

Foreword by Sir John Daniel

DISTANCE EDUCATION TECHNOLOGIES in ASIA



EDITED BY
JON BAGGALEY
TIAN BELAWATI



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Edited by

Jon Baggaley

and

Tian Belawati

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Sir John Daniel



International Development Research Centre

Ottawa • Cairo • Dakar • Montevideo • Nairobi • New Delhi • Singapore



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This book is dedicated to the memory
of Professor V.K. Samaranayake

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List of Abbreviations

A&E	Accreditation & Equivalency
AAOU	Asian Association of Open Universities
ADB	Asian Development Bank
ADMTC	Advanced Digital Media Technology Centre
ADSL	Asymmetric Digital Subscriber Line
AICC	Aviation Industry Computer-based Training Committee
AIOU	Allama Iqbal Open University, Pakistan
AIR	All India Radio
ALS	Alternative Learning Services
APOU	Andhra Pradesh Open University
ASEAN	Association of Southeast Asian Nations
ASTD	American Society for Training and Development
ASTI-DOST	Advanced Science and Technology Institute of the Department of Science and Technology
ATM	Asynchronous Transfer Mode
BALS	Bureau of Alternative Learning System
BBSs	Bulletin Board Systems
BEdP	Bachelor of Education Degree for Primary teaching
BIPS	Bhutan Information and Communications Technology Policy and Strategies
BNU	Beijing Normal University
BRAOU	B.R. Ambedkar Open University
BIT	Bachelor of Information Technology
BT	Bhutan Telecom
CAL	Client Access License
CCRTVU	China Central Radio and TV University
CEM	Center for Educational Measurement
CERNET	China Education and Research Network
ChinaGBN	China Golden Bridge Network
ChinaNET	China Public Computer Internet

CIIT	Comsats Institute of Information Technology
CIMS	College of Information and Management Sciences, Pakistan
CINTEC	Computer and Information Technology Council of Sri Lanka
CLV	Cambodia, Lao PDR and Viet Nam
CMC	Computer-mediated Conferencing
COL	Commonwealth of Learning
COMSATS	Commission on Science and Technology for Sustainable Development in the South
CSTNET	China Science and Technology Network
DE	Distance Education
DEMP	Distance Education Modernisation Project
DEPP	Distance Education Programme for the Public Sector
DLC	Distance Learning Centre
DLT	Distance Learning Technology
DTEP	Distance Teacher Education Programme
DTH	Direct-to-home
eLC	e-Learning Centre
EMPC	Electronic Media Production Centre
EPC	e-Assessment Procedures Checklist
ERP	Enterprise Resource Planning
ESPF	English for Special Purposes Foundation
FAPE	Fund for Assistance to Private Education
FGDs	Focus Group Discussions
GDLN	Global Development Learning Network
GDP	Gross Domestic Product
GPA	Grade Point Average
GSM	Global System for Mobile Communication
HDI	Human Development Index
HEC	Higher Education Commission
HEIs	Higher Education Institutions
HDR	Human Development Commission
HSUM	Health Sciences University of Mongolia
ICT	Information and Communication Technologies
ICT-SLS	ICT-supported Learning Support System
ID	Instructional Design

IDRC	International Development Research Centre
IEEE-IMS	Institute of Electrical and Electronics Engineers-Instrumentation and Measurement Society
IET	Institute of Educational Technology, Pakistan
IGNOU	Indira Gandhi National Open University
IIC	International Institute of Cambodia
IUC-TEFED	Inter-University Consortium for Technology- enabled Flexible Education and Development
IICUT	International Institute of Cambodia University of Technology
IDRC	International Development Research Centre
IRC	Interactive Radio Counseling
ISP	Internet Service Providers
ISRO	Indian Space Research Organisation
JICA	Japan International Cooperation Agency
LAN	Local Area Network
Lao PDR	Lao People's Democratic Republic
LEARN	Lanka Educational and Academic Research Network
LIS	Library and Information System
LMS	Learning Management Systems
LO	Learning Object
LAN	Local Area Network
LOM	Learning Object Materials
MB	Megabyte
MDFI	Molave Development Foundation Inc.
MIND	Mobile Technology Initiatives for Non-formal Distance Education
MoE	Ministry of Education
MoECS	Ministry of Education, Culture and Sciences, Mongolia
MMS	Multimedia Messaging Service
NAPE	New Approach to Primary Education, Bhutan
NeLC	National e-Learning Centre
NFE	Non-formal Education
NICC	National Institute of Correspondence Courses, India
NIE	National Institute of Education, Sri Lanka

NIME-Glad	National Institute for Multimedia Education-Gateways to Learning for Ability Development
NPTEL	National Programme on Technology Enhanced Learning
NSC	National Science Council
NUoL	National University of Laos
ODBC	Open Database Connectivity
ODL	Open and Distance Learning
OER	Open Educational Resource
OLIVE	Open Learning Institute of Virtual Education, Pakistan
OSS	Open-source Software
OU	Open University
OUSL	Open University of Sri Lanka
PANdora	Pan-Asia Network Distance Open Research Access
PDA _s	Personal Digital Assistants
PERN	Pakistan Educational and Research Network
PGCE	Postgraduate Certificate in Education
Piltel	Pilipino Telephone Corporation
PTC	Pakistan Television Corporation
PTC	Primary Teaching Certificate
QA	Quality Assurance
RAM	Random-access Memory
RSC _s	Regional Study Centres
RUB	Royal University of Bhutan
SALG	Student Assessment of Learning Gains
SARS	Severe Acute Respiratory Syndrome
SCE	Samtse College of Education, Bhutan
SCNU	South China Normal University
SCORM	Shareable Content Object Reference Model
SDU	Software Development Unit
SEMP	Secondary Education Modernisation Project
SIDA	Swedish International Development Cooperation Agency
SIM _s	Subscriber Identity Modules
SLIDA	Sri Lanka Institute of Development Administration

SLIDE	Sri Lanka Institute of Distance Education
SLIIT	Sri Lankan Institute of Information Technology
SMS	Short Messaging Service
SPSS	Statistical Package for the Social Sciences
SSA	Sarva Shiksha Abhiyan programme
STEA	Science, Technology and Environment Agency, Lao PDR
STOU	Sukhothai Thammathirat Open University, Thailand
TAF	The Asia Foundation
TDCC	Training and Development Communication Channel
Tg	Togrog
TTI	Teacher Training Institute
UCSC	University of Colombo School of Computing
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
UPOU	University of the Philippines Open University
USAID	United States Agency for International Development
UT	Universitas Terbuka, Indonesia
VCi	Virtual Campus Initiatives
VOD	Video on Demand
VoIP	Voice-over Internet Protocol
VTIs	Vocational Training Institutes
VUP	Virtual University of Pakistan
WAN	Wide-area Network
WBT	Web-based Training

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Foreword

For observers elsewhere in the world, the most striking feature of distance education (DE) in Asia is the mega-universities and mega-schools that have added many millions to the global tally of distance learners in recent decades. These are institutions such as China's radio and television universities (now called the Open University of China) and India's National Institute for Open Schooling.

This book reveals a more complex, differentiated and interesting reality. Canada's International Development Research Centre (IDRC) deserves our congratulations for having taken a pan-Asia perspective in PANDora in this study of *distance and open resource access*. The contributors of the various sections have worked in teams, which gives coherence and integrity to the book, which are usually missing in volumes where different contributors concentrate on individual countries. Furthermore, the editors and contributors have looked beyond the obvious places. For example, the development of distance education in Bhutan—where television is barely a decade old—is probably little known even to specialists. In most cases, rigorous research methods have been used in the studies, which have left an important legacy of expertise across the region.

I particularly appreciate the way that the book is true to its title: *Distance Education Technologies in Asia*. Instead of focusing on a limited number of institutions and surveying a sample of their students, the contributors have cast their net wider. What emerges is a broad and candid picture of the evolving role that technology is playing in education in Asia. We find that governments are engaging with distance education technologies in a determined fashion. The accounts of developments in China are particularly illuminating in this regard, focusing as they do on both the provision of network technologies and arrangements for quality assurance.

The contributions highlight both similarities and differences with developments elsewhere in the world. It is fascinating to discover, for example, that the effervescent multiplication and subsequent winnowing down of online schools in China around the turn of the century closely followed the dotcom boom and bust in the West. On the other hand, the major lesson of the book is that countries which simply tried to copy the use of distance education technologies in North America and Europe have encountered both technical and cultural difficulties.

In the technical arena the key lesson is that an attempt to be “modern” by focusing too sharply on Internet-based education will fail for some time yet because of its general lack of accessibility and affordability. In many countries browser loading times are so slow—if the web pages load at all—that web-based study is a passport to frustration. DE through mixed media technologies has a greater chance of success, particularly the use of DVDs on stand-alone computers. Connectivity to the Internet is, of course, expanding and improving everywhere, but distance education gets a bad name if its practitioners jump the gun by assuming an infrastructure that does not yet exist.

On the cultural front, it is risky to assert that Asian students are different from others either in preferring face-to-face instruction or in finding books more reliable than electronic media. Face-to-face teaching is still the main means of instruction in all countries and books are very flexible vehicles for learning in countries where they are rare, prized commodities. However, as students in Asia discover the convenience and richness of reliable DE technologies, they too will adopt them with enthusiasm. Meanwhile, the lesson of this book is that institutions should offer flexible learning systems that blend appropriate media with face-to-face events.

Another conclusion of the book, which successive generations of DE projects seem to have to rediscover the hard way, is that technology, whether using older or online media, has to be embedded within an effective student support system. Distance learners, like any students, require both encouragement and feedback. Technology can help to provide this, but it has to be built into the system by its designers; no technology provides its own pedagogy.

To say this is not to criticise institutions trying to offer DE in Asia. They are doing what they can with limited expertise and resources. Another challenge flagged in the book is the general shortage of trained DE specialists across Asia. It is helpful to have a chapter devoted to the training of instructional designers as well as media specialists.

The many institutions that are now adding distance learning to their conventional offerings are also learning that services which campus student can (sometimes!) take for granted, such as libraries, require special arrangements for distance learners. Here again the rhetoric about digital access is some way ahead of the reality in much of Asia.

As we would expect from Asia's largest country, China is a particularly interesting laboratory. As in other countries, the tremendous developments in higher distance learning—which already account for over 14 per cent of China's university and college enrolments—are now spawning the growth of open schooling at the secondary level. What will be more surprising to those with an older image of China's economy is that much of this growth is driven by the private sector. The commercialisation of DE is changing the way that it is managed.

The book also provides interesting insights into the rapid evolution of technology. A most interesting chapter (Chapter 8) reports on the evaluation of 56 learning management systems (LMS). It concluded that *Moodle*TM was the most generally useful system, somewhat anticipating its steady emergence as the industry standard in many parts of the world. The study rightly emphasises, however, that taking advantage of the good features of open source software (OSS) does require an institution to have more IT expertise available than if it locks itself into a proprietary LMS and relies on the vendor to adapt it to local needs.

The chapter (Chapter 9) on learning objects and education through mobile telephony provides other examples of how quickly things change. Today the term "learning object" has been replaced by "open educational resource" (OER) and the notion of learning object repositories has been superseded by search engines that allow OERs to be found wherever they are. However, the training that the PANdora project provided in the development and use of learning objects will stand the participants in good stead as

the adaptation and re-use of OERs becomes commonplace in developing learning materials for both face-to-face teaching and distance learning. Universities as different as Canada's Athabasca University and Malaysia's Asian eUniversity now require evidence of a worldwide search for adaptable OERs before any material can be developed from scratch for a new course.

Similarly, perhaps because of educators' devotion to the written word, the early use of mobile telephones in education concentrated, as it does in this book, on the use of text through SMS (Short Messaging Service). Today, this is being supplemented by the linking together of mobile networks and LMS to allow learning and assessment solely through the audio channel to reach thousands of people. Asia is in the forefront of this development, which promises to bring livelihood-related training to millions of illiterate people in their own language or dialect.

In summary, this is a most stimulating book. Thanks to its origins in the PANdora project it has coherence, a breadth of coverage and a rigour of analysis that are rare in such collections. I congratulate the editors and contributors on producing such an interesting volume and commend it to readers as a compelling guide to the diversity and complexity of the contemporary use of distance learning technologies in Asia.

October 2009

Sir John Daniel
President and CEO,
Commonwealth of Learning

Introduction

*Jon Baggaley, Tian Belawati, Naveed Malik, Felix Librero
and Maria Ng Lee Hoon*

THE PANDORA DISTANCE EDUCATION NETWORK

In 2004, the International Development Research Centre (IDRC) of Canada conducted a study of current distance education (DE) research and development initiatives across Asia. Managed by the IDRC's PAN Asia Networking division in Singapore, the study focused on uses of information and communication technologies (ICTs) in the delivery of formal and non-formal DE. Research teams were identified whose high levels of experience might assist other teams with lesser experience in future research projects. In September 2004, teams from a dozen Asian countries were invited to a conference in Siem Reap, Cambodia, at which they exchanged ideas and planned joint proposals for studies of Asian DE and distance learning technology (DLT). The IDRC responded to their proposals by funding a single "meta-project" combining all of them. The overall project became known as PANDora. Described at www.pandora-asia.org, its general objectives are to:

- conduct research on the effectiveness of DLTs in situations relating to accessibility, and to geographic, socio-economic, gender, pedagogical and cultural factors;
- learn, exchange, collaborate and share information with tertiary institutions in developing countries working in distance and flexible learning;

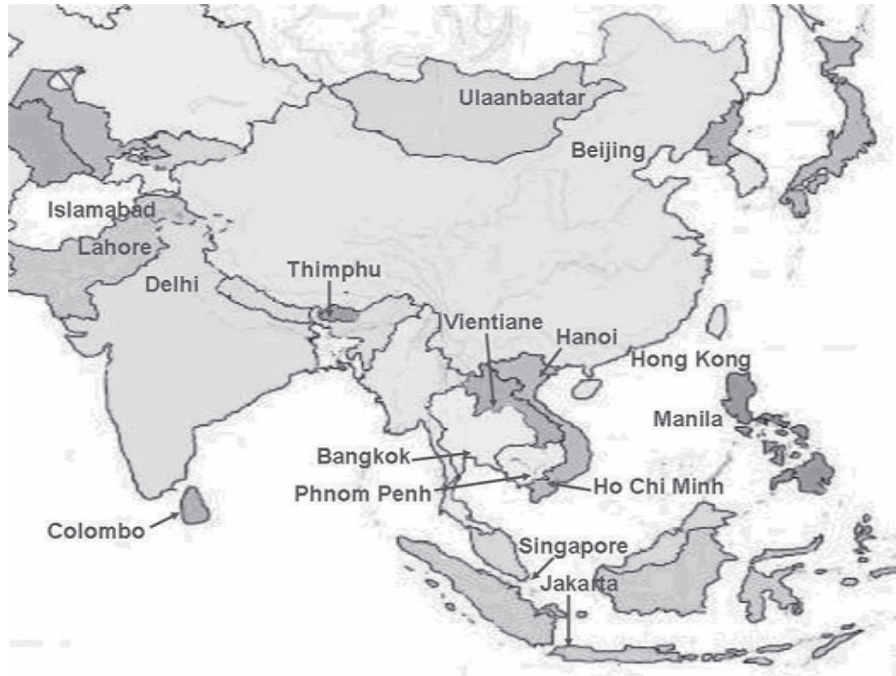
- foster collaborative research among DLT specialists and institutions in the region, incorporating lessons from previous and ongoing projects;
- develop access models for DE delivery;
- develop shared resources (including software) for DE;
- investigate the effectiveness of instructional procedures for specific DLTs;
- provide training in the practices of DLT research, evaluation and content development; and
- prepare policy guidelines and standards for DE in the region.

From 2005–08, 24 PANDora team members from 19 institutions in 11 Asian countries have collaborated on the following sub-projects:

1. Accessibility, acceptance and effects of DLT in Bhutan, India, Pakistan and Sri Lanka.
2. Viability of mobile SMS technologies for non-formal DL in Mongolia and the Philippines.
3. Evaluation and adaptation of open source software for DL in Indonesia, Mongolia, Sri Lanka and Viet Nam.
4. Distance-based teacher education in Bhutan.
5. Instructional design training for ICT-based DL in open universities across Asia.
6. A repository of reusable learning objects for DL in Cambodia, Indonesia, Pakistan and Thailand.
7. E-assessment methods and models for student evaluation in DL.
8. Best practices in DL technology for capacity building in Cambodia, Lao PDR and Viet Nam.
9. Evaluation of DL Practices for policy recommendations in China, Mongolia and Viet Nam.

As is apparent from these titles, most of the sub-projects involve researchers from at least two countries and usually three or more (the exception is the Bhutan project). This has ensured that each study is representative of regional issues and is not unduly influenced by the peculiar circumstances of any particular country. The combined results of these research efforts have been

The PANDora Network (2005-08)



Source: Authors (adapted from a map of Asia at www.worldmapfinder.com).

Note: Not fit to scale.

collated at the Grand Project level, and have yielded a series of two dozen training modules assisting the development of DE in Asia (Belawati and Baggaley, 2010).

Many of the PANdora studies have yielded original findings in a surprisingly short space of time, as is evident from the special edition of the international journal *Distance Education* devoted to PANdora and other pan-Asia reports in winter 2007. The current book contains the updated findings and final conclusions of all nine PANdora projects. Much is reported of original merit in relation to DE internationally, for example, the pioneering work of Asian educators in developing inexpensive mobile methods of DE delivery using the cell-phone; and critical observations about, for example, Internet-based techniques that have become standard in international DE, but do not work well in the Asian context owing to their inaccessibility. These conclusions are not drawn lightly, but are based on the evaluation studies that are a common feature of the PANdora projects.

