Distance Education Technology in Asia

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Bhutan, Cambodia, China, Hong Kong (China),
India, Indonesia, Laos, Mongolia, Pakistan,
the Philippines, Sri Lanka, Thailand, and Viet Nam

February 2009

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The Emergence of Distance Education in South Asia

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Distance education has developed more rapidly in South Asia than elsewhere in the region, with a wider range of approaches, and over a longer time period. Education is considered a major priority in South Asia, and a means to socio-economic advancement by all citizens, urban and rural, rich and poor. This attitude has created a demand for education with which traditional systems have been unable to cope; and the introduction of distance education has been intended as a solution. The chapter examines traditional and modern technological bases for distance education in the region, and the pioneering examples these provide for other Asian countries with similar physical and social conditions.

Education in South Asia

Distance education (DE) has developed more intensively and in more varied ways in South Asia than in other parts of the region. South Asia, as represented by countries in the area of the Indian subcontinent, has a history of educational activities dating back for millennia. These are shown by recorded history and in the evidence of historical sites such as Nalanda in India, Taxila in Pakistan and Anuradhapura in Sri Lanka. In addition to being reputed centres of

learning, religious institutions were providers of education, and were recognised as the knowledge centres of the community with religious leaders providing guidance. The Pirivena system of education in Sri Lanka was responsible for the delivery of general education not necessarily restricted to religious disciplines, and the temple is still in existence. The monastic education that prevailed in Bhutan provided similar educational leadership, also centred on Buddhist traditions. In South Asia generally, with the exception of Sri Lanka, the literacy rate is relatively low. Many citizens, notably women and those in rural communities are unable to study owing to the socio-economic problems of the region. The high level of urbanisation in India has also contributed to the problem (Datta, 2006). In this connection, the various governments have realised the value of distance education (DE), and policies are continually under development for using DE as a means of enhancing educational access. In this chapter the use of DE in schools, universities and other institutes, by students as well as teachers, is examined, and the DE facilities available in the four nations are discussed.

The population statistics, literacy rate, human development index (HDI), and gross domestic product (GDP) of the four countries are presented in Table 1. In India and Pakistan, the basic infrastructure of education is divided into four levels: primary; middle/ upper primary; secondary/ senior secondary; and tertiary/university. In Sri Lanka, the infrastructure is divided into: primary (grades 1-5); junior secondary (6-9); senior secondary (GCE O/Level and A/Level, 10-13); and tertiary/ university. In Bhutan, general school education is divided into four levels: primary, lower secondary, middle secondary and higher secondary. These levels are followed by vocational and tertiary education. Technical/ vocational education and teacher training are provided in these countries by numerous public and private institutions, with government support or independently. The literacy rate in Sri Lanka is high (92%), compared with those of Bhutan (60%), India (64%), and Pakistan (52.%). Most South Asian countries have literacy problems because of the inaccessibility and high cost of education, particularly in rural areas.

Table 1. Estimated development parameters of Bhutan, India, Pakistan and Sri Lanka.

Country (year of independence)	Population	Rural population (% of total pop.)	Literacy in the national language(s)	Computer owners per 100 inhabitants	'Phone lines per 100 inhabitants
Bhutan	0.83 million (2002)	79% (2000)	54%	0.64	2.14
India (1947)	1.037 billion	72%	52%	0.6	4.2
Pakistan (1947)	146 million (est.)	67.7%	50.5%	0.41	2.44
Sri Lanka (1948)	18.73 million (2001)	70% (2001)	91.4% (1999)	0.79 (2001)	8.0 (fixed and mobile (2001)
	Internet hosts per 10,000 inhabitants	Internet cafés/ telecentres per 10,000 inhabitants	Internet users per 100 inhabitants	Web sites in the national language (s)	Web sites in English and other language (s)
Bhutan	7.15	1.72 (including public call offices)	0.43	None	200 (54 hosted by Druknet)
India (1947)	0.35	0.1	0.33 subscribers and 1.65 users	20,000	130,000
Pakistan (1947)	0.78	5	1.16		
Sri Lanka (1948)	1.20 (2001)	0.1	0.785 (2001)	500 (Sinhala and Tamil)	25,000

	HDI	GDP per capita	Urban-isation	
Bhutan	0.579		7%	
India (1947)	0.619	$3452	28%	
Pakistan (1947)	0.551	$2370	33%	
Sri Lanka (1948)	0.743	$4595	23%	
Sources	Population, literacy, computer and telephone ownership: (*Bhutan*): www.apdip.net/projects/dig-rev/info/bt/ (*India*): www.apdip.net/projects/dig-rev/info/in/ (*Pakistan*): www.apdip.net/projects/dig-rev/info/pk/ (*Sri Lanka*): www.apdip.net/projects/dig-rev/info/lk/ Human Development Indices (HDI): UNDP (2007) Urbanisation: www.nationmaster.com/graph/peo_urb-people-urbanisation			

The colonial powers that invaded South Asia from the 15th century introduced their own religious and educational traditions, in their own languages as well as the local languages. The British were responsible for the introduction of English education which spread throughout the region. Most parents in the Indian subcontinent regarded their children's education as a high priority, as a means to move up the socio-economic ladder and to obtain white-collar jobs. English education was also recognised as important for serving under the British masters. Many of the working class attended night school in order to learn English and to secure employment, opportunities not available to those educated in the local vernacular.

- *Bhutan*

Today, general education in Bhutan can be observed in three different forms: the school system, monastic education, and nonformal education (NFE). Monastic education preceded the introduction of modern education in the 1950s. Education is free in government schools. Providing education was the sole responsibility of the government until the year 2000 when, faced with the challenge of keeping up with the resources requirements and the rapid growth of the student population, the private sector was encouraged to set up private schools and institutions. Since then, there has been a steady growth in the number of private schools, particularly at the secondary level. The figures of the Ministry of Education (MoE: Government of Bhutan, 2006a) show that approximately 42% of the students at the higher secondary level are enrolled in private schools.

Monastic schools continue to be a strong force in education, however. The Central Monastic Body and other community-based religious organisations offer monastic education from primary to higher levels. With the nation's culture and tradition entrenched in Buddhism, the state religion and monastic education play an important role in providing spiritual education and in preserving the age-old culture. Nonformal education (NFE) centres have been established to reach out to those who have missed formal education opportunities. The NFE programme in Bhutan has shown an exceptionally fast growth. From 6 centres with 800 learners in 1992, it has grown to 646 centres with 18,550 learners in 2006. In 2006, the MoE has also launched a continuing education programme in the capital city of Thimphu, for students who have not been able to complete their secondary education. The programme has been well-received, and there are plans to expand it to other parts of the country (Government of Bhutan, 2006b).

