per cent, and the gender divide is a non-issue, thanks to the country’s consistent investment in health and education.
However, the war has retarded economic growth, resulting in high levels of poverty, unemployment, unrest, and crime. Thus, despite steady growth in educational indicators, problems of poverty, access and equity continue to dog this island nation. On the bright side, since the peace initiatives of 2002, there are definite signs of recovery and reconstruction in the island nation.

### National policies, strategies and programmes

#### Policies, Strategies and Goals

In 1983, the first-ever Computer Policy for Sri Lanka (COMPOL) was formulated. The recommendations of the policy committee were accepted by the Government of Sri Lanka, and the Computer and Information Technology Council of Sri Lanka (CINTEC) was established by an Act of Parliament (Act No. 10 of 1984). The Act recognised policy recommendations and implementation as a major statutory function of CINTEC. The COMPOL recommendations, together with the recommendations made to the government by CINTEC from time to time, now form the current ICT policy.

In 1994, the Science and Technology Act was passed, and it became active in April 1998. This act repealed the CINTEC Act and replaced the Computer and Information Technology Council of Sri Lanka with the Council for Information Technology (although the well-known acronym, CINTEC, was retained). The 1994 Act provided for policy recommendations to be made by CINTEC to the government through the National Science and Technology Commission (NASTEC).

With the change of government in 1994, CINTEC began working on policy recommendations, and by 1996 it had completed most of the groundwork. It initiated a round table on ICT with the participation of all key agencies, which resulted in the formation of the National Working Group for the Exploitation of IT.

A draft of a national ICT policy was placed before the government for approval through NASTEC and the Ministry of Science and Technology. The main objectives stated were to use ICTs for efficient administration and management, create a competitive advantage and attract a significant portion of the global software and ICT services market to Sri Lanka, provide information on the country to the world, and use ICT as a tool for the acquisition of information needed for the society.

In 2002, Sri Lanka went through yet another review and realignment of national policies related to ICT and telecommunications. The current policy envisions the growth of the country into a financial and service hub for the South Asian region with connectivity to the rest of the world. Colombo, under the vision, would become a multifaceted service centre co-ordinating development at the provincial level.

#### Key Action Plans

Key action plans include the development of physical infrastructure, deregulation of the telecommunication sector, mobilisation of private sector investment, introduction of measures to protect intellectual property, capacity-building and provision of e-governance services.

#### Current level of ICT access and use

Sri Lanka has near total literacy, and access to education for all Sri Lankans is free up to the secondary school level. Gender disparities are not an issue in this island country. However, teledensity in Sri Lanka is low, with about 44 telephones per 1,000 people in 2001 and Internet use estimated at eight per 1,000. Judging by mushrooming computer vendors and training centres in Colombo and provincial capitals, computer usage seems to be spreading. Computers are used widely in the private sector for business applications with varying degrees of Internet connectivity and speed.

While a significant number of affluent upper- and middle-class families now own a computer, the cost remains prohibitive for most Sri Lankans. There is little access to computers in Sri Lankan schools and colleges and less in rural areas.

Internet access on a commercial basis became available for the first time in 1995. However, Internet use remains very low due to the high cost of computers, low bandwidth and low computer literacy. It is mainly the urban elite, businesses and private sector corporations who use the Internet. There is also an acute urban/rural disparity with respect to access to the Internet, and public Internet facilities are also limited.

#### Major initiatives

There are two dimensions to the use of ICTs in Sri Lanka: the extensive experience with community radio as a developmental tool and, more recently, the use of computer-based technologies and the integration of both kinds of applications in innovative ways.

#### Using Broadcast Technologies

Proactive government support and funds from international donor agencies enabled Sri Lanka to successfully experiment with community radio two decades ago. The
The project combines radio and the Internet to address the problem of rural access to computers and connectivity. It was set up as a mini-ISP (Internet service provider) with leased line connection to the Internet. It uses a 300-watt transmitter for a listening area of a 20 kilometre radius that comprises 52 villages, two large towns and a total population of 230,000 people.

The broadcasters use the Internet in research and production and local people access the Internet from the facilities at KCR. Internet-browsing by a presenter on behalf of listeners, called radio-browsing, also uses a community database and hosted websites as additional sources of information. Resource people from the community (lawyers, doctors, etc.) interpret the information.

Initial training programmes were implemented with the assistance of foreign experts. Now local people have picked up the skills and pass them on to each other.

Computerised community radio operations in remote Sri Lanka. Riding the wave of the experience with the Kothmale Community Radio Project, the Government of Sri Lanka established Uva Community Radio in Badulla, one of the most underdeveloped districts in Sri Lanka, with support from UNESCO and the United Nations Development Programme (UNDP). The purpose of the community radio is to facilitate increased community participation in designing, implementing and evaluating an area-based growth and equity programme that has poverty reduction as a major focus. As part of the project, rural broadcasters have been trained in using computer-aided programme production.

The Sri Lanka Environmental Television Project. The Sri Lanka Environmental Television Project (SLETP) offers the country’s television broadcasters and video users a broad range of factual programmes on subjects such as the environment, development, health, social justice and science. As the Sri Lanka Video Resource Centre affiliated with the International Television Trust for the Environment (TVE), SLETP has had access to some of the best factual programmes produced around the world.