SUMMARY OF ISSUES

Felix Librero

The results of the PANdora network's 2005–08 studies are comprehensively reported in the current volume. It has been compiled by Jon Baggaley and Tian Belawati on behalf of the PANdora network and its research teams in Bhutan, Cambodia, China, Hong Kong (China), India, Indonesia, Laos, Mongolia, Pakistan, the Philippines, Sri Lanka, Thailand and Viet Nam. It provides comprehensive coverage of recent Asian experience in DE, which has not been sufficiently highlighted in the larger body of literature that stresses DE experiences in Australia, Europe and North America. Asia is not a homogeneous region, but is composed of countries of diverse cultural foundations that differ greatly in the ways they provide educational services to their citizens. Nonetheless, a collection of experiences presumed to have an Asian "flavour" is a great contribution to the larger body of DE knowledge that is accumulating in the international marketplace of ideas. The fundamental issues that this volume has highlighted are clustered into six themes: accessibility, acceptance

and effects in South Asia; the Chinese experience; issues and practices in Cambodia, Laos and Viet Nam (the CLV countries) and Mongolia; recent developments in DE course delivery in Asia; and instructional design and assessment.

The book's emphases on these particular countries can be justified by the fact that information on DE initiatives there has been inadequately reported in the international literature. Perhaps the most extensive network of DE institutions in the world is to be found in China, yet we have little information about it outside that country. The Mongolian experience, similarly, is showing fresh views on harnessing external assistance, combined with internal political will to promote DE as a means of providing educational services to its widespread population. The CLV report also highlights DE initiatives in countries that are struggling to introduce ways of providing better opportunities for their citizens to access educational services, with the experiences of other countries of the region as models.

Information from the other Asian countries represented in the book provides interesting insights into recent trends in the delivery of educational services. Again, many of these countries have been offering high quality educational services for some time that has not been sufficiently highlighted in international forums. In some instances, recent efforts in Asian countries actually seem to involve more advanced mechanisms than are common in DE elsewhere, for example, the use of SMS technology to deliver educational content. These are significant contributions from Asia to the body of knowledge about DE currently available internationally.

National Issues

Early chapters in the book provide a major perspective on how issues of accessibility, acceptance and effects of DE are dealt with in the South Asian countries of Bhutan, India, Pakistan and Sri Lanka—nations with similar experiences influenced by the British educational system. Of these countries, Bhutan is the beginner in terms of adopting DE to provide educational opportunities to its citizens, having begun its DE efforts only in 1995 with the establishment of its Distance Teacher Education Programme (DTEP). India (since 1962), Pakistan (since 1974) and Sri Lanka

(since the late 1970s) have had rich experiences in implementing DE programmes. India has the most extensive network of open universities and DE institutions in Asia outside of China. Bhutan has elected to employ the advantages of recent advances in ICT by designing its DE initiatives to be largely Internet-enhanced. India, Pakistan and Sri Lanka, on the other hand, began by employing radio and television for DE because in those countries radio/TV broadcasting is highly advanced. India, for example, has made extensive use of satellite broadcasting. They have advanced greatly in the use of the Internet more recently. In general, however, there is a perceptible unevenness in the use of ICT-based resources across countries in the South Asian sub-region, although it seems clear that this is fast being resolved by the increasing deployment of advanced ICT systems. Still, the efforts seem to fall short of the need. While learners in the sub-region are aware of the advantages of ICT, the affordability and accessibility of these technologies remain a problem. For this reason, South Asian authors support increased investments in the ICT sector as a means of improving accessibility and affordability for learners.

Further detail about the early experiences of DE in Bhutan is given in a subsequent chapter. The Samtse College of Education in Bhutan is part of the Royal University of Bhutan, and is the pioneering institution that first introduced DE in the country. It is continuing its pioneering work by introducing ICTs as major support for its DTEP, which allows certified teachers to earn Bachelor's degrees in primary teaching. The telecommunications sector in Bhutan is experiencing rapid growth and development, and it is clear that ICTs will become ubiquitous tools in the delivery of educational services, as highlighted in the Bhutan Information and Communications Technology Policy and Strategies (BIPS) launched in 2004.

The Bhutan research team reports their extensive study of the growth and use of ICTs in DE programmes in their country, the conclusion that ICT usage has yielded good learning experiences. More than one-third of the DE students reported that the use of ICTs met their needs. A substantial proportion of them (58 per cent) claimed otherwise, however, mainly owing to the issue of limited access. Accessibility, the study has found, is influenced by sub-issues such as lack of hardware and limited skills in hardware use. Other interesting observations include the fact that male students slightly outnumber females in the frequency

of Internet usage, though females use it more frequently to download learning materials. While students in urban centres are more frequent Internet users than rural users, the latter use it more frequently for educational purposes. Overall, students and teachers both reported positive uses of ICTs for learning materials delivery, despite barriers such as limited capacity of the system and lack of hardware. Both reported that the use of ICTs improved the level of learner support and introduced an element of interactivity to the programme that had hitherto been absent, except during residential sessions. Student respondents of the study also said that one of the most important benefits of ICTs was the opportunity to download materials to which they would otherwise not have had access. This point was made in suggesting to instructors how they might effectively use ICTs. The introduction of ICTs in the DE programme of Bhutan also has implications for the introduction of learning management systems and the need to train learning services designers in their use. Thus, the introduction of technology in itself is not necessarily enough to expedite the learning process.

Much of the literature about DE in China focuses on the radio-TV universities in that country and provides relatively little on other interesting issues. Chapter 4 in the book provides extensive analysis and discussion of the efforts in China towards providing DE opportunities through e-learning strategies at the K-12 (primary and middle school) levels, through what are called the K-12 Online Schools. The schools' main channels for DE content are CDs, cable television and the Internet. The K-12 school experience is providing interesting information on access issues. China is a huge country and educational development across it is largely uneven and negatively affects the accessibility of conventional education institutions. The chapter reports a 2005 study, which reported that 63 per cent of the students and their parents said they chose online schools because they thought they could "obtain guidance from famous teachers in different places."

There are, of course, problems associated with online schools. Survey results reported in the book indicate that almost 42 per cent of the Chinese sample is unsatisfied with the education provided by online schools, and that 37 per cent thought such education was just adequate. Of those who were unsatisfied, about one-third criticised the quality of service. A major problem of the

online school in China is identified with the curriculum, which is still primarily focused on “teacher-centred” rather than “learner-centred” methods, combined with an imperfect assessment system that emphasises regular exercises and subjective examinations rather than measurement of the learners’ ability to use knowledge to resolve problematic issues.

Higher education in China is associated with “elite education” whereby only the top 10 per cent of the best students in society have access to education, mainly through the conventional system. Increasingly, higher education is becoming more accessible to students through the DE mode, particularly owing to the use of ICT to provide flexible e-learning strategies. It is expected that by 2010, the top 15 per cent of Chinese students will have access to higher education. As with other countries experiencing problems in the application of ICTs in the delivery of educational services, China is grappling with the issues of insufficient expertise in the design and application of e-learning strategies, the need to standardise and customise learning materials, and the high teacher-student ratio. E-learning in Chinese higher education is growing rapidly, and as of 2005, off-campus learning centres for higher education numbered 6,000. It is interesting to note that in China, the education sector is becoming increasingly market-driven, and that the Chinese government is controlling the increase in the number of institutions moving into e-learning.

Mongolia is a relatively recent entrant into the Asian DE movement, and its efforts are geared towards developing a strong ICT-enhanced DE system. While not much has yet been seen in terms of actual DE programmes and projects, much DE planning is being undertaken with the assistance of international development agencies. Given Mongolia’s large geographical size, it is not surprising that radio and TV broadcasting are major components of the emerging DE sector in that country, even as the Internet is gaining higher levels of penetration there. The use of radio, TV, and increased use of the Internet in the delivery of DE programmes has been prioritised by the Distance Learning Council of Mongolia. A national DE initiative is emerging that will encourage the use of these media in both the urban and remote areas of the country.

The use of other Asian DE experiences as basis for planning is a logical move for Mongolia because most Asian countries that

are now involved in DE have a collective experience that should prove highly beneficial to its efforts. Other countries have much experience relating to the design of local learning materials and nature, and local availability of human resources for that purpose. An evaluation of the DE initiatives of Mongolia thus far indicates that the teachers and learners alike have a positive attitude towards DE strategies. As in other developing countries, however, obstacles to the successful introduction of DE include the usual issues of limited financial resources, lack of trained human resources, and a lukewarm attitude on the part of policy and decision makers toward DE as a general educational approach.

Cambodia, Lao PDR and Viet Nam (CLV) are also starting to organise DE programmes and are keenly interested to learn from the experiences of their neighbouring countries, particularly in Southeast Asia. The CLV section of the book contains a review of their early DE and e-learning initiatives, which differ in rate of implementation and extent from country to country. While DE in these countries is not as mature as in some other Asian nations, all three of them are making clear efforts to strengthen their DE policy framework and their telecommunications and e-learning infrastructures.

New Technologies

The book reports numerous new studies of course delivery mechanisms by Asian researchers, with relevance to the whole region. An interesting initiative concerns the evaluation of various learning management systems (LMS) developed using open-source software (OSS), with a view to determining which of them best suits Asia's educational needs. Much information about LMS software is based on experiences and tests in North America and Europe, and the current evaluation appears to be the first of its type undertaken in Asia. Numerous LMS softwares, commercial and non-commercial, are available and differ greatly in terms of features and efficiency. Their hidden costs and user manuals are not always clear, and numerous other adoption problems relate to their interoperability, localisation features and bandwidth requirements. The current team of evaluators from Indonesia, Mongolia, Sri Lanka and Viet Nam shortlisted eight OSS learning management packages and concluded that *Moodle 1.5*,

while not necessarily ideal, is superior to rival products in terms of ease of adoption, cost of ownership, and openness, and is the most promising of current LMS products for the higher education community in Asia.

Many Asian institutions have developed the capability to produce learning materials that are ICT-supported and delivered through the Internet. These materials are difficult to access, however, being stored in closed systems. Another useful study is therefore developing a repository of digital learning objects for Asian educational institutions to share. This project is the result of contributions between Cambodia, Indonesia and Thailand. Some of the course designers involved in the learning object materials (LOM) project have been creating such materials for the first time, and they have been observed to be somewhat intimidated by the prospect of producing materials that would be made available region-wide, while going through the development process by trial and error. An overall effect of the project has been that these learning object developers have gained confidence in their ability to develop good objects that can be widely useful. On the other hand, they have found it quite difficult to design that are uniformly useful to all learners in Asia, because the region is vast and composed of culturally diverse nations and needs.

Mobile technologies have become commonplace worldwide. In Europe and North America, "personal digital assistant" technologies have been used effectively as administrative support tools in DE programmes. In Asia, something else is happening. Efforts are being made to use mobile technologies as tools to deliver content, which seems to be a new experience not observed elsewhere. The experiences reported in the book about uses of short message service (SMS) in Mongolia and the Philippines are attracting international interest, for they evidently attract high levels of interest among learners with mobile phones. In the current study, participants in the evaluation of SMS modules, while initially dubious owing to the inherent limitations of the mobile phone, appear to have been surprised at the possibilities of this new medium to deliver lessons. They appeared excited in using the technology to answer quizzes based on the lessons. There appears to be much scope for developing the SMS technology as a means of delivering instructional and administrative support in the Asian region and beyond.

Design and Assessment Issues

One of the major issues about which Asian DE experts are concerned is effective *instructional design*. This has become increasingly important as Asian countries look to DE as a major means of enhancing their national development efforts. The book reports a study showing that majority of instructional designers in Asian DE institutions have had formal training in instructional design, which they acquired while doing graduate work in North American or European universities during the last 15–25 years. Consequently, the instructional design models that they employ now are traditional approaches developed up to 30 years ago. The study shows that Asian instructional designers need to upgrade their instructional design knowledge and skills so that they are more relevant to the Asian educational technologies of the present day. Via a regional survey, the study has determined specific topics that designers would wish to be included in an instructional design training course for ICT-based DE. The survey was conducted in four Southeast Asian countries (Indonesia, Malaysia, the Philippines and Thailand), and four South Asian countries (Bhutan, India, Pakistan and Sri Lanka). It has indicated that Asian instructional designers are interested in undergoing instructional design training relating to:

- the application of current research and theory;
- the selection and use of methods and media;
- technology trends including mobile learning methods;
- evaluation techniques; and
- development of multimedia materials.

As a result of the study, a training course has been designed for Asian instructional designers with a module on each of these topics.

E-assessment has also become a major concern in relation to the increasing use of ICTs in delivering DE services. The book reports the study of four assessment strategies (formative, summative, diagnostic and adaptive) for DE purposes in Pakistan and Sri Lanka, in relation to gender, economic, technological, academic, socio-ethical and administrative/operational issues. An e-assessment procedures checklist (EPC) is provided to facilitate

the development of a flexible model of assessment in Asia, and e-assessment routines via open-source software.

COMMENTS BY THE EDITORS

The book presents a useful snapshot of DE's Asian development in the early years of the 21st century. In North America, Europe and Australia, a wide range of educational technologies have been available for decades, and practice gained in their DE uses. An attempt to apply these same techniques, primarily Internet-based, is now being made in the developing world with mixed results. The book reports, to our knowledge, the first amassing of organised data about this effort across an extensive network of Asian countries. The initiative has generated consistent and salutary findings about DE's impact, and lack of it, which should be carefully heeded by the developing world policy-makers and their advisors.

Where does the development of DE technology in Asia go from here? The overall conclusion of these studies is that DE methods that have become standard in other parts of the world are simply not working in Asia. This is not a new conclusion, for the developing world's lack of DE infrastructure, accessibility and training have been described repeatedly in the educational literature of the last 10 years. Recommendations for overcoming these problems have been also become commonplace and reappear yet again in the following chapters. The current book, however, adds firm evidence about DE's failures that has not always been available previously. The surveys it reports involve different DE contexts, methodologies and levels of generalisability, but their conclusions are inescapably consistent.

The analysis of DE practices in China and Mongolia is particularly frank, and indicates that students, teachers and managers can hold each other to blame for the problems. It is no longer a matter of needing to prove that DE efforts are failing in the developing world, therefore. The question has become how to change this situation for the benefit of the millions of students who would not have access to education otherwise, and as a means of injecting skill and enterprise into the region's needy economies. The current researchers deeply hope that their recommendations

will be capable of translation into practical and political action. The widespread non-accessibility of Internet-based methods to students, for example, should not continue to be ignored if DE's promise is to be taken seriously by Asia's teachers and students.

Congratulations go to the many individuals in the PANDora network who have contributed to this endeavour, and who have achieved so much in just three years. They have benefitted greatly from the network's unique collaborative approach, which has allowed them to compare their experiences and to design complementary studies across the region. Our gratitude for this goes to the IDRC, whose altruistic concern for real-world development issues has made this series of studies possible under a grant to the PANDora Pan-Asia Network Distance Open Research Access Project; and to Maria Ng Lee Hoon, Senior Programme Specialist in the IDRC's PAN Asia Networking division, for the unique vision of international collaboration and mentoring that has underpinned the project. We also honour the memory of Professor V.K. Samaranayake, the father of computing in Sri Lanka, whose leadership in the project has been vital to its success.

It has been a pleasure to assist the diligent PANDora project teams throughout the IDRC's 2005–08 Asian project, to be accepted with collegiality and friendship into their countries, and to edit their work into this and other publications for the benefit of a wide international readership.

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The Emergence of Distance Education in South Asia



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INTRODUCTION

Distance education (DE) 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

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 where this system originated 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 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 1.1. 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 per cent), compared with those of Bhutan (60 per cent), India (64 per cent), and Pakistan (52 per cent). Most South Asian countries have literacy problems because of the inaccessibility and high cost of education, particularly in rural areas.

The colonial powers that invaded South Asia since the 15th century introduced their own religious and educational traditions

Table 1.1 Estimated Development Parameters of Bhutan, India, Pakistan and Sri Lanka

<i>Country (year of independence)</i>	<i>Population</i>	<i>Rural population (% of total pop.)</i>	<i>Literacy in the national language(s)</i>	<i>Computer owners per 100 inhabitants</i>	<i>'Phone lines per 100 inhabitants</i>
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))
	<i>Internet hosts per 10,000 inhabitants</i>	<i>Internet cafés/telecentres per 10,000 inhabitants</i>	<i>Internet users per 100 inhabitants</i>	<i>Websites in the national language (s)</i>	<i>Websites in English and other language (s)</i>
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

(Table 1.1 Continued)

(Table 1.1 Continued)

<i>Country (year of independence)</i>	<i>Population</i>	<i>Rural population (% of total pop.)</i>	<i>Literacy in the national language(s)</i>	<i>Computer owners per 100 inhabitants</i>	<i>'Phone lines per 100 inhabitants</i>
	<i>HDI</i>	<i>GDP per capita</i>	<i>Urbanisation</i>		
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 (2006)

Urbanisation: www.nationmaster.com/graph/peo_urb-people-urbanisation

in their own languages as well as in 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 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 non-formal 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 per cent 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. 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 six centres with 800 learners in 1992, it has grown to 646 centres with 18,550 learners in 2006. In 2006, the MoE 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).

Both government and private vocational training institutes (VTIs) cater to the nation's requirements for vocational skills. There are currently six government-operated VTIs with 813 trainees and 96 instructors, and nine 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 five 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 per cent 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 7; 7.3 per cent 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 rose sharply—from 3.6 per cent to 6.8 per cent and 8.9 per cent 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 per cent in diploma programmes, 5 per cent in certificate programmes, and 4 per cent in postgraduate programmes. In 2006, RUB had 3,820 students (66 per cent male and 34 per cent 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 per cent 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). About 35 per cent of India's students are women. India's educational system has been extensively discussed in the

literature (Government of India, 2007; Panda, 2005), 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 of 16.4 per cent. 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 per cent. Urban literacy is relatively high at 64.7 per cent, whereas that of the rural population is only 34.4 per cent. The Human Development Commission (HDR) was established to increase educational outreach to remote and mountainous areas. The goals of the Ninth Five-year Plan (2006–10) were to increase the literacy rate to 70 per cent 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 per cent (Grade 1) to 87.5 per cent (Grade 15), the low socio-economic females had dropout rates rising from 9.3 (Grade 1) to 100 per cent (Grade 15). The study also showed the most common reasons for dropout (Table 1.2). Thirty-nine per cent of females and 23 per cent 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

Table 1.2 Reasons for Educational Dropout in Pakistan

<i>Reasons for dropout</i>	<i>Male (%)</i>	<i>Female (%)</i>
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

Source: Sathar et al. (2003).

the number of students seeking education, and national literacy rates, particularly of rural females.