Government and private vocational training institutes (VTIs) both cater to the nation's requirements for vocational skills. There are currently 6 government-operated VTIs with 813 trainees and 96 instructors, and 9 private VTIs with 34 instructors and over 200 students. These institutes fall under the purview of the Ministry of Labour & Human Resources. Most private VTIs tend to be based on uses of information and communication technology (ICT), indicating Bhutan's high demand for human resources in this area. School education in Bhutan begins at the age of six, with seven years of primary education followed by six years of secondary education. With the rapid growth in the student population, gaining admission to a government-sponsored higher secondary school is competitive, and those who do not qualify have the option of joining private schools or vocational institutes. Pre-school education in Bhutan has begun only recently in the form of privately owned day-care centres and nursery schools in urban areas. So far the country has 5 day-care centres, with 13 teachers and 269 children (Government of Bhutan, 2006a). It is primarily the parents who understand the need for, and can afford an appropriate early start to their children's education who send their children to the day-care centres.

Currently, approximately 30% of students who complete their school education can be accepted into the tertiary education system. Many students who cannot fulfil the academic requirements of the higher secondary schools and colleges join VTIs or institutions outside Bhutan, mainly in India. The dropout rate for school education up to class 10 had not shown much change over the last 10 years, until 2004 when a sudden drop occurred, followed by a steady rise to the present day. The highest dropout rate tends to be in class seven - 7.3% for 2006 (Government of Bhutan, 2006a). Not surprisingly, this occurs when the students begin secondary schooling, and may have to move from the primary school near their home to a new school further away. The dropout increase also coincides with the onset of adolescence and with possible changes in school and

community culture that require students to adapt to numerous simultaneous changes. Up to class 8, the dropout rates for girls have traditionally been slightly lower than those of boys. 2005 dropout statistics, however, have indicated that in classes 9 and 10 the girls' dropout rates rise sharply – from 3.6% to 6.8% and 8.9% respectively – both levels higher than the boys' dropout rates. This may be due to the traditional belief that females have a more important role as home-makers and require only functional literacy.

The Royal University of Bhutan (RUB) is the only university in Bhutan. It was established in 2003 as a federation of colleges and institutes spread across the kingdom. Prior to the RUB, tertiary education institutes were part of government ministries, and most higher education, especially at the postgraduate level, took place outside the country. With the creation of the RUB, all publicly financed tertiary education institutions have been incorporated into it. Currently, there are 10 institutes and colleges under the RUB in various parts of the country, with the Vice-Chancellor's office located in Thimphu. More than half of Bhutan's University students are enrolled in undergraduate degree programmes, 20% in diploma programmes, 5% in certificate programmes, and 4% in postgraduate programmes. In 2006, RUB has 3,820 students (66% male and 34% female). This gender ratio is fairly constant across the colleges except in the science and technology, natural resources, and traditional medicine disciplines (RUB, 2006a). Two new colleges, one public and one private, are planned to meet Bhutan's increasing higher educational demands. The University's Strategic Plan is to increase its intake to 8,000 students by 2012.

- *India*

After gaining its Independence in 1947, India focused heavily on educational policy. The 1st Five-year Plan (1951-56) allocated a 7.86% budget to education. At that time, India had 17 universities

and over 400 colleges. Today it has over 300 universities, 13,500 colleges, 10.5 million students, nearly 0.35 million teachers, and one of the largest higher education systems in the world (Powar, 2000). This massive expansion is directly attributable to the Five-Year Plan's socio-economic policies (Panda, 1999; Yadav & Panda, 1999). About 35% of India's students are women. India's educational system has been extensively discussed in the literature (Panda, 2005; Government of India, 2007) so will not be described in greater detail here.

- *Pakistan*

At the time of its 1951 Census, Pakistan had a poorly educated population, few schools, and a literacy rate pf 16.4%. The country had only one university, the University of the Punjab located on the Pakistani side of the Independence partition line. In the subsequent 50 years of independence, enrolment for tertiary education has outpaced the construction of new colleges and universities. According to the Higher Education Commission (HEC), Pakistan now has at least 58 public and 55 private universities, and over 100 'affiliated' or 'constituent' colleges, technical training institutes, teacher training schools, and other specialised institutions (HEC, 2007). The country's overall literacy rate is 52%. Urban literacy is relatively high at 64.7%, whereas that of the rural population is only 34.4%. The Human Development Commission (HRD) has been established to increase educational outreach to remote and mountainous areas. The goals of the 9th Five-year Plan (2006-2010) are to increase the literacy rate to 70% by 2010, and to have a school for each settlement of 1,500 citizens, or over a radius of 2.7 km.

Sathar *et al.* (2003) examined Pakistan's educational dropout rates in terms of gender and socio-economic status. They observed that the dropout rates increase from low to high educational grades in both low and high socio-economic groups, but particularly in lower socio-economic groups and in women. While the high

socio-economic male grouping showed a dropout rate rising from 0.5% (Grade 1) to 87.5% (Grade 15), the low socio-economic females had dropout rates rising from 9.3 (Grade 1) to 100% (Grade 15). The study also showed the most common reasons for dropout (Table 2). Thirty-nine percent of the females and 23% of the males in the sample dropped out of education because they could not pay the fees. The government has since taken steps to prevent this, and education is now free up to secondary level in some parts of the country. Female students are provided with free uniforms, books and monthly scholarships in rural areas. These measures are expected to increase the number of students seeking education, and national literacy rates, particularly of rural females.

Table 2. Reasons for educational dropout in Pakistan
(Sathar *et al.*, 2003).

Reasons for Dropout	Male	Female
Could not pay school fees	39%	23%
Lack of interest/ aptitude	33%	19%
Family responsibilities	24%	21%
Parent's/ family's disapproval	6%	24%
School too far/ trouble on way to school	3%	22%
Poor performance/ expelled	13%	6%

- *Sri Lanka*

In 1870, the colonial government of Sri Lanka, then named Ceylon, increased the number of its state-run schools, and introduced a programme of grants to private schools which met official standards. While most schools used the local languages of Sinhala and Tamil, institutions teaching exclusively in English attracted children of the social elite who were destined for administrative positions. The education of women lagged behind. In 1921, the female literacy rate among Christians was 50%, Buddhists 17%, Hindus 10%, and Muslims 6% (Country Studies,

2007). By 1948, when Sri Lanka gained independence from Britain, it had a literacy rate second only to Japan among Asian countries. Since then, successive governments have made education one of their highest priorities with excellent results. The University system of education introduced into Pakistan by the British also provided a means of obtaining higher administrative and professional qualifications. The post-Independence move to using local languages for education, and a general population increase owing to greater life expectancy resulted in a dramatic rise in the demand for higher education places.