SLETP was started in 1995 by TVE and the Open University of Sri Lanka as a non-profit service to use the audiovisual and electronic media to raise awareness on environmental and development issues. As a non-formal educational effort, all SLETP programmes are scientifically accurate, journalistically produced and use engaging, non-technical formats.

The project’s strength has been in forming partnerships with television stations, universities, government agencies, training institutes and non-governmental organizations (NGOs). Television producers and programme managers turn to the SLETP for complete programmes as well as video footage that is not easily or commonly found elsewhere in Sri Lanka.

The Science and Environment Video Library provides non-broadcast users with access to nearly 500 video films that have come from TVE along with a multitude of other sources. The videos are regularly borrowed for screenings in schools and universities, community gatherings, public seminars, training programmes and for private viewing. For those interested in buying videos, SLETP sells high-quality tapes containing those programmes for which copyright and distribution rights have been cleared (usually SLETP’s own productions and all TVE titles).

Using Computer and Internet-Based ICTs

Secondary Education Modernization Project. The first initiative has come from the World Bank and the Asian Development Bank, which recently launched two separate plans to introduce computers to schools and teach computer skills to high school students. Together the plans will provide computer centres each with 10 to 20 computers for 2,300 schools during 2001–2006. The project will improve access for an additional 5,000 poor students annually by upgrading 100 existing schools.

The project is comprised of three components. The first is the modernisation of secondary schools through modern teaching methods coupled with evaluation to improve quality. The focus is also on developing computer literacy to narrow the digital divide. The second component will expand educational opportunity for poor students by increasing the number of full-time schools in the rural areas, and the third component will improve the delivery of educational services by providing training for relevant agencies.

International Childcare Trust. The International Childcare Trust is working in Sri Lanka to enhance the capacity of partner organizations through information-sharing and training opportunities. Its objective is to help partners in designing, implementing and managing projects in co-ordination with local people. In Sri Lanka, the projects include supporting children in local schools.
Knowledge and Information Systems of the Urban Poor.\textsuperscript{6} The aim of this research project, Knowledge and Information Systems of the Urban Poor (KIS), is to investigate how the urban poor access the information and technologies they need to improve their livelihoods, and to strengthen their knowledge and information systems.

Poor men and women living in urban informal settlements need knowledge and information to cope with risks and to improve their livelihood. Not knowing about their rights, the services they could access, plans for their areas or what options there are for tackling certain problems puts them at a disadvantage and increases their vulnerability.

The Pan Asia Networking Program Initiative.\textsuperscript{7} The Pan Asia Networking Program Initiative (PAN), a project of the International Development Research Centre (IDRC), has been designed to provide the physical electronic infrastructure for networking in the Asian region. A joint venture company was set up to operate Internet-related services in the country. It is registered with the Board of Investments in Sri Lanka and is jointly owned by several partners including IDRC. The joint venture company provides competitive and affordable Internet services in the country. It promotes networking between research and educational institutions, government bodies, the private sector and national government and international programmes that are concerned with economic and social development.

Training

There is evidence of utilisation of ICT in various sectors of the economy in Sri Lanka, but not much for instructional purposes. One project, the Training of Teachers in Information Technology, co-ordinated by the Ministry of Education and supported by UNESCO and the National Open School of India, seeks to bring together students, teachers, ICT professionals, research and development institutions and private sector organizations to upgrade the knowledge and skills of teachers and facilitators and to integrate educational technologies in their work. More broadly, it also aims at tapping the potential of new ICTs (including distance education methods) to provide more easily accessible and better teacher education and professional development.\textsuperscript{11}

Constraints on the use of ICT

Lack of awareness, resistance to using ICTs, inadequate communications infrastructure and limited collaboration between different regulatory and educational organizations are some of the constraints on the greater use of ICTs for education.

There is an urgent need to establish a government intranet and to provide Internet access to it. At present the Lankan Educational, Academic & Research Network (LEARN) provides an Internet and e-mail service to universities and a few research institutes, but does so with much difficulty owing to the lack of funds and the difficulties in obtaining stable communication links.

Appropriate changes to the existing legislation, introduction of new legislation and the development of the necessary infrastructure are urgently needed to obtain maximum benefits from technology. For international players to enter the Sri Lankan market, it is also necessary to enact laws for the protection of personal privacy and intellectual property.

Analysis

There are two dimensions to the use of ICTs in Sri Lanka. One is that small individual projects, such as the Kothmale Internet Radio in Sri Lanka project have serious bottlenecks that hamper sustainability. Initial funding for infrastructure development has to be sustained by a parallel investment for the upgrading of capital equipment and for operating costs. Thus, initiatives enabling local partners to develop private-public partnerships and business models to ensure sustainability are essential.

Capacity-building of teachers is critical if the current initiative to upgrade secondary school education through the use of ICT is to succeed. Faculties in the universities are computer-literate and are capable of providing the leadership for a sustained effort for the rest of the country. But often they are working in isolation from each other because of inter-institutional competition. Thus, any initiative undertaken should be spearheaded by a nationwide collaborative effort of several partners and should focus largely on providing teacher education to improve awareness, access and use of ICT by teachers.

NOTES

1 See www.esrilanka.lk/eg-policy-prel-draft-may06-03.pdf.
7 See www.sletp.org.
9 See www.ict-uk.org/srilanka.html.
10 See www.itdg.org/html/shelter/kis_research.htm
11 See www.idrc.ca/research/index_e.html.