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 per cent, Buddhists 17 per cent, Hindus 10 per cent, and Muslims 6 per cent (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 Sri Lanka by the British also provided a means of obtaining higher administrative and professional qualifications. The post-independence move of 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 institutions.

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 per cent, 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, for example, schools' census figures, indicate 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 are 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 deliver 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 a 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 and supplemented by compulsory residential schools. It is based on the existing BEd (Primary) programme. This has several advantages. First, it makes optimal use of the resources already available. Second, 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. Third, 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 MEd 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 Postgraduate 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 and 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 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 (OU), 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 per cent of enrolment in higher education (Government of India, 2002). The plan was to improve this to about 40 per cent during the Tenth Plan period, but this also could not be achieved. (An analysis by Mishra [2003] predicted that the enrolment level would be between 21.5 and 27.5 per cent.) It is estimated that by the end of the Tenth Plan, 1:4 higher education students are studying via ODL. The Eleventh Plan (2007–12) continues to strive to reach the projected 40 per cent 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 have 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 per cent 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 120 million rupees 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 non-formal schools to reach the previously unreachable, 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 the 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 and 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 five faculties: Natural Science; Education; Engineering Technology; Humanities; and Social Sciences. It offers eight Bachelors' Degrees, four Postgraduate Diplomas, four 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;
- counselling; 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.

I. Models of ICT-based DE

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 education solely on ICT-based resources as opposed to traditional

media including books and lecture notes. The majority of 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. Table 1.3 compares the ICT usage in the OUs of Bhutan, India, Pakistan and Sri Lanka.

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 and 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 aimed 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 six 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

Table I.3 ICT Usage in the DE Universities of the Four Countries

<i>Indicators</i>	<i>Bhutan</i>	<i>India</i>		<i>Pakistan</i>		<i>Sri Lanka</i>	
	<i>SCE</i>	<i>IGNOU</i>	<i>Total OUs</i>	<i>AIOU</i>	<i>VUP</i>	<i>OUSL</i>	<i>UCSC (BIT)</i>
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).

Note: IGNOU's SC figure includes 22 tele-learning 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
ACs Academic Counselors or Tutor
RCs Regional Centres
SCs Study Centres
SRCs Sub-regional Centres
na Figures not available

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 1.4 (IGNOU, 2005; Panda, 2005).

Table 1.4 IGNOU's National Media Capacity

<i>Media and technologies</i>	<i>Numbers</i>
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 tele-conferencing channel)
All India Radio (AIR)	186 (interactive counselling)
Tele-learning centres	22
FM radio stations	14 (due to increase to 40)

Source: Panda (2005).

Audio and video cassette-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 Japan 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 counselling 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 and 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, tele-conferencing, training, consultancy, academic programme delivery and research. In 1993, IGNOU made its first entry into tele-conferencing 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, however, was not regularly used, owing to the inferior telephone networks of that time and the subsequent advent of more advanced technologies such as the heavily used 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 counselling. 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 teachers on toll-free telephone numbers. In 1999, the IRC programme was extended to eight 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 counselling. Although the IRC programme was originally designed to focus on interactive academic counselling, 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 (IVC-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 and 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 had a relatively low demand for DE over the years, and radio and TV have not previously played such a prominent educational role as in India and Pakistan. The OUSL, 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 (USD 2 million) and the Sri Lanka Government (USD 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 (up to class 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 (BT) has announced free Internet dial-up access subscriptions. Rates for leased lines have been cut to almost half (for example, 128 kbps has now been reduced Nu. 26,600 to Nu. 14,850 a month, where one ngultrum (Nu.) = approx. USD 0.02). This will hopefully allow most of Bhutan's population to take advantage of online resources and communication facilities. In addition to Druknet, the one ISP that is a part of BT today is that 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 2005–12, 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 and Technology, with the support of the International Development Research Centre's (IDRCs) pan-Localisation Project, launched the 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 and 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 outdated within months. E-learning allows the delivery of updated information to learners at an accelerated pace, opening up new vistas of knowledge transfer. With more than 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 (SSA) programme for Universalisation of Elementary Education (Singh and Abhiyan, 29 October 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 six union territories, with the DE programme as an integral component (Chand and 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 and 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 with 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 and 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 per cent IT literacy at senior secondary level (10 + 2) in five years and at secondary level in 10 years.
- (43, x): All institutes offering engineering education, including Polytechnics and ITIs, will ensure that within three 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 Postgraduate and Continuing Education programmes 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 10 such initiatives have been established in the country (Mishra and Sharma, 2005). The success or failure of these initiatives, however, has not been made public by these institutions; and the merits of the involved 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 and 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 1990s. A model for virtual education and e-learning was developed at AIOU in 1999, when OLIVE was started 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 and 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 and 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 a French online programming developed by the Alliance Française with AIOU support. This programme is basically developed for the 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), Erhvs Uddannelse, 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 travelled 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.

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 worldwide 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 UCSC and is currently in its eighth successful year.

The ICT Agency's national development programme, 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, websites 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 1990s. When its School of Computing (UCSC) was established in 2002, two centres were established to promote e-learning services: the e-learning Centre (eLC) funded by the Swedish International Development Cooperation Agency (SIDA) and the Advanced Digital Media Technology Centre (ADMTC) funded by the Japan International Cooperation Agency (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 Centre (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, thus, 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 and 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-based 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.

Accessibility, Acceptance and Effects of Distance Education in South Asia[§]

2

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INTRODUCTION

The development of distance education (DE) in Bhutan, India, Pakistan, and Sri Lanka has been rapid, though has so far proved unable to cater to the dual challenge of increasing demand and the rapidly changing educational content. Current educational policies in the region are encouraging the use of new DE methods based on information and communication technology (ICT), in the hope that they will improve the situation. This chapter reports a major study of the accessibility, acceptance and effects of current distance education in Bhutan, Pakistan and Sri Lanka. It is concluded that the modern focus on Internet-based education has failed to take account of its general lack of accessibility and affordability, and that DE's uses of mixed media technologies in the region should be encouraged.

The rapid emergence of DE in South Asia has been discussed in the previous chapter. To obtain information about its accessibility, acceptance and impact in the area, the PANdora network has conducted a series of studies across Asia, focusing in particular on Bhutan, Pakistan and Sri Lanka. The project considered a variety of learning scenarios, and did not examine

[§] The authors of chapters 1 and 2 acknowledge the late professor V.K. Samaranyake, who supervised the current study and the other PANdora projects at UCSC. The Sri Lanka authors also thank Ms Udani Jayasinghe for her contribution during the pilot study phase of the project in Sri Lanka.

ICT-based education solely from the point of view of DE. At Open University of Sri Lanka (OUSL), for example, students have the opportunity to attend face-to-face instruction, and a 100 per cent distance-based mode of education is rare. Indeed, a previous study of DE in Sri Lanka (Senanayake et al., 2005) has shown that a combination of distance-based and face-to-face methods was requested by 86 per cent of students.

A pilot study was carried out in late 2005 to explore the views of the Bachelor of Information Technology (BIT) external degree students of the University of Colombo. The sample for this survey consisted of the students who registered for the 2005–06 session of the BIT programme. A random sample of 500 students was as selected as participants of the survey. Key issues of interest were access, affordability and acceptance of DE. The results of the pilot study showed that 66 per cent of the sample was male and 34 per cent female, reflecting the gender imbalance in the BIT programme. Thirty-two per cent of the students had registered for the BIT programme to obtain a second degree; 40 per cent had registered for the BIT programme to enhance their IT knowledge, and included students who were already undergraduates in other disciplines. The results of the pilot study (Attygalle et al., 2006), helped the authors to design the questionnaire for the main PANDora survey.

In addition, a preliminary *online questionnaire* was created by the Software Development Unit (SDU) of the University of Colombo School of Computing (UCSC), and was promoted by a poster in and communications with institutes across Sri Lanka. The questionnaire responses were collated in a *MySQL* Database Management System. Its response rate, however, was very low and the data were not considered worth further analysis. Whereas it was hoped that 500 responses would be received, only 20 responses arrived of which 12 were incomplete. This outcome reflects the fact that web-based surveys are generally unsuccessful in Sri Lanka, owing primarily to the inaccessibility of Internet services.

A *technical study* on the topic, conducted by the whole 13-country PANDora network has uncovered reasons for the Internet's inaccessibility in Asia (Baggaley and Batpurev, 2007; Baggaley et al., 2007). The study has measured the time taken to access web pages between major Asian cities, and has reported that, "in most

of the survey conditions, browser loading times were noted up to four times slower than commonly prescribed as acceptable. Failure of pages to load at all was frequent." Using the widely available "traceroute" routine, the study also analysed the routes taken by web hits (attempts to access material) from web servers at Asian institutions. All web hits go through intermediate web servers before reaching their target, and the more intermediate "hops" involved, the greater the chance that the access attempt will be unsuccessful. Whereas hits by users on Canadian web servers may go through half a dozen hops, web hits by users in Asia commonly go through 20 or more hops, failing to reach their target altogether. For example, the PANdora traceroute study has found that Asian web hits are commonly routed through countries such as the US and Russia, owing to the lack of more direct local routes. Attempts by a Cambodian user in Phnom Penh to access material on a Phnom Penh web server are typically routed through Viet Nam, adding to the time taken and chances that the attempted hit will fail.

THE MAIN SURVEY

The main survey was conducted in 2006–07, using the sampling scheme shown in Table 2.1, with different questionnaires administered to students and educators. These were administered by trained enumerators in six districts in Sri Lanka, five provinces in Pakistan, and four regions of Bhutan. Each participant responded to two sets of questions: one on accessibility and acceptance of DE techniques and the other on learning styles. Modifications were made to the questionnaires to take account of differences in local language, education level, religion, currency, etc., as appropriate. In view of security problems in some areas, the geographical areas covered by the survey were not completely representative of the countries.

To maximise proportional representation and convenience of data collection, sampling was based on a distribution of institutions in the four separate geographical regions of the country, each of which covered four to six districts. To administer the survey, enumerators were identified in each geographical area with the help of teacher education departments. These resource persons

Table 2.1 Survey Samples (Students and Educators)

	<i>Pakistan (N = 1879)</i>			<i>Sri Lanka (N = 1271)</i>			<i>Bhutan (N = 625)</i>		
	<i>S</i>	<i>U</i>	<i>T</i>	<i>S</i>	<i>U</i>	<i>T</i>	<i>S</i>	<i>U</i>	<i>T</i>
Student	160	910	456	117	611	284	150	300	50
Educator	35	212	106	31	165	63	38	75	12
Total	195	1,122	562	148	776	347	188	375	62

Source: Authors.

Note: S = School; U = University; T = Other Tertiary.

were provided with consistent training, who then selected the secondary schools, universities and colleges, and vocational institutes that they would visit, with the goal of preserving a good sampling mix of urban and rural institutions, and male and female participants. The universities were generally in urban areas. The survey responses ultimately collected conformed well to the sampling plan initially conceived (Table 2.1).

I. Survey Demographics by Country

Bhutan

Responses were received from 501 students (62 per cent male; 38 per cent female). Their occupations were in government (86 per cent) and private institutions (14 per cent). Thirty-one per cent was studying in higher secondary schools, 59 per cent in university institutions and 10 per cent in training institution. They were Buddhist (88 per cent) and Hindu (11 per cent). Only 5 per cent of the participants were married. Previous educational qualifications ranged from bachelor's degree or higher (24 per cent) to grade 10 or lower (16 per cent). Sharchokp was the mother tongue of 42 per cent of them, Dzongkha for 23 per cent, and other dialects stood at 36 per cent. Most respondents reported the language of their studies as English (60 per cent), however, compared with the national language, Dzongkha (8 per cent), and other languages (32 per cent). Only 70 per cent provided information about their average family income per month; of these 97 per cent earned Nu. 20,000 (approximately USD 500) or less. The cost of their current studies was reported by 79 per cent of them; of these, 97 per cent incurred up to Nu.20,000 a month, and the others (from higher secondary schools) between Nu.20,001 to Nu.40,000.

Thirty-six per cent of the sample was pursuing studies at the degree level, and the others at class 10 (10 per cent), class 12 (27 per cent), and certificate or diploma levels (25 per cent). Their subjects were science (30 per cent), arts (17 per cent), commerce (12 per cent), technical/vocational (17 per cent), and others (23 per cent). Males tended to be enrolled in science and technical/vocational subjects, and females in arts, commerce and other subjects. Traditional face-to-face study methods were used by 76 per cent of them. The use of traditional DE methods was reported by 6 per cent of the university-level respondents, and online DE methods by 3 per cent.

Pakistan

The survey was administered in English, Urdu and Sindhi. The 1,527 respondents were Muslim (98 per cent), and all were students. Sixty-eight per cent were male and 30 per cent female; 28 did not state their gender. This distribution was consistent with the 70:30 division of male and female students in their institutions. Their mother tongues were Urdu (36 per cent), Punjabi (26 per cent), Sindhi (9 per cent) and English (1 per cent). Their languages of study, however, were English (62 per cent) and Urdu (37 per cent). They were studying in government institutions (32 per cent), semi-government institutions (12 per cent), private institutions (28 per cent) and others (28 per cent). Most were unemployed and in full-time studies. Ninety-seven per cent were spending an average of Rs. 5,500 (approx. USD 85) per month on their studies. Of the employed students, 71 per cent earn Rs. 10,000 monthly. Subsequently, only two members of the average seven-person household unit are earning—thus, the amount spent on education becomes quite high.

Thirty-one per cent of the students were enrolled in post-graduate programmes; 28 per cent were studying for their first degree; 26 per cent at higher diploma/certificate levels; class 10 (5 per cent) and class 12 (9 per cent). Their disciplines were sciences (33 per cent), technical/vocational training (28 per cent), commerce (15 per cent) and arts (13 per cent).

Sri Lanka

The Sri Lanka sample included 1,012 students from schools, universities and other educational institutions in the six districts with the most institutions in these three categories. It included equal proportion of male and female students, and representation from all of the country's religions and ethnicities. Most of the respondents (94 per cent) spoke Sinhala, and the others spoke Tamil and English. Their language of study was mainly English (72 per cent), and their subjects of study were predominantly in the sciences (49 per cent), with 55 per cent of the male students in this area. Female students (63 per cent) tended to study the arts. Their study methods were usually traditional (76 per cent), with

only 12 per cent of the students reporting and learning via online distance-based methods.

The sample also included 259 educators, equally divided between male and female, in schools, universities and other institutions. Ninety-two per cent were full-time educators, and around 8 per cent were part-time. Most worked in state or government institutions (64 per cent), and 30 per cent were with private institutions; 4 per cent were in the semi-government sector. Sixty per cent were in science disciplines and 25 per cent in technical and vocational areas. Most (80 per cent) earned less than SLR 30,000 (approximately USD 320) monthly. Their method of teaching was primarily traditional, face-to-face (88 per cent).

2. ICT Access and Usage

Bhutan

ICT methods were used by 77 per cent of the sample in their studies. Computers without Internet connection were reported as the most commonly used (65 per cent), followed by TV (53 per cent), projectors (49 per cent), audio-visual cassettes (45 per cent), Internet and radio (42 per cent each), e-mail (40 per cent), computer-aided learning methods (32 per cent), Internet chat (24 per cent) and web-based training (19 per cent). The use of Client Access License (CAL) and Web-based Training (WBT) is relatively higher in vocational training institutions (53 per cent and 29 per cent respectively, compared to 32 per cent and 24 per cent in the universities, and only 20 per cent and 5 per cent in the schools). Of those who had studied using computers without Internet, 46 per cent had used it at their institutions, 39 per cent in Internet cafés, and only 6 per cent at home. Forty-six per cent had used the Internet in cafés and 39 per cent at their institutions. TV and radio were reported to be more available at home (46 per cent and 49 per cent respectively, compared to 31 per cent and 16 per cent in the educational institutions), although only 10 per cent and 7 per cent of the sample reported having using these media in their studies. No gender differences were observed in uses of ICT for study. When asked about the factors that would encourage educational uses of the Internet, 44 per cent mentioned easier access at school, 36 per cent voted for free and cheap access,

34 per cent wanted easier access at home, and 17 per cent for free/cheaper lessons. Female respondents (42 per cent) tend to view free or cheap access as a facilitating factor, when compared with males (33 per cent).

Pakistan

Eighty per cent of the respondents stated that they use ICT in their current studies and 10 per cent use ICT techniques only. Most students are taught by traditional face-to-face methods (63 per cent), and only 6 per cent reported using distance-based online learning methods. The use of computers without Internet was reported by 50 per cent of the sample; e-mail (34 per cent), CAL techniques (26 per cent), online chat methods (23 per cent), and WBT (16.2 per cent). Fourteen per cent of them reported using Internet at a cyber-café and 12 per cent at their work place. No differences were observed between men and women in this respect, except that Internet cafés were used more by the men. Educational uses of TV and radio, both commonly available in Pakistani homes, were noted by 29 per cent and 21 per cent respectively.