In the past decade, private sector involvement in Sri Lanka's general education has supplemented the public, free education system to cater to the increasing demand. Sri Lanka's literacy rate is 92.5%, the highest in South Asia. The educational enrolment figures of children in Sri Lanka (World Bank, 2005) indicate a high degree of equity in the primary education cycle among families at various socio-economic levels. These rates have been calculated in socio-economic quintiles from 1995-96 data, those being the most recent household income and expenditure figures available. Evidence from other sources, e.g. schools' census figures, indicates that secondary enrolment rates among poorer households have risen considerably since the 1990s, and that the enrolment gap between low- and high-income households has narrowed.

The Need for Distance Education

Educational planners constantly face the increasing demand for higher education. Increases in the number of higher educational institutions and intake are not usually viable owing to lack of resources. A natural solution is to use various types of DE, as in correspondence courses whereby lessons are mailed to the student and assignments mailed back to the teacher. The particular needs for

education in agriculture, health and the environment have increased the needs for DE and collaboration between many agencies, public and private, in the effort to delivery education in all districts. Efforts to increase the acceptance and use of DE in South Asia so as to solve educational and literacy problems are being made by various universities and colleges, notably:

- Bhutan's Samtse College of Education (SCE);
- India's 15 open universities;
- Pakistan's Allama Iqbal Open University (AIOU) and the Virtual University of Pakistan (VUP); and
- Sri Lanka's Open University of Sri Lanka (OUSL), and the University of Colombo School of Computing (UCSC).

The current section of this chapter discusses the development of DE in these four countries.

- *Bhutan*

  Distance education is a recent arrival in Bhutan, being first introduced at the College of Education in Samtse on the southern border of the country with India. Samtse College of Education (SCE) was the first of two teacher education institutes to be established in Bhutan, both publicly funded. Established in 1968 as the Teacher Training Institute (TTI), it concentrated on the training of primary school teachers, and offered a two-year certificate programme for junior-high or high-school graduates. In 1983, a BEd programme for secondary school teachers was launched. Two more programmes were introduced subsequently, a Postgraduate Certificate in Education (PGCE) in 1990, and a BEd for primary school teaching in 1993. The Distance Teacher Education Programme (DTEP) was introduced in 1995 with the primary aim of upgrading and updating primary school teachers. The programme was designed to facilitate Bhutan's New Approach to Primary Education (NAPE), one of the country's major educational reforms since the mid-1980s. This approach

stressed child-centred teaching/ learning and the introduction of a curriculum geared towards Bhutan's needs and aspirations (Dorji, 2005). Teachers needed to be re-educated to meet these demands, and kept up-to-date with new developments. Distance education was seen as an effective choice, not impinging on the already short supply of teachers, and allowing teachers to apply their learning to their work with immediate effect.

The DTEP's mode of delivery is mainly print-based supplemented by compulsory residential schools. It is based on the existing BEd (Primary) programme. This has several advantages. Firstly, it makes optimal use of the resources already available. Secondly, it ensures quality equal to that of the pre-service programme. This is important given the widespread view of DE as a second choice rather than a preferred alternative. Thirdly, it is hoped that DE will help to improve the quality of the Institute's in-service programmes - the BEd (Primary) programme in particular - by establishing stronger links to the realities of classroom and school practice. The DTEP has been well received by the students, though the provision of efficient learning support has been difficult. Students have expressed their interest in the use of ICTs to help overcome the educational access problems faced by many of them (Jamtsho *et al.*, 2006).

Since, the DTEP's introduction at SCE, other colleges and institutions in Bhutan have introduced other types of DE in collaboration with international institutions. Notable examples include:
•   the M.Ed. and Diploma in Educational Management and Leadership at Paro College of Education (a collaboration with St. Francis Xavier University, Nova Scotia);
•   the Bachelor of Nursing at the Royal Institute of Health Sciences (in collaboration with La Trobe University);
•   the Post-Graduate Diploma in Teaching of Information System; and
•   the PG Diploma in English at Sherubtse College.

- *India*

In 1962, the University of Delhi established the Directorate of Correspondence Courses (later renamed as the School of Correspondence Courses & Continuing Education, and subsequently as the School of Open Learning) to offer the first correspondence courses at university level in India. The implementation of correspondence courses had an immediate and significant impact on the country's educational system. In 1966, the National Education Commission suggested that correspondence courses should be expanded to include courses in science and technology. To prepare students for university level, emphasis was placed on the professionalisation of teachers in remote areas, agricultural education, and on courses to improve the productivity of industrial and other workers. Between 1967 and 1971, as the correspondence courses were being established in the Indian universities, the government sent three delegations to the USSR, to study the Soviet system of evening and correspondence tuition. In 1972, a recommendation by the Standing Committee on Part-time Education & Correspondence Courses was accepted to establish a National Institute of Correspondence Courses (NICC).

In 1982, India's first Open University – the Andhra Pradesh Open University (APOU), renamed in 1991 as the Dr. B.R. Ambedkar Open University (BRAOU) -- was established by the State Government of Andhra Pradesh. An encouraging public reaction to the APOU encouraged the idea of developing other open learning systems, and in 1985 the Indira Gandhi National Open University (IGNOU) was established, as a means to democratise and increase access to higher education for large sections of the population. The IGNOU Act articulated the primary goals of the University to introduce and promote OU and DE systems. By 2007, 15 OUs and 129 dual-mode university DE institutes/ centres existed in the country, offering over 500 academic programmes with over 4,000 courses to more than 2.8 million students, taught

by 125,000 tutors and counselors through a network of 5,000 study centres in over 175 regional centres.

DE methods currently serve approximately a quarter of India's higher education student enrolment. By the end of the Tenth Plan period (2002-07), each of the nation's 29 states was expected to have an OU. This target was not achieved, however. According to the Tenth Plan document, open and distance learning accounts for only 13% of enrolment in higher education (Government of India, 2002). The plan was to improve this to about 40% during the Tenth Plan period, but this also could not be achieved. (An analysis by Mishra (2003) predicted that the enrollment level would be between 21.5 and 27.5%.) It is estimated that by the end of the Tenth Plan, 1:4 higher education students is studying via ODL. The Eleventh Plan (2007-2012) continues to strive to reach the projected 40% enrolment in ODL-based higher education. This time, however, there has been a systematic effort to reach this target, and IGNOU, as the apex body in Indian distance education, has launched a Convergence Scheme to encourage substantially increased enrolments by offering ODL programmes and dual degree programmes in partnerships with conventional education institutions.