Sri Lanka

Comparable responses were observed in the Sri Lanka sample. Among the student respondents, 89 per cent stated that they were using ICT resources in study programmes, with most of them (76 per cent) using computers without Internet. Internet and e-mail facilities were used (57 per cent and 54 per cent respectively) by university students, primarily in the workplace, and at lesser levels by students in institutes (36 per cent and 39 per cent), and in schools (12 per cent and 8 per cent). It should be noted that the schools in this sample were from the six main districts of Sri Lanka, and that these figures are likely to overestimate ICT usage in schools across the country as a whole. Low usage levels of online chat (23 per cent) and WBT (26 per cent) were noted. Similar ICT usage patterns were noted in the educators' responses, with 90 per cent reporting that their institutions use ICTs in study programmes.

3. Attitudes to ICT-based Learning

Reactions to ICT-based learning in the three countries were recorded on 5-point Likert attitude scales from “strongly agree” through “don’t know” to “strongly disagree” (Table 2.2). Six positive and six negative statements were created, to avoid response bias.

Most respondents in each country agreed that computers “can help you to learn” (Q3) and “are necessary tools in educational and work settings (Q4), and that “it is easy to learn when you use CD, CAL materials” (Q1). The most positive consensus on the last of these statements was in the Sri Lanka sample, and the highest undecided rate in Bhutan. The items regarding the use of ICTs to increase motivation to studies (Q9), making lessons more interesting (Q10) and increasing efficiency (Q11) received overwhelmingly positive responses in each country similarly. The students in all three countries were divided, however, on whether they “can learn more from books than from a computer or other technologies” (Q2), with relatively large proportions both agreeing and disagreeing with the statement. In Bhutan and Pakistan, nearly 4:5 respondents were of the opinion that “you have to be a ‘brain’ to work with computers” (Q5), with 2:3 of the Sri Lanka sample agreeing with this view.

The three country samples shared the predominant view that ICT-enabled learning is “interactive and interesting” (Q6), though there seemed to be more uncertainty on this among Pakistani males than in the other subgroups. Nearly 70 per cent of each country sample was positive about the use of e-mail as “an effective means of communication between the teacher and students” (Q7). Responses on the question of whether “it is difficult to use the computer/Internet for studying” (Q8) were mixed, though the majority disagreed. Relatively high proportions in all three countries disagreed that “ICT is affordable for my studies” (Q12).

4. Study Habits

Study activities of the sample were recorded on a 5-point scale from “I do this rarely/never” through “don’t know” to “I do this almost always” (Table 2.3). Eight student-related items were created and two teacher-related ones (Q7 and 8).

Table 2.2 Statements about ICT-based Learning

<i>Statement</i>	<i>Country</i>	<i>Gender</i>	<i>Responses (%)</i>					<i>N</i>
			<i>SA</i>	<i>Agr</i>	<i>DK</i>	<i>Dis</i>	<i>SD</i>	
1. It is easy to learn when you use CD, CAL materials.	Bhutan	M	16	59	16	9	0	297
		F	17	54	20	9	0	186
	Pakistan	M	28	51	13	5	3	926
		F	29	51	8	9	3	404
	Sri Lanka	M	40	54	4	2	0	498
		F	35	57	6	2	0	449
2. Can learn more from books than from a computer or other technologies.	Bhutan	M	17	36	8	33	6	302
		F	16	37	10	32	5	187
	Pakistan	M	25	38	10	22	4	865
		F	34	38	6	20	2	352
	Sri Lanka	M	17	51	6	23	3	494
		F	19	48	4	26	3	454
3. A computer can help you to learn.	Bhutan	M	64	33	1	1	1	294
		F	63	35	1	0	1	186
	Pakistan	M	40	46	7	3	3	922
		F	43	48	3	3	2	412
	Sri Lanka	M	47	49	2	2	0	500
		F	42	55	2	1	0	460
4. Computers are necessary tools in educational and work settings.	Bhutan	M	78	19	1	1	1	303
		F	82	15	1	0	2	189
	Pakistan	M	45	38	9	5	4	924
		F	54	36	3	5	2	403
	Sri Lanka	M	43	48	3	6	0	495
		F	49	44	3	4	0	452

5. You have to be a “brain” to work with computers.	Bhutan	M	26	53	4	15	2	302
		F	40	37	6	16	1	187
	Pakistan	M	31	44	8	12	4	924
		F	29	50	6	13	2	409
	Sri Lanka	M	23	43	4	24	6	489
		F	22	46	5	22	5	445
6. ICT-enabled learning is interactive and interesting.	Bhutan	M	38	54	5	2	1	299
		F	47	45	5	2	1	185
	Pakistan	M	26	49	15	9	1	900
		F	30	53	9	7	1	389
	Sri Lanka	M	31	54	7	7	1	489
		F	25	63	5	6	1	433
7. E-mail is an effective means of communication between the teacher and students.	Bhutan	M	29	45	11	13	2	302
		F	30	42	10	15	3	188
	Pakistan	M	26	41	12	16	5	919
		F	29	48	5	15	3	401
	Sri Lanka	M	22	51	9	15	3	491
		F	21	52	10	14	3	447
8. It is difficult to use the computer/Internet for studying.	Bhutan	M	5	23	5	49	18	304
		F	4	22	7	52	15	188
	Pakistan	M	12	24	10	35	19	926
		F	14	25	4	42	15	400
	Sri Lanka	M	5	14	4	48	29	494
		F	3	12	6	54	25	446
9. ICTs increase motivation to study.	Bhutan	M	45	50	4	0	1	307
		F	37	52	8	2	1	190

(Table 2.2 Continued)

(Table 2.2 Continued)

Statement	Country	Gender	Responses (%)					N
			SA	Agr	DK	Dis	SD	
10. ICT makes my lessons more interesting.	Pakistan	M	28	56	9	7	0	933
		F	28	64	5	3	1	417
	Sri Lanka	M	39	55	4	2	0	505
		F	33	61	3	3	0	461
	Bhutan	M	45	49	3	2	1	307
		F	37	54	5	2	2	192
	Pakistan	M	25	54	10	10	1	934
		F	27	58	6	9	1	412
11. ICT helps to increase my efficiency.	Sri Lanka	M	34	59	4	3	0	506
		F	30	62	4	3	1	459
	Bhutan	M	41	52	3	3	1	305
		F	33	58	5	3	1	189
	Pakistan	M	25	49	12	12	3	881
		F	25	60	6	8	1	366
	Sri Lanka	M	38	50	5	7	0	506
		F	29	63	4	3	1	459
12. ICT is affordable for my studies.	Bhutan	M	16	52	7	21	4	306
		F	18	55	7	14	6	189
	Pakistan	M	18	47	13	10	12	920
		F	17	57	8	16	2	401
	Sri Lanka	M	19	63	6	10	2	499
		F	18	65	7	8	2	444

Source: Authors.

Table 2.3 Statements about Study Activities

1. I do this rarely or I never do this
2. I do this sometimes
3. Neutral/DK
4. I do this often
5. I do this almost always

<i>Statement</i>	<i>Country</i>	<i>Gender</i>	<i>Responses (%)</i>					<i>N</i>
			<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	
1. I work through learning material point by point and study each section separately.	Bhutan	M	9	42	8	31	10	292
		F	6	49	5	26	14	185
	Pakistan	M	2	11	11	46	30	837
		F	1	7	6	51	34	359
	Sri Lanka	M	9	38	8	30	15	489
		F	9	36	6	31	18	444
2. I repeat the most important parts of the material until I know them by heart.	Bhutan	M	10	15	7	34	34	293
		F	7	15	5	31	42	186
	Pakistan	M	2	13	8	44	33	817
		F	3	9	3	54	31	355
	Sri Lanka	M	9	29	12	32	18	486
		F	8	25	9	29	29	442
3. I try to combine everything dealt with separately in a course to form a whole.	Bhutan	M	12	31	20	29	8	292
		F	13	32	24	25	6	182
	Pakistan	M	4	21	12	47	16	793
		F	3	17	14	46	19	334
	Sri Lanka	M	11	30	19	29	11	477
		F	11	28	22	23	16	429

(Table 2.3 Continued)

(Table 2.3 Continued)

Statement	Country	Gender	Responses (%)					N
			1	2	3	4	5	
4. I link the specific facts with the general arguments in a unit/module.	Bhutan	M	12	36	22	23	7	289
		F	16	41	15	19	9	177
	Pakistan	M	4	19	14	46	16	802
		F	4	14	12	55	15	339
	Sri Lanka	M	7	33	20	28	12	483
		F	9	29	21	25	16	437
5. To test my progress, I put the main points in course units into my own words.	Bhutan	M	9	25	8	34	24	293
		F	3	30	4	37	26	183
	Pakistan	M	4	13	10	42	31	811
		F	4	10	11	46	30	341
	Sri Lanka	M	11	28	14	30	17	481
		F	9	25	14	29	23	441
6. I do more activities and assignments than is asked of me in a course.	Bhutan	M	17	31	15	24	13	290
		F	21	31	13	23	12	185
	Pakistan	M	8	25	10	39	18	808
		F	8	24	7	42	20	348
	Sri Lanka	M	20	31	11	26	12	479
		F	18	33	12	23	14	439
7. I follow the instructions given in the materials and by the tutor/teacher counsellor.	Bhutan	M	4	13	5	29	49	290
		F	2	13	3	31	51	184
	Pakistan	M	2	10	7	49	32	801
		F	2	9	4	49	36	344

8. I need the teacher to give advice when I have difficulties while studying.	Sri Lanka	M	7	25	12	37	19	480
		F	7	22	13	34	24	437
	Bhutan	M	4	16	8	34	38	291
		F	4	18	3	34	41	185
	Pakistan	M	2	7	7	45	38	809
		F	1	6	5	48	40	345
9. I always base conclusions on the information in the materials and group interactions.	Sri Lanka	M	11	27	14	31	17	484
		F	8	31	11	30	20	442
	Bhutan	M	8	25	15	36	16	293
		F	7	33	9	37	14	186
	Pakistan	M	4	18	11	46	21	801
		F	4	14	9	45	28	348
10. Using the theory in a course, I form solutions to practical problems.	Sri Lanka	M	8	32	14	32	14	484
		F	6	36	15	29	14	434
	Bhutan	M	6	28	16	34	16	290
		F	6	34	11	34	15	186
	Pakistan	M	4	12	12	49	24	805
		F	4	12	10	50	24	343
	Sri Lanka	M	7	27	16	35	15	484
		F	5	34	16	30	15	436

Source: Authors.

Three of the study activities listed in Table 2.3 (Q3, Q5 and Q10) may be regarded as logical styles of learning. A large proportion of students in Pakistan appear to be using these approaches more than students in Bhutan and Sri Lanka. Items relating to solitary learning approaches (Q2 and Q6) also suggest that Pakistani students, compared to those in Bhutan and Sri Lanka, use a greater mixture of learning activities. The items about teacher-focussed learning styles (Q7 and Q8) indicate that students in Pakistan and Bhutan tend to use a more teacher-centred approach than those in Sri Lanka.

5. Motivation for Studying

Reactions about motivation for studying in the three countries were recorded on 5-point Likert attitude scales from “strongly agree” through “don’t know” to “strongly disagree” (Table 2.4).

In general, these results indicate that students in all three countries like to choose the study programmes that promise to be useful in their future and career. Their choices of subject differ, however, between countries and gender groups. In Bhutan most students (approx. 2:3) take particular study programme purely out of interest. In Pakistan, this proportion is 1:2, while in Sri Lanka it is 1:4. The item about preferences for courses with theoretical content (Q10) indicates that most students in all three countries believe that the theoretical knowledge that they gain should be capable of practical application.

DISCUSSION

1. **Accessibility:** The survey looked at the use of ICT resources by students and educators at their homes, educational institutions and at work where relevant. The results indicated that the sample institutions have not yet fully harnessed computers in education, even though in possession of them, and that both campus- and distance-based education are still being provided mainly through traditional methods. Low Internet availability was noted,

Table 2.4 Statements about Motivation for Studying

<i>Statement</i>	<i>Country</i>	<i>Gender</i>	<i>Responses (%)</i>					<i>N</i>
			<i>SA</i>	<i>Agr</i>	<i>DK</i>	<i>Dis</i>	<i>SD</i>	
1. I like to take courses which seem useful to me in my present or future career.	Bhutan	M	63	29	4	1	3	299
		F	70	21	4	3	2	190
	Pakistan	M	55	32	8	5	1	837
		F	58	33	4	4	1	366
	Sri Lanka	M	42	36	11	6	5	492
		F	43	40	10	2	5	442
2. I am in this programme out of the interest for the subjects that are being dealt with.	Bhutan	M	34	27	16	10	13	296
		F	31	26	8	15	20	189
	Pakistan	M	20	33	11	25	10	819
		F	18	39	5	30	8	357
	Sri Lanka	M	11	22	20	22	25	490
		F	12	16	22	26	24	437
3. I chose this study because the work I can do with it after graduating interests me.	Bhutan	M	45	37	11	4	3	296
		F	45	33	15	6	1	188
	Pakistan	M	23	48	12	13	4	816
		F	29	42	7	17	5	349
	Sri Lanka	M	35	39	15	8	3	487
		F	36	36	19	6	3	441
4. My most important goal in following this programme is to pass the exams.	Bhutan	M	10	19	16	21	34	297
		F	21	20	9	22	28	189
	Pakistan	M	25	28	9	27	11	824
		F	25	37	5	21	12	359

(Table 2.4 Continued)

(Table 2.4 Continued)

Statement	Country	Gender	Responses (%)					N
			SA	Agr	DK	Dis	SD	
5. I only study to improve myself personally and to enrich my life.	Sri Lanka	M	21	30	15	21	13	488
		F	22	30	20	17	11	442
	Bhutan	M	32	28	14	12	14	299
		F	34	30	11	14	11	190
	Pakistan	M	30	38	10	17	5	820
		F	37	39	8	14	2	361
6. I want to be able to apply what I learn in solving practical problems.	Sri Lanka	M	30	33	16	14	7	488
		F	28	34	17	11	10	439
	Bhutan	M	44	40	10	3	3	300
		F	47	29	16	6	2	190
	Pakistan	M	42	42	10	5	1	832
		F	48	41	6	4	1	363
7. The teacher should encourage me to think about how material is linked to reality.	Sri Lanka	M	37	40	13	6	4	484
		F	35	44	14	4	3	443
	Bhutan	M	42	38	10	7	3	299
		F	43	37	13	7	0	190
	Pakistan	M	39	45	8	6	2	826
		F	46	46	4	4	1	364
8. I prefer being encouraged to study the materials at a certain pace.	Sri Lanka	M	23	50	14	9	4	483
		F	25	51	16	5	3	443
	Bhutan	M	25	45	19	7	4	298
		F	33	42	14	7	4	187
	Pakistan	M	29	47	11	11	3	824

		F	27	53	6	11	2	366
	Sri Lanka	M	24	47	17	10	2	484
		F	24	46	21	6	3	440
9. I prefer to work on assignments and projects with other students.	Bhutan	M	27	48	15	6	4	297
		F	39	35	11	11	4	190
	Pakistan	M	32	44	9	11	4	839
		F	37	40	6	12	5	368
	Sri Lanka	M	34	42	12	10	2	483
		F	36	45	10	6	3	444
10. I prefer courses in which practical applications of theoretical content are given.	Bhutan	M	35	45	10	5	5	297
		F	42	30	14	7	7	190
	Pakistan	M	38	39	14	6	2	820
		F	44	40	9	5	3	361
	Sri Lanka	M	39	40	12	6	3	484
		F	35	44	15	4	2	442

Source: Authors.

in particular at the Bhutanese and Pakistani institutions, and students in all three countries continue to receive their education by the traditional face-to-face method.

2. **Affordability:** When asked whether it is affordable to use ICT for their studies, most study in Pakistan and Sri Lanka responded in the affirmative, though only 1:3 in Bhutan. The high costs of Internet access were a major reason for low use, and it is clear that connectivity charges are particularly unaffordable for most students and even educators, given their low incomes.
3. **Acceptance:** Despite the low accessibility and affordability of common DE methods, there was a general acceptance that ICT-based learning is useful. Relatively high proportions of the students in all three countries agreed that computers with Internet facilities are or would be useful for their studies. Nonetheless, over half of the samples in each country felt that more can be learned from books than from a computer or other technologies.
4. **Effects:** The results showed general agreement that ICT resources can make studies more interesting. Relatively high proportions of the students agreed that they save time for other work when they use computers and CD materials; and over half of them in each country stated that using the Internet increases their understanding of concepts and theories.
5. **Gender differences:** The survey has suggested numerous gender differences in the survey responses: higher proportions of male students in science subjects, for example, and female students in the arts. In Bhutan, a greater proportion of male students tends to use ICT-based learning methods compared with the female students; and female educators also reported lesser levels of experience with ICTs compared with male educators. Similar results are observed in Pakistan, where the size of female population is now reaching that of the male population (2007 ratio: 1.05:1), and gender disparity in educational access has become a major national problem. Traditionally, families favour boys over girls for admission to schools, especially when education is expensive. The Sri Lanka results reveal

a possible gender difference with respect to Internet access, in that Internet cafés appear to be more popular with male than female students.

6. **Capacity-building:** The need for increased public awareness and capacity-building in relation to ICT and DE benefits has been made particularly clear by this study. In its own right, the survey has illustrated ways in which capacity-building can occur among Asian educators. For example, research assistants were provided with training in all three countries, and undergraduates received training in enumeration techniques, and were sent to rural areas to conduct face-to-face surveys with students and educators. The survey coordinators gained experience in managing national-level projects, and had the opportunity to work with multidisciplinary teams from the education, computing and statistics disciplines. In addition, the project provided many researchers with a first-time opportunity to use ICT tools for international communication, and software for the handling and analysis of large data sets. The experiences they received with the Statistical Package for the Social Sciences (SPSS), for example, have since been passed on to students and colleagues. The collaborative nature of the PANdora project also helped researchers to grow personally and professionally, by attending online seminars and making presentations at international conferences. Project planning and reporting workshops were conducted with the participation of IDRC/PANdora resource persons, and the annual synthesis meetings at which all of the PANdora projects were discussed were major educational experiences. The experience as a whole benefitted not only the individuals involved but also their institutions.

RECOMMENDATIONS

1. Establish regional centres for efficient learning support: Through government/private/public/donor partnerships, regional centres should be established to provide easier and

affordable access to learning resources. The centres should be equipped with basic reference materials and tutorial facilities, and with Internet, printing and fax facilities. They should be equipped and managed according to a sustainable model, so that tutors and mentors are continually available, and their facilities can be easily maintained and replaced. Degree programme students could be given part-time employment to mentor their juniors at a distance as well as face-to-face. Staff involved in DE delivery need to be trained to design programmes that are sensitive to the needs and conditions of distant learners. Existing models of this type should be expanded to all parts of the region.

2. Strengthen localised online educational resources: The lack of up-to-date reference materials as well as the accessibility of references is a concern for students as well as teachers. Resources are typically limited to library-based references, and access to them can be difficult from the place of work. The development of shareable digital materials, with an emphasis on localised content, will provide easier access and widespread opportunities for content development and translation. Capacity-building in the development of digital materials will be required.
3. Develop blended learning models: Student preferences in all three countries are moving towards blended learning approaches, by which traditional teaching and learning methods are integrated with technology-based practices. Traditional universities should adopt DE methods so that their services can be extended beyond their physical boundaries. The region's open universities should also move towards more extensive uses of IT in course delivery, and combinations of TV, radio, web and offline material. Among the three countries of this study, online educational methods remain a distant dream, with only a handful of institutions currently taking the necessary steps towards developing them. The integration of ICT into the curriculum should be encouraged at all levels; and Internet access charges should be reduced as a major way of creating positive public attitudes to ICT-based distance learning.

4. Policy guidelines for government and donor agencies:
 - Governments should allocate more funds for the promotion of ICT infrastructure.
 - Donor agencies should identify under-privileged and low-income populations with the help of local NGOs, and provide them with ICT-based educational resources.
 - Internet facilities should be made available at every educational institution, at lower costs and higher speed.
 - Governments should construct adequate power plants to eradicate the problems of power failure.
 - Governments should provide training in ICT usage for DE students and teachers.
 - Quality assurance guidelines should be provided for institutions delivering online education, and their implementation strictly monitored.

CONCLUSIONS

Bhutan, Pakistan and Sri Lanka each give a high priority to education and the advantages of a knowledge-based society. Their present and past governments have recognised the value of high-school education for all citizens. Access to tertiary education, however, remains restricted by lack of the resources needed to make it available to all. An obvious strategy for them is to increase the use of effective ICT-based DE methods. As the current study has indicated, students are highly motivated to use ICTs in their work, and major initiatives have emerged in South Asia promoting ICT-based DE, and creating a vast range of new possibilities for teachers and learners. A “paradigm shift” is beginning to be observed from teacher- to learner-centred methods, giving the student greater flexibility of control in the learning process. A wide spectrum of ICT-based methods is now envisaged to help DE as well as traditional education to expand.

The modern focus on Internet-based education in South Asia, however, seems to have totally failed to take account of its general lack of accessibility and affordability. While waiting for improved access to modern ICT facilities such as computers and

the Internet, there is clear scope for more extensive uses of radio and TV, media that are freely available in all parts of South Asia. Nationwide systems of educational radio and TV are much to be desired. Although the public and private sectors both steer away from such initiatives for financial reasons, a public and private investment in educating future generations by these readily affordable and accessible media would be a significant contribution. With Internet access not yet universally available, uses of mixed media technologies in DE are much needed and should be encouraged. Expanded, equitable educational opportunities are needed for all ethnic, religious and social communities, and for both genders. It is crucial for educational institutions to provide access to ICTs, not just for learning but also as a preparation for life.

Development of ICT-based Distance Education in Bhutan

3

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INTRODUCTION

This chapter describes the introduction of information and communication technology (ICT) for learning support in the Distance Teacher Education Programme (DTEP) at the Samtse College of Education (SCE), Royal University of Bhutan (RUB). The study focuses on changes in student and instructor perceptions of the quality of and access to learning support as a result of ICT usage, for example, the introduction of a learning management system. In addition, the challenges of using ICT with students and instructors who are relatively new to it are discussed, and recommendations are made for how ICTs can be used for learning support in such circumstances.

Web-based technology (WBT) with possibilities for both synchronous and asynchronous communication can particularly improve the quality of distance education (DE) by increasing opportunities for interaction and communication between instructors and learners, and among learners. As long as learners have reasonable access, it can be argued that ICT should form an integral part of any DE programme. In developing countries such as Bhutan, however, it is still a very recent phenomenon. Bhutan is a small country perched in the Himalayas between China and India. It is 38,394 square kilometres in size, and has a population of 672,425 with a literacy rate of 59.5 per cent (Government of Bhutan, 2006c). The Royal University of Bhutan (RUB), the only university in the country, was established in 2003 as a federation of 10 colleges and institutes spread across the kingdom. RUB's current intake is roughly 30 per cent of the students graduating

from higher secondary schools. It planned to double its intake in the next five years (RUB, 2006a) to meet the increasing demands of higher education in Bhutan. In terms of gender balance, about 34 per cent of RUB's students are female, with relatively lower proportions of female enrolment in its science and technology programmes (RUB, 2006b).

The SCE is a member institute of the RUB. SCE was established in 1968 and called the Teacher Training Institute (TTI). Its focus was on the training of primary school teachers and offered a two-year certificate programme. In 1983, it was renamed the National Institute of Education (NIE), and a BEd programme for secondary school teaching was launched. Two more programmes were later introduced: the Postgraduate Certificate in Education (PGCE) in 1990 and the BEd for primary school teaching in 1993. In 2003, NIE became part of the newly formed RUB, and gained its current name, the SCE.

SCE pioneered DE in Bhutan in 1995 with the introduction of its DTEP. The programme was introduced to update and upgrade in-service primary school teachers. These teachers have a Primary Teaching Certificate (PTC) post a two years' programme usually following their secondary school education. The DTEP is aimed at improving the quality of education by upgrading the qualification of primary school teachers in a flexible way that does not impinge on the already short supply of teachers in the country. The need to update primary teachers was also necessitated by major school curriculum reforms in the mid-1980s. Foremost among them was the introduction of the New Approach to Primary Education (NAPE). This approach emphasised child-centred teaching-learning and the introduction of a curriculum that is geared towards meeting Bhutan's needs and aspirations (Dorji, 2005), as compared to the earlier practice of using a borrowed curriculum and textbooks, and the traditional "chalk and talk" method.

The DTEP allows those with a certificate to obtain a Bachelor of Education degree for Primary teaching (BEdP). This programme is delivered using printed study materials and a month-long compulsory residential session at the beginning of each level of the programme. Given the lack of opportunities for primary teachers to enhance their professional qualifications, the DTEP has been well-received by students despite numerous shortcomings that will be discussed later in this chapter. Since the introduction of

the DTEP at SCE, many other colleges and institutions in Bhutan have introduced DE programmes, often in collaboration with universities outside the country.

ICT AND DISTANCE EDUCATION

Telecommunication in Bhutan has seen rapid recent growth. Television, introduced for the first time in June 1999, has gained much popularity and can be received from most parts of the country. Radio is perhaps the only medium that is capable of reaching every corner of the kingdom. Neither TV nor radio, however, has yet been used in DE, partly because they allow one-way communication only. A promising development from the educational point of view is the introduction of cellular mobile services in 2003. This began with 7,736 subscribers and reached 37,872 in 2005, as compared with 32,709 landlines (Government of Bhutan, 2006c). The Rural Telecom Project has already connected several remote villages, and aims to create at least 10 telephone connections in each of the 201 *gewogs* (blocks) by 2007 (Government of Bhutan, 2004).

Although computers were introduced in Bhutan in the 1980s, and the Internet in 1999, Internet connectivity has increased rapidly since then. By December 2005, there were 3,036 connections (Government of Bhutan, 2006c). Most government organisations and institutions now have official websites from which useful content can be accessed. Recently, Bhutan Telecom has announced free Internet dial-up access subscription, and rates for leased lines have been slashed by almost half. It is hoped that this will allow DE students to take advantage of online resources and communication facilities. Bhutan Telecom has also begun to establish a number of community information centres, providing ICT access in rural communities. The national language of Bhutan is Dzongkha. The recent introduction of Dzongkha unicode software by the Department of Information and Technology, through a grant from the Pan-Localization Project sponsored by the International Development Research Centre (IDRC), has opened up new possibilities. This will remove the language barriers that existed in ICT use previously, for learning, information and communication.

The Bhutan Information and Communications Technology Policy and Strategies (BIPS) launched in 2004 has outlined a comprehensive set of strategies and activities to guide Bhutan's ICT growth. It outlines strategies to harness ICT, to enhance quality and accessibility of education through activities, such as, establishment of online education, e-learning and digital libraries (Government of Bhutan, 2004). For example, the RUB is planning a wide area network (WAN) that will connect all its colleges and institutes and provide web-based learning (RUB, 2006a). Table 3.1 shows the levels of DE students' access to ICTs from 2005–07.

Table 3.1 Student Access to ICTs (%)

<i>Distance students' ICT access</i>	2005	2006	2007
Telephone at home	74	73	68.3
Access to telephone at place of work	63	75	78.6
Own computer	18	33	31.6
Access to computer at place of work	40	77	78
Internet at home	09	17	18.9
Internet at place of work	12	22	32.1
Students who own mobile phones	na	na	68.9

Source: RUB (2006b).

THE DEVELOPMENT PROJECT

An important goal of the DTEP is to “provide opportunities for students to express, reflect and share their experiences as practitioners (and) provide context relevant teacher education by relating theory and practice” (NIE, 1998). While the DTEP has been well-received by in-service teachers, there have been concerns about the provision of learning support beyond the residential school (Jamtsho et al., 2006). The print-based nature of the programme and the geographic isolation of many of the students have meant that, after the residential session is complete, many of them are on their own for the rest of the year. Prior to the project, the level of learning support beyond the residential school has been limited to the telephone and to postal mail, which can be very slow, especially for those in remote locations who are the ones who need most the support. The fact that the module instructors have heavy teaching loads at the institute further

lessens the chance of any support in the form of useful feedback to the students. Student access to library resources is similarly limited to the residential school period.

Accordingly, there have been very few support activities which involve interactions between the instructors and students, among students, and provision of information and resources to promote learning beyond the residential sessions. The emphasis of the month-long annual residential school tends to be on delivery, and the need for support increases when the students begin to study on their own. Therefore, the provision of timely learning support constitutes a great challenge. The DTEP, in fact, runs the risk of being an isolating experience involving one-way knowledge transmission (Paul and Brindley, 1996; Simpson, 2000). Even though collaborative learning methods are known to enhance understanding (Bruffe, 1999), the traditional delivery method of the DTEP does not facilitate this approach. The use of ICT-supported methods can facilitate interaction and the use of collaborative learning approaches.

The use of WBT affords numerous interactive possibilities in distance learning support, particularly in the asynchronous mode, which can help to overcome the shortcomings of traditional media such as the telephone and postal mail (Bullen, 1998). Computer-mediated Conferencing (CMC) has been shown to be particularly useful in facilitating social construction of knowledge, reflective thinking and developing higher-order thinking skills (Gabriel, 2004; Murray and Mason, 2003; Stacey, 1999, 2002), as well as promoting interaction and access to resources that were previously inaccessible (Brigham, 2001; Tait, 1996). Considering the rapid growth of ICT infrastructures, and the increasingly important role they play in education and everyday life, it has become very important to train teachers in their usage. As access increases, uses of ICT and the Internet in particular will allow students and teachers to communicate with greater flexibility and access useful online resources.

I. Goal and Objectives

The goal of the current project was to improve the quality of the DTEP at SCE, by using ICTs to provide more efficient and effective learning support. The research project set out to:

- assess the current distance teacher education programme in terms of its quality and accessibility;
- develop and pilot-test an appropriate ICT-supported learning support (ICT-SLS) system;
- determine the impact of the ICT-SLS system on DTEP students' learner satisfaction and persistence;
- understand how instructors use the system and their perceptions of it; and
- determine whether there are gender or geographic differences in the students' responses to the ICT-SLS.

2. Variables

The two dependent variables studied in this research project were the quality of learning support, and access to learning support in the DTEP. The quality of learning support refers to the satisfaction reported by distance students following the introduction of the ICT-SLS. The ICT-SLS refers to uses of ICT, particularly web-based, to provide tutorials, academic counselling, supplementary learning materials, academic information, registration, orientation, assessment and DE networking. The main tool for ICT-based learning support consisted of the use of the *Moodle*TM learning management system (LMS), a DTEP website, and the establishment of regional study centres as access points for learning support. Access refers to the extent to which DTEP students receive timely, quality support from the instructors and college staff who assist them in completing their studies.

3. Methodology

The project went through three phases.

Preparation

The preparatory phase assessed the existing quality and accessibility of learning support in the DTEP, and identified ways to improve the programme with a special emphasis on student support and greater use of ICT.

Intervention

During the intervention phase, a DTEP website with useful links and information was launched, and the ICT-SLS was developed, pilot-tested, revised and launched. An open-source LMS (*Moodle*TM) was installed on the college server, faculty members were trained how to use online technology to support learning and websites for learning support were developed. Computer and Internet literacy classes were introduced in the first year of the project, especially for students who had little or no knowledge of computer use. Later, these students were taught how to use the LMS. Online learning activities were initially designed for four pilot modules, offered in 2005. Following this pilot implementation stage, all teachers with course modules were encouraged to develop online learning and support activities.

Ten course modules adopted the use of *Moodle*TM in 2006. In addition, the use of e-mail and other Internet resources was encouraged. Seven regional study centres (RSCs) were established around the country to provide Internet access and basic facilities such as printing, telephone and fax, for the benefit of students who did not have ready access to ICT facilities. While these centres were not necessarily located within easy reach of all students, they provided a much faster and more reliable avenue for communication than would otherwise be available. For example, use of postal mail services could, in many cases, take up to two weeks; one way only. Students were encouraged to use the RSCs as meeting points for course-related discussions and tutorials. It is hoped that such activities will also become important for engendering friendship and support amongst students (Mills, 1996). Efforts were also made to collaborate and to use the existing educational resource centres established by the Ministry of Education (MoE).

One of the primary motives behind this approach was to create a gradual shift to the RSCs for much of the activities currently carried out in the Residential School, so that students would become closer to not only learning support, but also play more active roles in organising collaborative learning activities.

Data Collection and Evaluation

In the final phase of the project, data were collected and analysed to assess the impact of the new ICTs on the quality and access of learning support.

4. Research Questions

The research attempted to answer a series of specific questions for:

Students

- Do students feel that the ICT-SLS has improved their ability to obtain learning support?
- Are students satisfied with the quality of the learning support provided by the ICT-SLS?
- Are there differences between completion rates and final grades, pre- and post-ICT-SLS?
- How are students using the ICT-SLS (how often, when, where, which components, etc.)?
- Are there gender differences in the uses of the system and students' perceptions of it?
- Are there differences between rural and urban students in the uses of the system and perceptions of it?

Instructors

- How are instructors using the ICT-SLS (how often, when, where, which components, etc.)?
- Do the instructors feel the ICT-SLS has had an impact on their workload?
- Do the instructors feel the ICT-SLS has had an impact on their ability to support their students?
- Are there any elements of the ICT-SLS that need improvement or change?
- Do the instructors feel they are adequately prepared to use the ICT-SLS?
- Do male and female instructors use the system differently, or have different perceptions about its impact on their workload or ability to support students?

- Are there differences between the ways that external and internal instructors use and react to the system?

5. Preliminary Results

During the preparatory phase, an assessment of the quality and accessibility of learning support in the DTEP was conducted, and ways to improve it were explored. Survey questionnaires were administered to 150 students representing 81 per cent of the enrolment that year. Interviews were conducted upon a stratified random sample of students, dropout students and course instructors. The preliminary results of the assessment (Jamtsho et al., 2006) highlighted important learning support issues, for example, feedback on student work, academic support, learning resources and ICT usage.

A serious area of concern for students was the turnaround time taken by instructors to provide appropriate feedback about student assignments. Only 27 per cent of the students said this feedback was timely. Most said that they would prefer more detailed feedback specifying the strengths and weaknesses of assignments, rather than merely the overall marks given to them.

Students also pointed out that there is hardly any support from the instructors or the institute after Residential School. Only 55 per cent of students reported that they were able to speak to their instructors at times of need. Even where telephone facilities exist, students did not find it useful, as it is hard to find a convenient time when the required support would be assured. Both students and instructors expressed concern over the lack of supplementary reference materials. Only 14 per cent of the students reported that they had reasonable access to reference materials for their distance-based study.

Considering the role that interaction among the students themselves should play in adult learning, this should be seen as an important component. Only 43 per cent reported that they had some opportunities to interact with other students, however. Despite limitations in their access to ICT facilities, most students (81 per cent) recommended that the DTEP should make use of ICTs, and 78 per cent were in favour of using the Internet for learning support.

6. Data Collection and Analysis

Data were collected using semi-structured interviews with students and instructors in the modules that used the ICT-SLS and survey questionnaires were administered to them (Appendix I). In addition, final grades and completion rates, and the LMS and RSC logs were examined.

Semi-structured interviews

Interviews were conducted with 12 of the 33 instructors (36 per cent), and 25 of the 190 students (13 per cent). A stratified sample was chosen on the basis of geographic location (remote, rural, urban) and gender. Face-to-face interviews were held using a formal protocol. The interviewer was instructed to use the protocol as a guide only, to ensure that key issues are covered, while allowing other issues and themes to emerge in a conversational manner. The student and instructor interviews were transcribed and analysed for themes and issues relating to the research questions. Thematic guides were used to analyse the interview transcripts.