- *Pakistan*

Pakistan's socio-economic situation has prevented a high enrolment in formal education by rural people, females and workers, and the idea of establishing DE and OU systems has developed to address this problem. As a result, the world's second OU was established in Pakistan by federal charter in 1974. Allama Iqbal Open University (AIOU) aims to help educate the masses who cannot leave their homes and jobs, to create training opportunities for teachers, and to expand the curriculum in relation to general knowledge and skill. AIOU has conducted pioneering work in the fields of mass education, female literacy, teacher education, and media-based DE, and is currently

harnessing ICTs in order to reach out to the 65% of Pakistan's students who live in remote and rural areas. Its educational facilities and student enrolments are both growing rapidly in programmes including science, technology and professional education. The University is in a strong financial position with endowment fund reserves of more than 1.2 billion rupees, and R 120 million in its development budget. Its endowment fund is allocated to infrastructure, laboratories, equipment, and R&D expenses. AIOU is modernising its ICT infrastructure and e-learning capacity with its own radio, TV/ satellite earth stations and Internet and videoconferencing services, delivering courses to rural and remote areas.

In 2000, the Government of Pakistan developed a new initiative to enhance the country's online education capacity, as a result of which the Virtual University of Pakistan (VUP) was established in 2002. The VUP is an information technology based university currently offering 17 degree programmes. It uses the national telecom infrastructure and delivers its lectures asynchronously through satellite broadcast TV channels with interaction provided over the Internet. VUP has developed video content for over 170 courses covering more than 7,650 lecture hours. By these and other measures, the government's National Education Policy (1998-2010) has pledged to double the literacy rate, universalise primary education, replicate nonformal schools to reach the previously unreached, increase the learning time by reducing school holidays, improve the assessment system through the creation of a national testing service, and initiate a decentralisation process through the formation of district education authorities.

- *Sri Lanka*

Distance education was initiated in Sri Lanka in the late 1970s. The Sri Lanka Institute of Distance Education (SLIDE) was established in 1976 with two sections, one for Mathematics,

Science and Technology and other for Humanities and Social Sciences. The first DE system was established at the MoE to provide training to graduate teachers already in the schools system. This training was provided by means of printed material and face-to-face sessions at regional centres (Karunanayaka & Wijeratne, 2005). In 1980, the External Degree Unit of the University system and the DE functions of SLIDE were amalgamated to establish the Open University of Sri Lanka (OUSL) as a recognised national DE university with the same legal and academic status as any other university. In Sri Lanka, DE initiatives have been primarily for teacher education, as provided by the National Institute of Education (NIE). DE has contributed to the school system of Sri Lanka by helping to clear a significant backlog of untrained graduate teachers who have been serving in the school system for many years without initial training.

OUSL's 25,000 students pursue further education by open and distance learning (ODL) techniques. Targeted students are adults and workers who missed earlier opportunities to gain an education, adults who do not have prospects of entering state universities, and the increasing workforce in the disadvantaged rural sector. Unlike the traditional state universities which provide free education, OUSL charges fees but its fee structure is 'pro-poor'. The University has 5 faculties: Natural Science; Education; Engineering Technology; Humanities; and Social Sciences. It offers 8 Bachelors' degrees, 4 postgraduate diplomas, 4 Masters Degrees, and other diplomas, certificate and advanced certificates, PhDs, MPhils, foundation courses and continuing education programmes (OUSL, 2005). Its programmes are diverse, catering to the academic, vocational, and professional needs of the students, employers, and society. In order to increase educational access for remote communities, 26 centres have been established across the island, with the main campus in Colombo, and with Kandy, Jaffna and Matara as the three main regional centres (OUSL, 2005).

OUSL's teaching and learning methods include:

- self-study learning materials (print, audio, video, CD-ROM, websites);
- tuition and face-to-face support (tutorials, workshops, seminars, lab classes);
- e-mail communication between students and tutors;
- counseling; and
- assessment.

The combination of these methods is unique to each course, and is customised to the different teaching/ learning modes. In order to deal with the problems of replacing direct teacher-student interaction with multimedia materials, steps are taken to ensure the quality of materials by needs assessment surveys, developmental testing, and pre/post-testing. The Policy framework proposed by the National Education Commission (Government of Sri Lanka, 2003), however, does not refer to DE programmes specifically, possibly due to the success of the traditional general education programme. It refers instead to policies for enhancing ICT-based education. Thus, a direct move is seen towards the development of ICT-based education and systems to enhance DE in general.

ICTs in Distance Education

DE delivery is changing rapidly with the advent of new technologies. The study reported in this chapter is the first stage of a major comparison of current DE developments in South Asia, designed to generate recommendations for a common infrastructure and approach to increasing the acceptance, affordability and accessibility of ICT-based DE methods. In this study, ICT is defined in a broad sense including the media of radio, TV, telephony, computers, the Internet, and methods including web-based education, and interactive collaborative teaching/ learning. While each technology can serve in its own right, ICT combinations give us a variety of

models for ICT-based DE which can be combined with traditional methods such as correspondence courses and face-to-face teaching.

1. <u>Models of ICT-based DE</u>

Media and technology are integral aspects of DE in South Asia, improving access and facilitating teacher-student interaction, student-student interaction, and distance-based collaboration. A study conducted in Sri Lanka (Attygalle *et al.*, 2006) indicated that students have a positive attitude towards ICT and its educational usage. They have doubts, however, about basing educational solely on ICT-based resources as opposed to traditional media including books and lecture notes. The majority of the students are restricted to using institutional Internet facilities for reasons of cost, accessibility, and access speed. Using mixed technologies to deliver course content can create a productive learning environment which increases the accessibility cost-effectively. <u>Table 3</u> compares the ICT usage in the OUs of Bhutan, India, Pakistan, and Sri Lanka.

<u>Table 3</u>. ICT usage in the DE universities of the four countries.