Survey questionnaires

A Likert-scale questionnaire measuring perceptions of learning support quality and accessibility was distributed to 190 students and 33 instructors, to which 107 (56 per cent) students and 13 (39 per cent) instructors responded.

Logs and student records

Data from the official DTEP student records were used to determine final student grades and completion rates. Data from the user logs maintained at the RSCs and the logs generated by the LMS were also analysed.

RESULTS

I. Students

The results suggest that in general students found that the ICT-SLS had some value for them, and improved the quality of their

learning experience. Barriers were, however noted, which must be overcome if the ICT-SLS is to be fully integrated into the DTEP, and for it to have a significant impact on the provision of effective learning support. The following excerpt from one of the students' responses is indicative of the overall student perceptions.

The learners who have access to such facilities, it really helps us. For example, with lack of references we can easily download it from the Internet. When we have doubts, we log on to the discussion forum and get the clarifications from the instructors and colleagues very easily. Also we can share other resources which we find it useful... It has not increased the work rather helps in decreasing it. For example, I work in Dzongkhag administration where we have busy schedule. But with such facilities I am able to work from any place where there is accessibility of telephone connections. (Student qualitative response, 2006)

When asked if the system met their needs, only 35 per cent agreed or strongly agreed. As to whether it improved their ability to obtain learning support, 58 per cent said the system permitted easier assignment submission, 50 per cent said it resulted in better instructor support and 44 per cent said it was easier to receive feedback as a result of using the system.

Barriers to access

These figures do not suggest an overwhelming endorsement of the ICT-SLS system, owing in part at least to difficulties in accessing and using it. Only 38 per cent of the students said that they found the system easy to access, and 83 per cent of respondents said they had difficulty using it owing to, for example, their need to travel too far to get Internet access (33 per cent), slow Internet connections (22 per cent), lack of time (22 per cent), and problems in the system's use (22 per cent). One student summarised the key barriers the students faced:

Firstly, the lack of time is most prominent barrier. Since we have to perform so many duties as an administrator, we find difficult to find enough time to use such facilities. Our workload keeps [us] away from learning through Internet since we need good amount of time to use it. Secondly, there is lack of facilities like computers and Internet connection. We do not have sufficient resources that

we require. Thirdly, we do come across the lack of skills to use such ICT facilities. (Student qualitative response, 2006)

Barriers to access may help to explain why students used the system relatively infrequently: 66 per cent said that they used it less than once per month and only 30 per cent said, at least once a week.

Students' use of the system

Among the students' uses of the ICT-SLS, downloading study materials was the most popular (59 per cent), followed by assignment submission (50 per cent), communication with the instructor (42 per cent), use of the calendar (39 per cent) and discussion with classmates (31 per cent). In terms of utility, students strongly favoured the accessibility of online resources provided by the system, with 65 per cent citing this as the most useful feature. The usefulness of module outlines was preferred by 53 per cent, the asynchronous discussions by 49 per cent and the calendar by 46 per cent.

One of the original reasons for implementing the ICT-SLS was to improve communication between students and instructors, but 83 per cent of the students stated they used the system to communicate with their instructors less than once a month. The LMS logs also showed relatively little activity in the discussion forums than had been expected. Increasingly frequent use of e-mail by students to communicate with instructors, however, has been observed. Student access to the system was fairly evenly split between home/other (44 per cent), school/office (34 per cent), regional study centre (32 per cent) and Internet café (29 per cent). A somewhat surprising result is the relatively high proportion of students who indicated that they accessed the system from home/other places. This suggests that home access to the Internet, for this target group, may be more widespread than expected.

Final grades and completion rates

Between 2005 and 2006, course completion rates increased marginally in 9 of the 14 modules, decreased marginally in two modules, and remained the same in three (Table 3.2). No significant

Table 3.2 Completion Rates Pre- and Post-ICT-SLS

<i>Programme module</i>		<i>Completion rates (%)</i>			
		2003	2004	2005	2006
PCS 151	Teaching of Math	82	100	89	100
EDN 130	Teaching Skills	79	100	86	93
EDN 233	Learning Process	96	60	80	93
EFC 305	Sound and Speech	94	100	94	96
GEO 391	Spaceship Earth	94	98	100	93
PCS 371	Teaching of Social Studies	94	100	95	94
EDN 335	Teaching Strategies	94	100	93	96
PCS 381	Teaching of Science	94	100	95	100
GEO 493	Atmosphere	94	93	94	96
EDN 436	Education for Development	94	100	96	97
HIS 494	Legacy of British Raj	97	100	100	100
PCS 482	Teaching of Science	94	100	96	98
ENG 597	Literary Criticism	97	100	100	100
GEO 599	Understanding Environmental Geography	97	100	100	100

Source: Authors.

differences were observed in the final grades. Based on these results, it is not possible to form definite conclusions about the ICT-SLS's impact.

Gender differences

Comparisons of male and female students in terms of frequency and types of use of the ICT-SLS do not suggest any meaningful differences (Tables 3.3 and 3.4). The data do indicate a difference in intensity of use, however. Men and women both ranked the system's components in the same order, though the frequencies of usage by the women were higher than for the men.

Geographic differences

The data indicate differences in frequency of use between remote, rural and urban students, and possible differences in intensity of their uses. As Table 3.5 shows, frequency, and by inference intensity of use, was greatest for urban students and least for remote students. Table 3.6 shows that all three students group ranked the different components in the same order, but that the frequencies for each component were higher for all students.

Table 3.3 Frequency of Use: Females vs Males (%)

	<i>Females</i>	<i>Males</i>
Less than once a month	62	66
At least once a month	21	9
At least once a week	18	25

Source: Authors.

Table 3.4 Types of Use: Females vs Males (%)

	<i>Females</i>	<i>Males</i>
Download study materials	71	54
Submit assignments	64	45
Communicate with instructor	59	34
Check calendar	54	33
Discuss with classmates	45	24

Source: Authors.

Table 3.5 Frequency of Use by Location (%)

	<i>Remote</i>	<i>Rural</i>	<i>Urban</i>
Less than once a month	78	75	58
At least once a month	11	6	18
At least once a week	11	19	24

Source: Authors.

Table 3.6 Type of Use by Location (%)

	<i>Remote</i>	<i>Rural</i>	<i>Urban</i>
Download study material	33	51	69
Submit assignments	30	40	60
Communicate with instructor	30	30	54
Check calendar	30	36	49
Discuss with classmates	10	25	40

Source: Authors.

2. Instructors

Overall, instructors gave a moderately positive reaction to the ICT-SLS, but their questionnaires responses told a slightly different story compared with their interview responses. In the interviews, eight of the 10 instructors were overwhelmingly supportive of the ICT-SLS. The following comment from one of the instructors is indicative of the usually positive nature of their impressions:

It has made learning more efficient. In the past, the contact with the teachers and students were only during residential school times... But now because of this learning system the interaction has increased and I think to certain extent it has...improve[d] the learning quality. (Instructor qualitative response, 2006)

Most of the instructors qualified their positive impressions, however, with comments about the lack of accessibility to adequate computer facilities and reliable Internet service. For example:

It shall certainly help in distance learning. But my students have shown slow reaction to the facilities. They say the facilities are not accessible. But this will certainly improve the quality of the distance learning. Because we can really interact and share to learn better. (Instructor qualitative response, 2006)

Their positive comments can thus be regarded as more indicative of the potential of the system for a positive impact on learning and programme support, than of its actual impact. The questionnaire data may reveal a more reliable assessment of the system's actual value and impact. Eight of the 13 instructors indicated that its use led to improved learner support and increased frequency of support requests from students. Timely submission of assignments was cited as a benefit by just over half of the instructors, but only 38 per cent indicated that it resulted in higher quality of assignments.

Barriers to access

Despite their generally favourable reaction to the ICT-SLS, barriers to access were clearly a major issue. In the questionnaires, most instructors indicated that they had difficulty using the system, with connection speed being the most frequently cited hurdle (69 per cent). Actual Internet access was not a major issue problem for them, and only one instructor cited this as a factor. Lack of time (8 per cent) and user-friendliness (15 per cent) did not appear to have been significant barriers either. The interviews indicated a similar conclusion, with a greater emphasis on problems of Internet access. In the interviews, in fact, all instructors cited adequate access to a computer and the Internet as significant barriers. Adequate training for instructors and students in how to use ICTs was cited by four of the 10 instructors interviewed.

Instructors' uses of the system

Instructors appear to have made more frequent use of the system than their students: 46 per cent indicated that they used it at least once per month, and 31 per cent used it at least once a week. All of the instructors indicated that they used the system to communicate with their students at least once a month. Most of them (77 per cent) said that they access the system from the college, and the remaining 3 per cent indicated they did so from home. Instructors' uses and perceptions of the system were fairly evenly spread amongst the different components (Tables 3.7 and 3.8). As with student usage, the discussion forums were the least used feature.

Table 3.7 Types of Use: Instructors (%)

<i>Types of use</i>	
Send and receive assignments	69
Add materials to module	69
Communicate with students	61
Moderate discussions	38

Source: Authors.

Table 3.8 Value of ICT-SLS Features: Instructors (%)

<i>Component</i>	
Online resources	92
Assignment submission tool	92
Module outlines	77
Calendar	61
Discussion forums	61

Source: Authors.

Impact on workload

The instructors were evenly divided regarding the ICT-SLS impact on their workload, with half of them indicating that it increased their workload and half saying it either had no impact or reduced it. These results were found in both the interview and questionnaire data. The following comment from an instructor suggests that the ability to reach students more easily throughout the year eased the burden that they usually faced during the January residential session.

In the previous years we used to see the learners only once when they attend the residential school. It used to make very hectic days for the assessment and teaching. But now, we can provide feedback through the *Moodle*TM, we feel that the assessment and assistance are better than before. (Instructor qualitative response, 2006)

Gender and location differences

Because of the small size of the instructor sample ($n = 13$) and even smaller sample of female instructors ($n = 1$), it was not possible to make any comparisons on the basis of gender. Eight instructors came from outside the SCE, and five worked full-time at SCE. No substantial differences were observed between external and internal instructors in their frequency of use, however, nor in the components of the system that they used or found useful.

DISCUSSION

The ICT-SLS was implemented as a result of the DTEP assessment's recommendations regarding the need to improve learner support. Using the ICT-SLS offered a chance to increase levels of interaction between instructors and students, and possibly among the students themselves. It promised to make online resources more available to students and to allow instructors to keep their course modules up-to-date. The system also had the potential to transform an essentially independent DE study programme into a more interactive and collaborative programme the year round.

Implementing an online system of this kind in Bhutan faces significant obstacles, however. Internet access is limited, as are computers. Internet access at home and individual ownership of computers are even more limited. When Internet access is available, speed and reliability are often a problem. Clearly, a western model of online delivery that assumes reliable, widespread and relatively cheap broadband access at home, as well as individual computer ownership is not viable. For these reasons, the ICT-SLS has been used mainly with a focus on the distribution of programme information, and on instructor–student communication, rather than as a means to ongoing, collaborative work and interaction among instructors and students. This implementation approach chosen has sought to take the limited

access to the Internet and computers into account, while hopefully still having a positive impact on the quality of the DTEP.

The original purpose of this study was to determine whether the adoption of an ICT-SLS worked, and its impact on the ability of students to gain adequate learner support. It aimed to measure student and instructor levels of satisfaction with the ICT-enhanced DTEP, and whether the implementation of the ICT-SLS affected their performance and persistence. Finally, it sought to understand how instructors were using the system, and whether any gender or geographic differences existed in how students used it. The study indicated that the system's implementation did have a positive impact within the DTEP, but that owing to the barriers mentioned earlier its use was limited. This in turn made it difficult to arrive at a reliable impact assessment. Instructors and students alike were generally positive about the system, but without exception their positive comments were balanced by comments about the need for better and more reliable Internet access, more and better computers and facilities and the need for more training in ICT usage.

Despite these barriers, the opinions of students and instructors indicated that the ICT-SLS did improve the level of learner support, and introduced an element of interactivity to the DTEP that had, hitherto been absent except during the residential session. The system allowed students to submit assignments electronically rather than by mail only. This gave them more time to complete assignments, and enabled the instructors to provide more rapid feedback to students. Assignment submission, access to online resources and the ability to download study materials were clearly the most appreciated components of the system by the students, and the most used by the instructors. These distribution uses make distributing and accessing, information easier and faster, and are adequately justified in the context of Bhutan's intermittent and limited Internet access.

The study did not reveal any significant gender or geographic differences in how students were using the system. The raw data, however, do indicate that female students may have been using the system more intensively, if not more frequently. The results also indicate a relationship between frequency of use and remoteness, with urban students using the system most frequently and remote areas using it the least.

The impact on overall performance and persistence was difficult to measure. DTEP completion rates have been relatively high since 1998, averaging over 80 per cent, and given the limited implementation of the ICT-SLS, it would probably have been surprising if any direct impact on completion had been observed. One might have expected the system to have had some impact on final grades, in view of the fact that it permits easier access to resources and more timely feedback by instructors. The fact that this was not observed may be due in part to the system's limited implementation.

The successful diffusion and adoption of innovations involve a number of key variables at the individual and organisational levels. Rogers (2003) identified five key attributes contributing to the adoption of an innovation: relative advantage, compatibility with current values, complexity, trialability, and observability. The fact that downloading additional information and resources was viewed as a valuable feature of the ICT-SLS system suggests that the one attribute missing in this project was compatibility. This may be inevitable in a traditional transmission-oriented learning culture. The manner in which instructors were asked to use the ICT-SLS may have been incompatible with their current values and practices. Using ICTs to supplement a purely print-based programme may be their preferred approach at this stage, providing the necessary scaffolding for a gradual transition from the traditional and familiar instructional system to a more open and flexible constructivist approach. Introducing new technologies is always a complex iterative approach in this way, because until the appropriate infrastructure is in place widespread adoption is not possible. Governments, business and educational institutions are reluctant to invest in the infrastructure until they are confident that it has clear benefits, and that its adoption will be widespread. The result is a vicious circle—for the benefits cannot be demonstrated clearly without the infrastructure, and the adoption will not happen without the perceived benefits.

This is the situation currently facing the introduction of ICT-supported education in Bhutan. The moderate success of the current study demonstrates the potential of ICT-supported education, but the use of ICTs in the country cannot be optimised until an infrastructure providing reliable and relatively low-cost access to the necessary hardware, software and networks is

in place. There are encouraging signs in recent college data that the situation may be improving. Computer and Internet access has been growing steadily since 2005, and nearly 70 per cent of students own mobile phones. This suggests that the student body recognises the value of these technologies and is increasingly equipping itself to use them when the educational applications become available.

RECOMMENDATIONS AND CONCLUSIONS

In order to take full advantage of ICT developments in education, issues of access and technical support need to be addressed at a broad national level. It is strongly recommended that all stakeholders including the MoE, Ministry of Information and Communication (particularly their agencies such as the Department of Information and Technology, and Bhutan Telecom) and other member colleges and institutes of the RUB, should collaborate to address these challenges. Sharing of resources and mutual supporting will enhance the sustainability and optimal usage of resources. For a small nation with limited resources, this spirit of collaboration will be critical for progress.

To be fully effective, the implementation of ICT-supported DE must also be driven by clearly articulated institutional strategies and policy (Haughey, 2007). These must address the need to train both faculty and students in ICT skills. Introducing new media requires a “rethink and redesign of teaching systems and staff skills” (Thorpe, 2005) and often takes time. As Haughey (2007) emphasises, faculty development needs to stress how the use of digital technologies can facilitate the introduction of learner-centred pedagogies. The current study therefore recommends that RUB should develop a strategy for ICT-supported DE involving strong faculty input (Beers, 2007). In case of the SCE, it will be important to maintain the current staff training in the use of ICT-based methods including the use of *Moodle*TM, and to encourage more widespread and intensive uses of ICT within the DTEP and in other college programmes. It is the authors’ firm belief that the effective use of ICT will greatly facilitate the “focus on student learning outcomes” proposed by Maxwell et al. (2006).

Introducing learning management systems can also be expensive. Setting up the system, training people to use it and customising and maintaining it involves substantial investment. At RUB, whose colleges are spread across different campuses, it may be more cost-effective and sustainable to customise a single instructional LMS to meet the needs of the university system as a whole. The study's firm recommendation is that this system should be *Moodle*TM because of the expertise already acquired in its use at RUB, and because its open-source basis provides technical support advantages.

Finally, if the RSC's objective to facilitate a collaborative learning culture is to be achieved, it will be important to continue improving the resources available at the RSCs. The centres should be seen as an important vehicle for expanding the support system by networking with the students, so that they can play an active role in the learning support process. Besides improving their general ICT facilities, it will be important to develop them as learning centres where useful reference materials are available and tutorials and other activities frequently take place.

Even though web-based learning is fast becoming a norm rather than an exception in continuing and higher education, small and developing countries such as Bhutan are still very far from applying it effectively. With increasing economic progress, it may become tempting to leapfrog current technological developments so as to move rapidly from a closed conventional system to a more open and flexible style of ICT-based education. The uses of ICT in the current project were limited to enhancing learning support in distance education, and this may be an appropriate approach for institutions to adopt in other developing countries. It is Bhutan's experience that the process of applying technology with adult learners can be slow despite their expressed interest and readiness to learn. Changes in the way we learn require major changes in our beliefs about how we learn, and a systematic evolutionary change may be the most preferable and least painful way of ensuring such changes.

Appendix I

SURVEY INSTRUMENTS: STUDENTS AND MODULE INSTRUCTORS

Interview Protocols

Instructions to interviewers

In 2005, we pilot-tested the use of *Moodle*TM (learning management system) with four modules for level III of the distance programme. We also established seven regional study centres where students could access Internet, printing, phone and fax facilities. This is basically what we mean by ICT-SLS. Please communicate to the interviewees that the information collected will be used only for the purpose of IDRC-sponsored research study and to enhance the distance programme, and that everything shared will be kept in strict confidence. Their names will not be used in reports and they will be not penalised in any way for sharing their honest views.