Indicators	Bhutan	India		Pakistan		Sri Lanka	
	SCE	IGNOU	Total OUs	AIOU	VUP	OUSL	UCSC (BIT)
Programmes	2	101	441	93	17	40	3
Courses	40	900	3,863	1,416	267	6,000	26
Students ('000)	0.2	366.1	923.7	576	6	25	15
RCs and SRCs	9	54	111	120	7	na	10
SCs	(na)	1,257	4,388	682	117	26	0
ACs	45	33,366	64,838	>40,000	(na)	216	30
Audio	(na)	1,293	2,304	2,699	--	(na)	(na)

Video	(na)	1,792	2,288	657	1,921	(na)	(na)
Sources	*SCE (2007)*	*Panda (2005)*		*AIOU (2004)*	*VUP (2006)*	*OUSL (2005)*	*UCSC (2007)*

(IGNOU's SC figure includes 22 telelearning centres and 35 overseas centres.)

Key: Institutions and job capacities

AIOU   Allama Iqbal Open University, Islamabad
IGNOU   Indira Gandhi National Open University
OUSL   Open University of Sri Lanka, Colombo
UCSC   University of Colombo School of Computing
SCE   Samtse College of Education, Bhutan
VUP   Virtual University of Pakistan, Lahore
AC   Academic Counselor or Tutor
RC   Regional Centre
SC   Study Centre
SRC   Sub-Regional Centre
na   (figures not available)

- *Bhutan*

Television and Internet services were introduced into Bhutan simultaneously in June, 1999. Bhutan Telecom, the sole telecommunication service provider in the country, is owned by the government. The Bhutan ICT Policy & Strategies launched in 2004, outlines activities under five strategic headings of policy, infrastructure, contents and application, human capacity, and enterprise. Telecommunication in Bhutan has seen rapid growth since the launch of cellular mobile services in 2003. The number of subscribers has risen from 7,736 to 37,872 in 2005, surpassing the 32,709 landline telephone subscribers (Government of Bhutan, 2006c). Today, telephone coverage spans all 20 districts, and several remote locations without roads now have lines. The Rural Telecom Project aims to add at least 10 telephone connections in each of the 201 *gewogs* (blocks) by 2007. Simultaneously, TV has gained greatly in popularity and can be received in most parts of

the country. Radio is perhaps the only medium that is capable of reaching every corner of the kingdom at this stage. Its full potential has not yet been explored or exploited in DE, however, partly because it affords one-way communication only.

- *India*

The media network system for both DE and campus-based learning in India is coordinated by IGNOU. A federal government satellite transponder with uplink facility provides 6 TV channels to schools, higher education, DE, and language and agriculture specialists. Apart from its use by the government and the Indian Space Research Organisation (ISRO), this facility is available to IGNOU exclusively, since no private TV channel has yet been mandated to uplink from India. The media capacity of IGNOU available to the DE systems of India is summarised in Table 4 (IGNOU, 2005; Panda, 2005).

Table 4. IGNOU's national media capacity.

Media and technologies	Numbers
Satellite transponders	1 (extended C-Band)
Satellites (EduSat)	1 (two-way videoconferencing) and 131 (satellite interactive terminals)
Tele-conferencing centres	790 (due to increase to 2000)
National TV channels	6 (including the teleconferencing channel)
All India Radio (AIR)	186 (interactive counseling)
Tele-learning centres	22
FM radio stations	14 (due to increase to 40)

Audio and video cassettes based programmes have been produced at IGNOU since 1987, as supplementary to self-learning print materials. IGNOU's former communication division was

upgraded as an Electronic Media Production Centre (EMPC) in 1996, assisted by a grant from the Japanese International Cooperation Agency (JICA). The number of audio programmes produced by EMPC has increased from 67 in 1987-88 to over 6,000 in 2005, and video programmes during that period have increased from 85 to 1,792. In recent years, however, the annual production figures have dropped as the focus has shifted to broadcasting on the new *Gyan Darshan* (Knowledge Television) channels. FM radio has been used in India by DE institutions, open schools, higher education institutions, and government ministries and agencies; and interactive radio counseling programmes produced at IGNOU's New Delhi headquarters and at FM radio stations in the regions has proved low-cost, effective, and the most popular teaching/ learning medium in the country.

TV broadcasting began in India in 1991 on the national *Doordarshan* (Government Television) network, with 90-minute broadcasts three days per week (Monday, Wednesday, and Friday), subsequently increased to five. The All India Radio (AIR) stations in Mumbai and Hyderabad began broadcasting in 1992. A TV programme, *Open Channel*, was initiated to answer the queries of students and other audience members, and to bring OU programming to the general public. The development of the Training & Development Communication Channel (TDCC) for interactive TV (one-way video and two-way audio) was a landmark in the international history of the DE media. IGNOU makes these facilities available through its EMPC to schools and divisions of the University, and to other OUs, DE institutions, higher education institutions, NGOs, and government departments for the purposes of production, post-production, teleconferencing, training, consultancy, academic programme delivery, and research. In 1993, IGNOU made its first entry into teleconferencing with a 10-day trial focusing on the potential of non-print media components in programme design and delivery, and on interactivity issues. This experiment used a two-way audio-conferencing system created with support from the

Commonwealth of Learning, Canada. The audio system was not regularly used, however, owing to the inferior telephone networks of that time, and the subsequent advent of more advanced technologies such as the heavily used Training and Development Communication Channel (TDCC), and EduSat.

In 1998, IGNOU developed an Interactive Radio Counseling (IRC) programme at the AIR station in Bhopal, designed to bridge the gap between institutions and learners by providing instant responses to their enquiries and interactive academic counseling. These presentations are made from IGNOU's audio studio and partner radio stations. Students from all parts of the country listen to the presentations in their homes and workplaces, and can interact with the teachers on toll-free telephone numbers. In 1999, the IRC programme was extended to 8 other AIRs in Lucknow, Patna, Jaipur, Shimla, Rohtak, Jalandhar, Delhi and Jammu. Currently, 184 radio stations across India broadcast the programmes for one hour every Sunday. The EMPC coordinates the activities, the AIR stations organise the time slots, and IGNOU's Regional Services Division handles the interactive counseling. Although the IRC programme was originally designed to focus on interactive academic counseling, the highest number of students' questions has been found to be on course management and logistical issues.

Gyan Darshan represents India's hopes to develop a set of national channels fully devoted to educational and developmental programmes. It was launched in 2000 by the national government, Prasar Bharti, in conjunction with IGNOU, with the latter as the channel's nodal agency for transmission. *Gyan Darshan*'s educational programmes are designed by the national Department of Adult Education and other governmental and non-educational organisations. They are uplinked from IGNOU's earth station and downlinked across the country through INSAT-2B. By 2001, the channel had increased its programming from 2 to 24 hours daily, with toll-free telephone facilities extended to 40

cities. Today, *Doordarshan* and *Gyan Darshan* are offered as a part of the same direct-to-home (DTH) transmission operations system. The fully dedicated VSAT-based EduSat, launched in 2004 with two-way digital video and broadband Internet, promises convergence of technologies for administrative services including data and learning management, online learner support and interactivity, online teaching and learning, online resource repositories, and multiple-media education.

The use of EduSat has not improved the educational delivery system, however, for most of the programmes are of the talking-head variety, lacking desirable higher levels of interactivity. The data-transfer facility has not yet been activated, and no integrated system is in place to support student learning. As in Sri Lanka, it has been found that India's DE students do not like their courses to be exclusively media-based but also appreciate content delivered via print-based media and interactive CDs, provided by offline study centres (Dikshit *et al.*, 2003). DE in India is thus evolving towards a flexible mixed-media DE approach. The nation's Tenth Plan points to further developments at IGNOU, the establishment of an Inter-University Consortium for Technology-Enabled Flexible Education and Development (IIC-TEFED), and a national DE network (N-NODE) to assist the nation's institutions in implementing the new DE methodology. This plan will require an extensive capacity-building investment.

- *Pakistan*

Iqbal (2004) has calculated that 10,184 hours of programming are broadcast in Pakistan annually on 3.6 million TV sets. The figures for radio programming are estimated to be four times those of TV. TV and radio have been a means of adult literacy education in Pakistan since the 1960s. The Institute of Educational Technology (IET), a centre for media production, was established as an integral part of AIOU from its inception. The radio and TV programmes produced at the IET to promote and support the

University's DE courses were broadcast on national radio and TV channels. The Government established an ETV operation in 1992, which was later transferred for operation and maintenance to Pakistan Television Corporation (PTC). AIOU contributes many educational programmes to this satellite channel, and has recently enhanced its media production capacity (print, radio, TV and digital multimedia). Most of AIOU's programming is delivered to students in non-broadcast mode, though a TV channel and a satellite communication channel will be established at the University in the near future. AIOU is also establishing its own FM radio network, and currently offers 440 courses featuring substantial media support via 637 TV programmes, 2,699 radio programmes, 518 non-broadcast audio, 107 non-broadcast video, and 20 digital multimedia courses.

Many formal and public education programmes are broadcast on Pakistan's national media channels. The VUP currently operates four satellite channels exclusively for educational broadcasting, and is providing approximately 1,921 hours of video support for 55 Bachelor-level courses. Online educational facilities are developing rapidly. The Pakistan Educational & Research Network (PERN) has established Internet links for all public-sector universities, including campus-based connections on fibre-optic and wireless networks. Online video-conferencing facilities have been created at over 40 universities. The HEC has created a digital library providing access to over 20,000 journals and thesis databases, and 6,000 text journals, free of charge to educational institutions. AIOU has developed an online education capacity through the work of its Open Learning Institute of Virtual Education (OLIVE), providing synchronous and asynchronous support for students using the OLIVE learning management system. ICT usage is also increasing at school level. The Ministry of Information Technology provides an increasing annual number of computers to over 20 schools and colleges in each province, and ICT training for teachers. At present, this access is

limited to selected classes owing to the high ratio of students to computers. Internet access in the schools is also limited.

- *Sri Lanka*

With a population of only 20 million, Sri Lanka has a relatively low demand for DE over the years, and radio and TV have not previously been such a prominent educational role as in India and Pakistan. The Open University of Sri Lanka, however, produces audio and video materials for its students, and selected courses are broadcast on national TV network while others are distributed in cassettes to the regional centres (OUSL, 2005). The Bachelor of Information Technology (BIT) external degree programme of UCSC uses the national TV extensively. Summary lessons are produced at the UCSC multimedia centre. These broadcasts enhance the computer literacy of the public at large. In addition, Sri Lanka's Distance Learning Centre (DLC), opened in 2003, links Sri Lanka and 50 other international DLCs via the worldwide video-conferencing system of the Global Development Learning Network (GDLN). This project was financed by the World Bank (US $2 million) and the Sri Lanka Government (US $1 million). It envisages Sri Lanka as using cutting-edge DE technology and methods for training, information exchange, knowledge sharing, and dialogue on development topics including conflict resolution, reconstruction, sustainable development, and poverty reduction.

2. Computers and e-learning

- *Bhutan*

Computers were first used in Bhutan in the 1980s. By 2003, the nation had 1,130 Internet connections (Pradhan, 2003a) rising to 3,036 by 2005 (Government of Bhutan, 2006c). Today, most organisations, institutions and government departments have

official websites, and computers can be seen in most Bhutan schools except for primary schools in remote locations without electricity. All higher and middle secondary schools have a computer laboratory containing at least 15 to 20 computers (Government of Bhutan, 2006a). Secondary schools have computer literacy classes, and many of them also have Internet connectivity. It is envisaged that by 2008, all students who have completed the basic level of education (to grade 10) would have acquired basic IT and computer skills. The government has outlined strategies to harness ICTs enhancing quality and accessibility of education by 2010 through activities such as e-learning and digital libraries (Pradhan, 2003b). To a great extent, these developments have been made possible by a steady decrease in the costs of all of Bhutan's telecommunication facilities. Recently, Bhutan Telecom has announced free Internet dial-up access subscriptions. Rates for leased lines have been cut to almost half (e.g., 128 kbps has now been reduced Nu. 26,600 to Nu. 14,850 a month, where one ngultrum = approx. US $0.02). This will hopefully allow most of the Bhutan population to take advantage of online resources and communication facilities. In addition to Druknet, the one ISP that is a part of Bhutan Telecom (BT), today VSAT leased lines are available at competitive rates from private companies. BT has also begun establishing a number of community information centres to provide ICT access in rural communities. It is estimated that there are currently fewer than 400 IT professionals in Bhutan. Relatively few tertiary institutes provide ICT training, mainly at undergraduate and diploma levels. The RUB's Strategic Plan for 2005-2012, however, recognises the importance of ICT in higher education and plans to create a wide-area network that will connect all of the University's colleges and institutes and provide web-based learning (RUB, 2006b).

To this point, web-based teaching/ learning methods are relatively unfamiliar in Bhutan. They have been pioneered by the DTEP at SCE, via an IDRC-sponsored research project which has

implemented the use of *Moodle*, an open-source learning management system (LMS) since 2004. The language of computer technology to date has been mainly restricted to English, with little opportunity for using Bhutan's national language, Dzongkha. In 2006, however, the national Department of Information & Technology, also with the support of the International Development Research Centre (IDRC)'s Pan-Localisation Project, launched Dzongkha Unicode. Online learning and web-based support can now be provided for DE by means of Dzongkha-based courses, and sharing of information is now possible in the national language for many who have been left out so far. As Jamtsho & Bullen (2007) point out, however, the development of online learning in Bhutan still involves serious accessibility problems.