1. In general, what were your impressions of the Information & Communication Technology-supported Learning Support System (ICT-SLS)?
 - Did you find it easy to use? Why, why not?
 - Did you find it helped your work? Why, why not?
 - Did you find it increased your workload?
2. What did you like most about the ICT-SLS?
3. What did you like least about the ICT-SLS?
4. Did having the ICT-SLS make you feel less isolated than before?
5. Do you have any suggestions for how the use of the ICT-SLS might be improved?
6. What barriers did you encounter in using the ICT-SLS:
 - Lack of computer/Internet skills?

- Poor access to the Internet/computer?
- Lack of time?

7. (Instructors only): Do you feel that having the ICT-SLS has improved your ability to support your students? Why, why not?

Questionnaire (students)

A) Student information

Put a tick (✓) in the box next to the response that applies to you.

1. Sex: Male
Female

2. Age: years

3. I'm currently enrolled in the Distance Course Level:

I II III IV V

4. Academic qualification:

Class 9 and below

Class 10 pass

Class 11 pass

5. Teaching experience:

Less than 5 years

5–10 years

11 years or more

6. Type of school you are currently teaching in:

Community

Primary

Lower secondary

Other (please specify)

7. Average number of students in the classes you teach:

36 or less

36–40

41 or more

8. Teaching load (in-class teaching hours only):

Less than 20 hours/week

20–25 hours/week

26–30 hours/week

9. Location of your place of work:

Remote*

Rural**

Urban

* Remote = no road or telecommunication facilities.

** Rural = limited road access and telecommunication facilities.

B) ICT-SLS support

Note: ICT-SLS = Information and Communication Technology-supported Learning Support System such as the use of Moodle™, e-mail, Internet, etc.

1. On average, I used the ICT-SLS:

At least once a week

At least once a month

Less than once a month

2. On average, I communicated with my tutor(s) using the ICT-SLS:

At least once a week

At least once a month

Less than once a month

3. Did you have difficulties using the ICT-SLS?

Yes

No

4. If yes, it was because:

Internet access was very far away

Internet connection was slow/inconsistent

I didn't have enough time

It was very complicated for me to use

5. Complete the following section using the scale provided:

Put a circle on the most appropriate number according to how you feel or think:

5 = Strongly agree; 4 = Agree; 3 = Unsure; 2 = Disagree; 1 = Strongly disagree

Having the ICT-SLS made it easier for me to get support from my tutor.	1	2	3	4	5
Having the ICT-SLS made it easier for me to submit assignments.	1	2	3	4	5
Having the ICT-SLS made it easier for me to receive feedback on my assignments.	1	2	3	4	5
The support I received from my tutors through the ICT-SLS met my distance study needs.	1	2	3	4	5
On average, I received answers to my questions regarding my distance study through ICT-SLS within one week.	1	2	3	4	5
On average, it took longer than two weeks to receive answers to my questions through ICT-SLS.	1	2	3	4	5
I found the ICT-SLS relatively easy to access.	1	2	3	4	5
I found the discussion forums in the ICT-SLS useful.	1	2	3	4	5
I found the module outlines in the ICT-SLS useful.	1	2	3	4	5
I found the module calendar in the ICT-SLS useful.	1	2	3	4	5
I found the online resources such as readings and websites in the ICT-SLS useful.	1	2	3	4	5
I found the assignment submission and feedback system in the ICT-SLS useful.	1	2	3	4	5
I usually use the ICT-SLS at the Regional Study Center.	1	2	3	4	5
I usually use the ICT-SLS at an Internet café.	1	2	3	4	5
I usually use the ICT-SLS at my school/at a government office.	1	2	3	4	5
I usually use the ICT-SLS at home or other places.	1	2	3	4	5
I used the ICT-SLS to communicate with my tutors.	1	2	3	4	5
I used the ICT-SLS to download readings/study materials.	1	2	3	4	5
I used the ICT-SLS to submit assignments.	1	2	3	4	5
I used the ICT-SLS to discuss issues raised in the modules with my classmates.	1	2	3	4	5
I used the ICT-SLS to check the module calendar.	1	2	3	4	5
Overall, ICT-SLS has improved the learning support I receive for my distance.	1	2	3	4	5

Please use additional sheets to write any other comments and suggestions you may have.

Questionnaire (instructors)

A) Instructor Information

Put a tick (✓) in the box next to the response that applies to you.

1. Sex: Male
Female

2. Age: years

3. Teaching load (in-class teaching hours only):

Less than 20 hours/week

20–25 hours/week

26–30 hours/week

4. Location:

Samtse College of Education (SCE)

Outside SCE

5. Does your module have a Moodle™ site?

Yes

No

B) ICT-Supported Learning Support (ICT-SLS)

Note: ICT-SLS = Information and Communication Technology-supported Learning Support System such as the use of Moodle™, e-mail, Internet, etc.

1. On average, I logged into and used the ICT-SLS:

At least once per week

Several times a month

At least once a month

Less than once a month

2. On average, I communicated with my students using the ICT-SLS:

At least once a week

Several times a month

At least once a month

3. Did you have difficulties using the ICT-SLS?

Yes

No

4. If yes, it was because:

Internet was not readily accessible

Internet connection was slow/inconsistent

I didn't have enough time

It was not very user-friendly

5. Complete the following section using the scale provided:

Put a circle on the most appropriate number according to how you feel or think:

5 = Strongly agree; 4 = Agree; 3 = Unsure; 2 = Disagree; 1 = Strongly disagree

I usually use the ICT-SLS at NIE.	1	2	3	4	5
I usually use the ICT-SLS at an Internet café.	1	2	3	4	5
I usually use the ICT-SLS at home.	1	2	3	4	5
I used ICT-SLS to communicate directly with my students.	1	2	3	4	5
I used ICT-SLS to send and receive assignments.	1	2	3	4	5
I used ICT-SLS to moderate discussions with my students.	1	2	3	4	5
I used ICT-SLS to add material to the module.	1	2	3	4	5
I find the discussion forums in the ICT-SLS useful.	1	2	3	4	5
I find the module outlines in the ICT-SLS useful.	1	2	3	4	5
I find the module calendar in the ICT-SLS useful.	1	2	3	4	5
I find the online resources feature in the ICT-SLS useful.	1	2	3	4	5
I find the assignment submission tool in the ICT-SLS useful.	1	2	3	4	5
I normally use the ICT-SLS during the day.	1	2	3	4	5
I normally use the ICT-SLS in the evenings.	1	2	3	4	5
I normally use the ICT-SLS during the week.	1	2	3	4	5
I normally use the ICT-SLS on weekends.	1	2	3	4	5
I felt that using the ICT-SLS increased my workload.	1	2	3	4	5
I felt that using the ICT-SLS had no effect on my workload.	1	2	3	4	5
I felt that using the ICT-SLS reduced my workload or made it easier to handle.	1	2	3	4	5
I felt that the use of ICT-SLS improved the quality of assignments I received.	1	2	3	4	5
I felt that the use of ICT-SLS improved the timely submission of assignments.	1	2	3	4	5
I felt that the use of ICT-SLS increased the frequency of requests for support by my students.	1	2	3	4	5
Overall, ICT-SLS has improved the learning support I provide to my distance students.	1	2	3	4	5

Please use additional sheets to write any other comments and suggestions you may have.

E-learning in Chinese Schools and Universities

4

China: *Chen Li (sub-project leader), Wang Nan and Chen Hui Na*

INTRODUCTION

New practices are rapidly emerging in two major areas of Chinese distance education (DE): elementary and middle schooling (K-12), and higher education. This chapter discusses the development of these two areas since 1996, and China's educational usage of radio, television, multimedia, satellite and the Internet. Emphasis is laid on video-conferencing and the World Wide Web, and uses of real-time and non-real-time educational methods are highlighted. Patterns and characteristics of e-learning, student support systems, management and business approaches and quality assurance methods are discussed, and the Chinese government's policies for standardising and sustaining online schools. Finally, the current problems and challenges of e-learning in China are identified in terms of lack of resources, expertise and standardisation of methods.

E-LEARNING IN CHINA

Modern information and communication technologies (ICTs) are being widely applied in Chinese education. They have generated so many new educational formats that government documents and academic papers frequently refer to this development as DE. The field has had extraordinary growth in China since 2000. With the constant evolution of the ICTs themselves, Chinese DE is becoming not only a major lifelong education option for full-time working adults, but also a key approach for sharing quality educational resources that greatly help to reform

the traditional pedagogies of class teaching. ICT-based DE in China is classified under four headings:

- *E-education* is the general term for all types of education conducted in schools and organisations where ICTs are used to enable self-study with the assistance of teachers separated from the students in time and/or space. Examples include radio and TV universities, network and online education colleges (e-colleges) and Intranet teaching in middle and elementary schools (e-schools).
- *E-teaching* relates to the type of teaching assisted by modern ICT for students separated from the students in time and/or space. Examples include Internet-based student research, self-study and collaborative study with digital resources in traditional classes.
- *E-delivery* is a specific term used for ICT-based resource delivery in initiatives such as the Modern DE Project for Rural Fundamental Education. The Government of China has invested 10 billion Yuan since 2003 in this project, which is expected to utilise a wide range of ICTs including satellite dishes and the Internet in order to achieve resource-sharing by sending courses into the vast rural areas of the country.
- *E-learning*, naturally, is the outcome of these processes in terms of their beneficial effects on the student.

As in other countries, China has witnessed the development of three major stages of DE. The first generation has its core in correspondence education, which uses printed materials as main resources and communicates with postal deliveries of homework (correspondence tutoring), assisted by a certain amount of time of face-to-face tutoring. Correspondence education has been maintained in China since 1950 as support for the higher education system. It is provided by independent correspondence schools and by the correspondence/off-campus education colleges of, for example, Beijing Normal University, Beijing University of Posts and Telecommunications and Renmin University. Correspondence tutoring can be slow and inefficient, however.

The second generation of DE included education by radio, television, computers and methods including audio/videotape

and CDs. Radio and TV have a prestigious position in the higher education system for they have been the main media in China's drive to expand college enrolment. Relying exclusively on one-way broadcasting technologies, these second generation media have disadvantages, however, preventing direct teacher-student and student-student communication. In order to compensate for the lack of interaction, Chinese correspondence and radio/TV education colleges organise extensive programmes of face-to-face tutoring, question and answer and short-term on-site residence.

The third generation of DE is the modern format based on the application of interactive ICTs. It contains two key components: multimedia and networking. Modern DE allows more efficient exchanges among teachers and students, and encourages student cooperation and self-study. Third-generation ICT permits real-time (synchronous) and non-real-time (asynchronous) communication, using a DE environment and resources that make teaching and learning more flexible and more individualised. Modern DE can be found in middle and elementary schools and in higher education institutions such as radio and TV universities and network education colleges. Unlike the first two generations, the modern DE technologies have reached out from the college campus to create methods of distance-based fundamental education.

Currently, educators in China are using a wide range of media environments and technical support in their teaching and learning practices, to present, transmit, receive, manage and store information, and to design an appropriate atmosphere in which teaching and learning can be conducted (Zhang Xiaojing, 2006). The major ICT formats are:

Print

Despite the emergence of new media, print is still the main DE medium. Schools, colleges and universities provide print-based learning guides and bulletins. The learning guide is usually in a textbook format describing the framework and main content of the course and learning strategies. The bulletins take the form of newspapers, journals or magazines.

CDs

CD-based courseware continues to play a DE role as it has for years. Schools send CDs directly to the student for home study,

and to off-campus learning centres, allowing students in urban and remote rural areas to receive the same resources. China now has 78,000 CD playing points in the rural remote and mountainous areas where teaching resources are in short supply. The number of teachers in these areas is low, teaching capacity is low and the teaching tasks are heavy. In areas with a teacher shortage, CDs can serve as assistants to the teacher, optimising the classroom teaching's impact.

Cable TV

At present, there are approximately 300 million TV sets in China's urban, rural and remote areas. With improvements in digital compression technology, mixed-optical fibre, co-axial network technology, asynchronous transfer mode (ATM) network technology and digital modulation technology, DE via cable-TV synchronous broadcasting, video broadcasting and video-conferencing is becoming possible.

Satellite TV

The satellite broadcasting system is the largest information transmission medium in China, and has become a key DE medium. It covers schools in the remote areas, and its economic cost is relatively low. Based on broadband transmission of large quantities of information, satellite-based content is more visual and the images more vivid. Programming is sent from the computer classroom to a receiving station via the satellite transmitter, for display on TV and projectors. A notable example of this development is Tsinghua University. With the development of Ku Waveband, operating at a higher frequency and increased resources on the channels, two-way video-conferencing is possible.

Video-conferencing

Video-conferencing uses existing media to deliver human audio clips, static and moving images, and other types of information to the student's computer, enabling geographically diverse users to exchange detailed material in the effort to understand one another. Schools use video-conferencing and electronic whiteboards

in real-time for two-way interaction. The teacher speaks in the main classroom while the students attend in distant classrooms. While transmission quality is quite good, the costs are high and the format involves greatly reduced flexibility for both sides, so this method is not often applied in DE classes.

The Internet

In 1999, China upgraded the high-speed core network and the medium and high speed regional networks of the China Education and Research Network (CERNET), making it the second largest Internet provider in China. In October 2003, the satellite-based wideband multimedia platform was launched, which transformed the nation's satellite radio and TV education from analog to digital. It supports multimedia, realises intensive simultaneous and non-simultaneous interactions and provides the learners with abundant resources. China has four major internets: China Education and Research Network (CERNET), China Public Computer Internet (ChinaNet), China Science and Technology Network (CSTNet) and China Golden Bridge Network (ChinaGBN). Internet-based technologies combine with multimedia computers to generate e-learning. Students can study in any place at any time on own schedule, and can log on to the websites of online schools to download the materials and to communicate with classmates and teachers. The online environment encourages the students to take the initiative to discover and master knowledge. Perfect for full-time employees, online education has become the most commonly used DE format.

With these developments, an ICT-supported e-learning network has taken shape by air and ground links, providing interactive services and paving the way for a bright e-learning future in China. Online schools such as Beida Middle School and Beida Primary School are using mixed satellite and Internet modes. Skynet (a satellite-based network) is used for teacher-student communication, and Earthnet (that is, the Internet) is used to transmit written documents, teaching programmes, exam questions, exercises and the latest information about education in the Beijing area. Recently, Xi'an Jiaotong University has successfully developed the first multimedia real-time DE system in China, with an independent copyright. Successfully combining the best

educational resources of satellite and the Internet, this system has the advantage of satellite wide-scope broadcasting and ground network two-way interaction, and has effectively resolved several technical problems of running DE via Skynet and Earthnet. This technology is expected to solve the severe shortage of teaching resources in the middle and western areas of China and in rural and remote areas, and also to generally promote the development of Chinese DE.

The Modern DE Project for Rural Fundamental Education is taking the modern generation of DE technologies to the country's most remote regions. This project by the Ministry of Education (Government of China, 2003) is providing training for teachers, educational opportunities for more students, and enhanced rural education at low costs. Its goal is to equip all rural elementary schools with satellite reception, VCD or DVD players and support materials, and all rural middle schools with computer classrooms. Although using the term "DE", however, the project is so far concerning itself with resources delivery rather than with the actual process of teaching and learning. Owing to extensive differences in the ICT approaches of elementary/middle schools (e-schools), and DE colleges (e-colleges), this chapter will deal with these two levels of education separately.

THE K-12 ONLINE SCHOOLS

According to the China Internet Information Centre (2007), the number of Internet users in the country in 2006 was 137 million. Chinese "netizens" spent 16.9 hours online each week, and the number using the Internet via broadband was 90.7 million. The Internet is increasingly used in China, and is beginning to influence people's lives. An important sign is the large number of online schools targeted at primary and middle-school students (the K-12 online schools). With the maturing of Internet technology and the popularisation of personal computers, online schools have become popular with students as well as with their parents, for their interactive and personalised approaches.

China has 250 million primary and middle school students and 550,000 primary and middle schools, but its educational resources tend to be insufficient and unevenly distributed, so there

is a big market potentiality for e-learning in K-12. Online schools are now the most important form of DE in Chinese primary and middle schools. According to official statistics, since the first K-12 online school enrolled students in 1996, the number of such schools has grown to over 200, mainly concentrated in Beijing, with nearly 600,000 registered students from different parts of the country. In Beijing alone, there are 30 K-12 online schools and 120,000 registered students, and at the online school of Beijing Number 4 Middle School, the number of registered users is 60,000. In 2004, the number of fee-paying students at K-12 online schools in China was approximately 200,000, and the current annual tuition fee is 2,000 Yuan. The annual income of these schools is estimated at 500 million Yuan (Liang Jinfeng, 2006).

I. Evolution of K-12 Online

Online schooling's 10-year process of development can be divided into three stages: the starting stage, the adjusting stage and the steady stage. Table 4.1 shows these three development stages based on the statistics of partly online schools (Zhang Xiaojing, 2006).

Table 4.1 The Development of Online Schooling in China (1996–2005)

<i>Stages of development</i>	<i>Year</i>	<i>New schools</i>
1. Starting	1996	2 (5.7%)
	1998	2 (5.7%)
	1999	3 (8.6%)
	2000	10 (28.6%)
2. Adjusting	2001	6 (17.1%)
	2002	2 (5.7%)
	2003	6 (17.1%)
3. Steady	2004	3 (8.6%)
	2005	1 (2.9%)

Source: Zhang Xiaojing (2006).

The starting stage (1996–2001)

Over these five years, the growth of K-12 online schools was very fast, reaching a peak in 2000 and 2001. There were as many as 1,000 K-12 Online Schools in the whole country (Du Yongsheng, 2006), and online schools began to be accepted by more people.