- *India*

Today learning is seen as a continuous activity rather than as the almost "one time" activity it used to be. Technologies and business practices are changing rapidly, and skills can become are outdated within a few months. E-learning allows the delivery of updated information to learners at an accelerated pace, opening up new vistas of knowledge transfer. With 1,000 million people and 180 million households, India is one of the largest growing economies in the world. With the advent of the ICT revolution, India and its villages are slowly but steadily becoming connected to the cities of the nation and the world. With approximately 350 million people in the learning age group of 18-32 years, India has a particular challenge in developing and maintaining its educational infrastructure - the schools, colleges, labs and even the roads leading to them. In 2001, the government launched the *Sarva Shiksha Abhiyan* programme (SSA) for Universalisation of Elementary Education (Singh & Abhijan, 2004). The programme's goals include:

- all children completing five years of primary schooling by 2007;
- all children completing eight years of elementary schooling by 2010; and
- universal retention by 2010.

The 'universalisation' task is enormous, and DE methods have been adopted to achieve these goals within the stipulated time frame, and to provide ICT training for all those involved in the effort. Initially implemented in 18 states, the SSA programme now covers all 29 states and 6 union territories, with the DE programme as an integral component (Chand & Amin-Choudhury, 2005). The professional development of teachers and facilitators involves an online learning community, a community of practice, and the student's own social community and culture (Rehani & Chaatra, 2002). Simultaneously, a National Mission for Education through ICT has been proposed by the Ministry of Human Resources. By this plan all institutions of higher learning will be networked through broadband connectivity (Tellis *et al*., 2001). Online content will be developed and made available through *EduSat*, the Internet and cable TV networks. Indian technology institutions, in conjunction the Indian Institution of Science in Bangalore, have jointly developed over 225 video and web-based courses under the National Programme on Technology Enhanced Learning (NPTEL). These are available for use by engineering colleges.

E-learning has been most successful in India in the corporate segment, where it is seen as a means of achieving business goals and motivating employees. Today, easy, reliable and fast Internet access via local 'phone calls, and thousands of cyber cafes across the nation have made online learning a reality, even in small towns such as Nathdwara in Rajasthan, Nadiad in Gujarat, and Nanded in Maharashtra. With increasing competition among Internet Service Providers (ISP), Internet access has become cheaper and more efficient. By the end of 2006, India had over 2.1

million broadband subscribers, and this number is expected to increase to 30.1 million subscribers by 2013 (Kaushal, 2007). This increase in broadband penetration will provide further access to online learning in India. Despite its existing limitations in computer and Internet penetration, India has made tremendous progress in educational computer usage.

The major impetus for e-learning came from the National Task Force on Information Technology & Software Development instituted by the Prime Minister in 1998 (Government of India, 1999). The Task Force report presented India's long-term master plan for ICT usage in education, institutional capacity building, and human resources development in IT-related areas. Its major recommendations included:

- (*43, ix*): Government in association with IT HRD companies will aim to achieve 100% IT literacy at senior secondary level (10 + 2) in 5 years and at secondary level in 10 years.

- (*43, x*): All institutes offering engineering education, including Polytechnics and ITIs, will ensure that within 3 years all engineering students in the country will acquire IT knowledge to be able to serve in IT enabled Services sector besides serving in IT industry directly.

- (*45, iv*): Institutes of national importance such as IITs and IIITs will be encouraged to establish Virtual Institutes, particularly in the area of advanced Post Graduate and Continuing Education programs in IT, to support IT education and Research at other institutions in the country.

IGNOU responded to the Task Force's recommendations in 1999 with its Virtual Campus Initiatives (VCI). Since then over ten such initiatives have been established in the country (Mishra & Sharma, 2005). The success or failure of these initiatives, however, has not been made public by these institutions; and the merits of

involved the online programmes are questionable, as no specific standards appear to have been followed in their development, and the capacity building of teachers to design courses and support learners in online learning environments has been extremely poor. A study by Panda & Mishra (2007) pointed to a lack of e-learning policy, poor faculty development efforts, and poor computer and e-mail access for teachers.

- *Pakistan*

Internet access was first introduced into Pakistan in the late '90s. A model for virtual education and e-learning was developed at AIOU in 1999, when the Open Learning Institute of Virtual Education (OLIVE) was opened and a number of courses were conducted via synchronous online meetings and asynchronous e-mail and message transfer methods. The first major e-learning project was the launch of an electronic courseware production centre in the Computing Science Department in 2001. Multimedia content and an LMS were developed, course delivery was extended, particularly among the female population, and costs were reduced (Sangi & Ahmed, 2007). Since then, AIOU has initiated major ICT modernisations, video-conference units have been purchased with the help of JICA, and an IT Services fibre network has been created with HEC support. In addition, FM radio, TV channels and satellite delivery systems have been developed for use in remote and rural areas, and content for all of these media is being produced (Homeed & Mahmood, 2006). The Virtual University of Pakistan (VUP) is also producing and delivering dual-mode TV and online educational facilities nationwide. VUP's web portal has automated all academic and many service facilities including student evaluation.

The Pakistan government has also supported the initiative of French online programming developed by the Alliance Française with AIOU support. This programme is basically developed for French Embassy in Pakistan and the Commission on Science and

Technology for Sustainable Development in the South (COMSATS). The HEC has also developed lecturing and meeting facilities using an online video-conferencing system for all the public-sector universities of Pakistan. The HEC has also established the Pakistan Educational Researchers Network (PERN) to promote synchronous online learning and to establish linkages with foreign universities. A Digital library with access to journals and databases will enhance the quality of e-learning in the country. This effort will be maintained by collaborations between government and private-sector organisations including the United Nations Industrial Development Organization (UNIDO), the College of Information and Management Sciences (CIMS), Cybersoft, ASIA IT&C, Comsats Institute of Information Technology (CIIT), Erhvsuddannelse, Burnley Telematics, and the Teleworking Centre Ltd.

- *Sri Lanka*

Since the mid-80s, Sri Lanka has initiated several pioneering ICT-based DE programmes, primarily for rural communities. In 1987, for example, the Computer and Information Technology Council of Sri Lanka (CINTEC), introduced a bus that traveled to all parts of the country to teach computer literacy, enabling many who had never seen a computer before to use computer-assisted learning methods. In 1996, the Institute of Computer Technology of the University of Colombo - later renamed the University of Colombo School of Computing (UCSC) - proposed the first national telecentre. *Sarvodaya Shramadana Sangamaya,* the largest NGO in the country serving 15,000 villages, was identified as the University's partner in this project, and the country's first multi-purpose community telecentre was established at Kahawatte, 100 km from Colombo (Samaranayake, 2005).

The Internet has brought powerful new DE techniques to Sri Lanka. The Lanka Educational and Academic Research Network (LEARN), established in the mid-90s with the support of the

national IT community and CINTEC, now provides inter-university links and Internet access with its own second-level domain name (ac.lk). A UNESCO-sponsored community radio project established in 1998 at the remote radio station in Kothmale, 150 km from Colombo, illustrated that the Internet can be used to access current news more immediately than is possible via the late-arriving daily newspapers. A by-product of this project has been the establishment of three telecentres so that the Internet can be used for education. This pioneering project has received world-wide acclaim, and is regarded by UNESCO as a model to be replicated. Its success has resulted in CINTEC's launch of a weekly one-hour radio programme, *Internet Resource Use*, with live telephone questions from listeners about Internet skills. This programme is now administered by the University of Colombo School of Computing (UCSC) and is currently in its eighth successful year.

The ICT Agency's national development program, e-Sri Lanka, was launched in 2003 with World Bank funding. ICTA has begun establishing 1,000 telecentres in all parts of the country, with 100 already in place. Known as *Nanasalas* (rural knowledge centres), these centres provide access to learning resources and facilities for information sharing relating to e-government, e-commerce and other citizen services. More recently, ICTA has initiated a weekly TV programme *Nenapiyasa* to provide lessons on computer usage and applications, with very high audience figures. ICTA also hopes to establish a regional telecommunications network by persuading providers to provide remote areas of the country with subsidised services. DE Centres are planned in five major cities. In addition, the Distance Education Programme for the Public sector (DEPP) has been initiated by the Sri Lanka Institute of Development Administration (SLIDA) to train the country's large number of public servants. Supported by donor funding, this programme has had a significant impact on the quality of the public service.

The university level of education in Sri Lanka uses these media in its daily teaching and research. OUSL, for example, uses a mixed delivery mode featuring face-to-face seminars, workshops, lab classes, day schools, and multimedia self-study materials (print, CD-ROMs, web sites, and e-mail communication). OUSL recognises prior learning experiences and qualifications, and provides greater control for the students of time, place and pace through the use of a learning management system. The University of Colombo has pioneered e-learning in Sri Lanka since the late '90s. When its School of Computing (UCSC) was established in 2002, two centres were established to promote e-learning services: the e-Learning Center (eLC) funded by the Swedish International Development Agency (SIDA) and the Advanced Digital Media Technology Centre (ADMTC) funded by JICA. SIDA has funded a pilot project through the eLC to extend e-learning facilities to the BIT external degree programme. In the second phase of this project, UCSC has established a National e-Learning Center (NeLC) to promote e-learning in secondary, higher, and community education. Under the JICA project, UCSC staff members are provided with training in web-based course development and instructional design. The ADMTC also trains staff at other universities and institutes and has created a national pool of e-learning specialists.

The National Institute of Education (NIE), the University of Moratuwa, and the Sri Lankan Institute of Information Technology (SLIIT) are other higher educational institutes which are now using e-learning in a mixed media learning environment. Each of these institutions has created a framework for e-learning in the form of a web portal for students and public visitors. Registered students of study programmes are able to obtain their course details and public notices of the institutes from these web portals. Many academic and professional organisations are using commercial LMS methods to create virtual learning environments. *WebCT* and *Blackboard* have been used by some private institutes, but these commercial products have not proved

sustainable for many public organisations owing to their high costs and the limited availability of funds. UCSC developed its own LMS, *theducation*, for its BIT programme. Open-source software (OSS) for LMS development has become the most popular solution among many educational institutes in Sri Lanka. OUSL, for example, has used the *Manhattan* LMS in some courses, and has now joined UCSC, University of Moratuwa, and SLIIT in independently choosing *Moodle* as their OSS product for providing DE as well as campus-based education. UCSC's LMS research group is working on a *Moodle* interface in two local languages, Sinhala and Tamil. The University has created e-learning courses for its undergraduate and postgraduate programmes in ICT and is planning MSc, MPhil, and PhD programmes in e-learning in conjunction with universities in Sweden and Japan.

In order to popularise e-learning in higher education and secondary education, several projects are being conducted by government and non-governmental organisations in Sri Lanka, with funding by various international donors. The Distance Education Modernisation Project (DEMP) funded by the Asian Development Bank (ADB) intends to improve the OUSL infrastructure and to enhance DE capabilities of public and private higher educational institutes. Many schools lack the basic facilities to take advantage of ICT-assisted education, and the Secondary Education Modernisation Project (SEMP) of the MoE aims to enhance this infrastructure. The project will provide computers to selected schools, and Internet connectivity for 1,000 schools through SchoolNet. Such projects have begun to develop an infrastructure for much-needed ICT-based DE in Sri Lanka, with the goal of developing appropriate content in the local languages, at affordable cost, using bandwidths capable of interruption-free delivery. This work is aided by the Unicode standard and operating systems for Sinhala and Tamil (Samaranayake & Nandasara, 1997), and by the increasing availability of local-language software. A greater return on

investment, however, would be provided by a more integrated approach. In countries such as Sri Lanka, where education is considered an important priority and asset, there is no doubt that ICT-based DE must be encouraged within a national framework.

Conclusions

Given the scarcity of resources for formal education, DE is an obvious means to increase educational access in South Asia. Uses of ICT in DE have created a vast range of new possibilities for teachers and learners, with the result that a paradigm shift can be perceived in the region, from teacher- to learner-based methods whereby the student has greater control over the learning process. Faced by serious disparities of educational opportunity and access in Asia's urban and rural sectors, ICT-based DE, combined with traditional educational methods, is beginning to provide significant enhancements. This paradigm shift can also benefit the traditional educational system, the standards of which are being eroded by increasing student numbers and by the lack of adequately trained teaching staff. Such deficiencies may to some extent be eliminated by the use of ICT-based individual and group learning approaches that facilitate open learning at a distance as well as in the face-to-face campus context. Uses of ICT have not only improved the delivery of information in DE, but have also created new ways of producing effective learning in the region's urban and rural populations generally.