Zou Yiping (14 August 2002) found that as many as 30 per cent of netizens were choosing to receive continuing education via online schooling, and that it had become a new learning fashion. The investors and managers of online schools put more focus on the enormous possibilities of profit, however, and lacked understanding of educational methods and operating problems.

The adjustment stage (2001–03)

Despite a fast growth in the number of online schools at the earlier stage, the number of online schools at this stage, for external and internal reasons, dropped sharply from over 1,000 to 200. Nearly two-thirds of them were closed in a single year (Nie Hongzhang and He Yuan, 2005). The main reasons for this were:

- lack of educational resources;
- lack of attention by online school managers to educational methods;
- lack of management ideas—cooperation between the schools and enterprise did not have a clear demarcation of rights and duties; and
- managers' blind optimism about the industry's future.

In 2001, the Internet bubble broke, the severe acute respiratory syndrome (SARS) crisis emerged and online schools lacked the necessary funds to continue. At this point, the Chinese Ministry of Education and Beijing Municipal Government took emergency measures to open an online classroom for primary and middle school students. After the crisis was over, many schools began to pay more attention to DE, thus opening the way for another stage of K-12 online school development.

The steady stage (2003 to date)

In 2003, K-12 online schools returned to a relatively steady period of development. Those which had survived the adjustment stages understood the routine of running online schools. At present, the total number of K-12 online schools in China remains at

approximately 200. A joint survey by Sohu.com Education and Beijing News Daily (2006) has shown that there are many people who have not chosen online learning, and that there is much scope for future development of online schools.

2. Student Support Systems

The student and learning support system is an important part of DE in China. According to an analysis of online schools by Hu Xiaoyong and Zhang Chuan (2000), the main functions of K-12 online schooling are synchronous teaching, information about examinations, facilitation by experts, a database of exercises, a virtual classroom environment, psychological counselling, a chat-room and recreational games. These divide into two categories: communication and resources. Communication support includes general interaction between teachers and students, a students' forum, etc. Resources support includes an online library and databases of case studies and exam questions. The support should be provided by teams including faculty members, educational technologists, editors and facilitators. The faculty members are the subject matter experts who guarantee the content and quality of the teaching. The educational technologists are responsible for determining and planning the teaching modes. The editors and facilitators play supportive roles (Chen Yiqin, 2003). In practice, however, the teaching content at most current K-12 online schools tends to be collected by editors from the Internet. Commercially produced resources are not usually adequate, and eminent teachers are often too busy to answer student questions and to provide online tutorials. At many online schools, the course facilitators are often editors and other support staff, local part-time teachers and college students in part-time employment. The shortage of teachers is thus a major problem faced by the online schools as well as in the traditional educational system.

3. K-12 E-learning Resources

There are three main teaching modes in K-12 online schools: real-time online teaching dominated by video-conferencing, non-real-time teaching and independent teaching based on use of the World Wide Web.

Real-time online teaching

This mode, also known as live broadcast teaching, brings together teachers and students in different places via an interactive broadband network. Real-time online teaching is dominated by video-conferencing. The students attend the lesson in multimedia classrooms in different places, and the teacher gives the lesson from another multimedia classroom. Students can ask the teacher questions and the teacher can answer them in real time.

Non-real-time teaching

This mode is also known as rebroadcast teaching. Using a multimedia network, the students can control their learning by choosing independently from a supply of electronic courseware combining words, images and sounds. The teacher can guide the process, helping the students and answering their questions over the network.

Independent teaching mode

In this mode, the teaching contents are placed on a website for the students to select in the classroom and at home. The teacher creates a combination of external textbook content and interactive online multimedia according to the course's requirements.

The resource construction of China's K-12 online schools occurred in two stages. The first stage (1996–2000), focused on static teaching content. Online schools basically transplanted the teaching content of eminent schools, teaching notes and exam papers, to the network. The second stage (2001 to date), focuses on a more dynamic presentation of the content, characterised by video-based teaching, and by teacher–student communication. With the rapid development of computer network and multimedia technology, online schools have made substantial progress in the construction of their teaching content and platforms. The development of audio-visual technology in particular has made it possible for real-time classrooms and network methods to be more effectively integrated. There is room for improvement, however. The theory of network education and the practice of designing good network teaching materials are not yet well

harmonised. Many basic educational websites are commercially created and tend to give high priority to the aesthetic appearance of the interface while ignoring the effective organisation of the teaching materials. The higher quality teaching materials tend to be those produced by fee-collecting online schools (Li Zengwei, 2003). A major problem is that the network teaching resources of primary and middle schools lack an appropriate evaluation mechanism.

4. Quality Assurance and Management

The quality of K-12 online schools is monitored by the government and within the school system. The government formulates policy for standardising the management process and for guaranteeing a healthy, sustainable system. The schools themselves collaborate in many ways to assure their quality and development and to make profits. In 2000, a decision of the State Council on “deepening educational reform and promoting quality-oriented education” identified the need for vigorous efforts to modernise educational technologies and to increase educational automation. The following measures are encouraged:

- construction of a modern DE system based on China’s educational research network and a satellite video system;
- use of the network to provide lifelong learning opportunities and training in rural and remote areas;
- popularisation of computers and IT-based education in primary and middle schools; and
- development of excellent educational software.

To meet the demands of the information society, the MoE pointed out in a 2000 document (“Guiding Opinions about Accelerating the Construction of Information Technology Course in Primary and Middle Schools”) that over a 5–10 year period it intends comprehensive popularisation of ICT as a required course, to connect 90 per cent of independently established primary and middle schools to the Internet, and to enable every primary and middle school teacher and student to share online educational resources. To strengthen the management of online education and to ensure a smooth implementation of the Modern DE Project,

the MoE has issued a series of documents since 2000, including a “Public Notice on Strengthening Management of Educational Websites and Online Schools”, and an “Announcement of Distributing the Interim Method for Managing Educational Websites and Online Schools”. These documents request local governments to strengthen their management of educational websites and online schools, and have had two effects discussed below.

Sustainable development of online schools

The policies have allowed enterprises and school-enterprise cooperative entities to run online schools. It is not explicitly stated whether a joint-stock system can be introduced into the school-enterprise cooperative running of online schools, nor is it stipulated that the holding party must be the school which guarantees the teaching quality. No restrictions are imposed on how tuition fees can be handled by the enterprises and the school, and it is not stated whether or not the enterprise can share in the returns from the tuition fees. Thus, scope is left for further development.

Standardised management of online schools

The policies have introduced an open management mode. An online school can either be a public institution or an enterprise in law, but an enterprise must cooperate with the school and must hold an educational licence. Any authorised educational website, which applies to be listed in the stock market in or outside China in the form of an enterprise must gain permission from its Education Ministry in advance. These different modes seek to guarantee both the teaching quality of online schools and their sustainable development.

In this context, several modes of managing K-12 online schools have emerged.

Multilateral cooperation by government, enterprise and school

This mode involves donations by enterprises or individuals, or funds by government organisations, supporting economically

backward areas and helping them to change their educational situation. An example is Hope Online School, jointly sponsored by China Youth Development Foundation and Beijing SMTH Technology Company Ltd. Its purpose is to increase support for the primary schools of the Hope Project, enabling them to obtain the most advanced teaching resources as soon as possible, and making possible for more teachers and students in the remote areas to receive online training and learning; hence a sharing of good educational resources.

Enterprise-school cooperation: The cooperation between an enterprise and a school is for mutual advantage. For instance, this is achieved by using satellite and computer network technology provided by the company as an educational platform, and by introducing the company's advanced management system. The company cooperates with the school to accomplish the teaching tasks and to bring the advantages of DE to more and farther places, thus making positive contributions to the level of basic education in China. The enterprise-school cooperation is the most popular mode of running schools in China today.

Hosted by enterprise: In this mode, a school is independently run by an enterprise, though without a fixed partnership between them. The necessary educational resources are obtained by purchasing, or by employing teachers and college students, who have to do their regular teaching and facilitation work and that of the college at the same time.

Hosted by the school: In this mode, a school is either run independently by one school or cooperatively by more than one school. The advantages of this mode are: clear relations, high enthusiasm among students and guaranteed teaching resources. Meanwhile, however, the school may lack a high level of technology development, and experience in operations and procedures.

K-12 online schools usually charge fees to support their operations, which must be paid, in part at least, before the user can download the information (Liang Jinfeng, 2006). Users who have not paid the fee can see the website's introductory displays only. Two operating modes are used. B2C is the main business mode for basic online education. The school sells online resources and

teaching services via its website. When running an online school in the B2C mode, it is necessary to make a good initial start, to expand quickly, and to launch publicity and expansion campaigns supported by experts, scholars and celebrities. The students choose their subjects and exam questions at their convenience. In the B2B mode, an online school sells its teaching content and services to primary and middle schools under its brand name, and enters into a partnership with them by an approach known as the “authorised chain store of online education” model. As each K-12 online school expands its business and the market competition intensifies, there is a tendency for these two modes to merge. Nowadays, K-12 online schools basically “walk with two legs”, or use different marketing modes for different situations.

K-12 ONLINE: SUCCESSES AND PROBLEMS

China is a vast country with uneven regional development. This is reflected in the quantity and quality of education. A survey by Nie Hongzhang and He Yuan (2005) showed that 63 per cent of students and their parents say that they choose online schooling because they think they “can obtain guidance from famous teachers in different places”. Despite the steady usage of K-12 online schools by the public, however, numerous problems arise from an unclear understanding of their essential features and operations (Zhang Xiaojing, 2006). The schools have developed unevenly with respect to the quality of teaching, services, courseware and websites (content, forms, links updates, etc.). Most K-12 online schools provide an online library containing links to general resources, though not based on the school’s own courses.

A common and serious problem in the school’s curriculum resources is the over-emphasis on the aesthetics of teaching materials, without attention to the effective design of the teaching environment and practices. In general, the network delivery of most online schools still emphasises “teaching”, the one-way spreading of knowledge, and uses a monotonous, teacher-centred approach consistent with traditional modes of instruction without harnessing the diverse features and advantages of online education. The students can only receive the content passively, and the so-called independent learning provided by many online

schools is limited to the opportunity given to the students to learn from the network courseware on their own, without the necessary resources for effective independent learning. Online courses should provide opportunities for group discussion, role playing and problem solving, and should use such methods as research-oriented and collaborative learning, thereby moving to a more student-centred learning mode. Development of online schools is being impeded by the lack of adequate evaluation mechanisms. In the traditional teaching, evaluation methods provide constant feedback about teachers' performance. In network teaching, however, a reliable method for evaluating teachers and facilitators has not been devised. Evaluation in network teaching is typically limited to the routine assignments and final examinations given to the students. No evaluation occurs from fellow students in the learning process, no evaluation by the learner himself and no evaluation of the students' learning process by the teacher.

As individual online schools mature, however, they can be seen to play an increasingly important role in the sharing of excellent educational resources. For example, the online section of Renda Middle School recently launched "The League of Mutual Building and Mutual Sharing of Basic Education in Remote Areas" in conjunction with six organisations including the MoE and the China National Library. The school offered its teaching materials free of charge to students in remote areas of western China, giving the local teachers a chance to explore up-to-date and effective teaching methods by online methods. The popular method of running K-12 online schools in collaboration with enterprises may prove vital in the development of efficient future technologies and approaches. Cooperation between all parties, based on a clear division of rights and responsibilities, will make it possible for many users—the students, the school, the enterprise, the family and society—to win.

E-LEARNING IN HIGHER EDUCATION

I. Evolution of Online Higher Education

E-learning in higher education in China is also based on the government's "Modern DE Project". In May 1998, the MoE adopted

“SuggestionsonDevelopingE-LearninginChina”, which explained the urgency of establishing such a system, and provided guidelines for it: overall planning, expansion of demand, greater openness and higher quality (Government of China, 2003). In December 1998, the MoE formulated “Plans for Vitalising Education in 21st Century”, identifying goals to enforce a “Modern DE Project”, form an open education network and establish a system of lifelong learning. E-learning was formally implemented in China in 1999, with the MoE’s authorisation of e-learning pilot units at four higher education institutions (HEIs), including Tsinghua University. Since then, numerous HEIs across the country have joined the project, and the higher education DE system has grown at a rapid rate. By 2006, the number of institutions had risen to 68 HEIs and the China Central Radio and TV University (CCRTVU),[§] most of them under MoE supervision. The annual approval of pilot schools in the project is carefully controlled (Table 4.2).

Table 4.2 Approved E-Learning Project Pilot Schools (1999–2005)

<i>Year</i>	<i>Pilot schools</i>	<i>HEIs approved</i>
1999	5	5
2000	31	26
2001	44	14
2002	67	22
2003	68	1
2005	69	1

Source: Zhang Xiaojing (2006).

Since its pilot stage, the project has been carried out at different levels, including diploma and non-diploma. The former covers junior college programmes, bachelor’s degree and bachelor’s degree programmes for adult students with high school diploma, while the latter includes graduate-level courses and professional training programmes. According to the 2003 annual report of modern DE in China, the total number of students enrolled in DE institutions was 976,394, and the number actually registered was 942,614. These figures represent an increase of approximately

[§] Editor’s note: During the 2009–10 publication phase of this book, the China Central Radio TV University (CCRTVU) has been renamed as the Open University of China (OUC).

50 per cent from the previous year. By the end of 2005, the number of students enrolled in pilot schools for DE exceeded 3 million, with two-thirds at the CCRTVU and the others at common colleges (Liu Ying, 2005). By the end of 2005, the pilot schools offered 18,000 courses covering 153 academic specialties in 10 fields: engineering, management, medicine, literature, sciences, agriculture, economics, pedagogy, law and philosophy.

The student body includes an increasing proportion of full-time employees, numbering from 579 in 1999 to 165,043 in 2000, and 911,866 (97 per cent) by the end of 2003. Many DE students also received further/on-job training such as the bachelor's degree programme for adult students with a junior college education or high school diploma. By the end of 2003, 27 pilot schools had graduated 186,880 students. The number of teachers and workers in e-learning was 378,603, with 18,701 (5 per cent) on campus and 359,902 (95 per cent) at off-campus learning centres. By the end of 2005, the total number of graduates surpassed 1.5 million, with 400,000 from common colleges and over 1 million from CCRTVU (Liu Ying, 2005). Since the beginning of the project, the government has attached great importance to the quality of e-learning. In 2002–03, with 67 approved HEIs already in the pilot programme, the MoE tightened the rules in order to control the number of schools, and issued a series of documents including the "Proposal about Improving Education Quality of Modern DE by Enhancing Administration" and the "Tentative Measures on Managing Off-Campus Learning Centres". The MoE has also emphasised e-learning research in documents such as "DE Basic Theories and Practice Models" issued in 2002 as a key aspect of the Tenth Five-year Plan.

2. Student Support Systems

Higher education institutions provide student support on-campus and via off-campus learning centres.

Off-campus learning centres

In conjunction with the MoE, CCRTVU has created a "China Public Service System for DE" to assist schools in recruitment and learning support by creating open e-learning centres. Since February 2003, when the opening ceremony was held in the Great People's Hall and the first centres received their licences,

40 provincial TV universities and over 300 at the city level have joined the system. According to government figures, by the end of 2003 all provinces, autonomous regions and municipalities across China had established their own off-campus learning centres. The CCRTVU alone had established 800 centres providing DE support services to 20 HEIs. Sixty-four percent of off-campus learning centres had been set up by CCRTVU and HEIs, 3 per cent by companies, and the remaining 33 per cent by other organisations. By 2005, over 6,000 off-campus learning centres had been established in the country, over 3,000 of them independently by the 69 DE institutions.

Support staff

Support staff members include recruitment officers, hosts, teachers and tutors and student file managers. In 2006, the DE Research Institute of South China Normal University (SCNU) surveyed 17 pilot schools and found that in two learning centres on average each teacher is responsible for 20–30 students; in three centres for 30–50 students, in seven centres for 50–100 students and in two centres for over 100 students. Most pilot HEI learning centres hire their teachers according to the job requirements specified by their campus-based headquarters, but these requirements still vary (Cai Jianzhong and Zhuang Xiaoxian, 2006).

Support media

The same survey found out that schools adopt many means of student and learning support, including classroom teaching, postal delivery, telephone tutoring, e-mail and text messages video on demand (VOD), online real-time and non real-time tutoring, bulletin board systems (BBS), Q&A systems and audio/video automated check-in methods. All of the schools meet the basic demands of diverse student groups by offering at least six means of support. The most common methods are group teaching, VOD, e-mail and BBS.

Management support

Schools also support DE students via information and consultation services. Via mail, telephone, BBS and text messages, advice is given on academic and non-academic problems, and on

the people to contact in order to solve them. The school websites include details about *specialities* (introduction, curriculum, teaching plans and course outlines), *faculty* (lecturers and liaison officers), *instructions* (key study points), *resource manuals* (including instructions about technology platforms and software), *supervision* (class attendance and assignment feedback) and *management* (course registration, exam booking and charges) (Cai Jianzhong and Zhuang Xiaoxian, 2006).

Academic support

Resource services include textbook delivery, library and network databanks. Textbook delivery covers the release and update of paper materials and CDs. Students can order any textbook online in any place and at any time, and can choose how they would like to receive it, whether by visiting the centre or having it delivered directly to their homes (Feng Lin and Zhang Aiwen, 2006). Schools provide students with diverse instructions about instructional manual delivery, study strategies, progress analysis and DE skills including schedule management, stress management and self-evaluation (Chen Li, 2005b). The SCNU survey of 17 schools found that it is difficult for DE students to access university libraries, and that 47 per cent of schools have provided digital e-libraries to solve this problem. The study pointed out that most schools emphasise homework performance, and the teachers are required to review assignments at least five times each semester. Since hundreds, thousands and even tens of thousands may attend the same course, it is debatable as to how homework should be reviewed in a personalised manner. Some HEIs are developing a test to identify the individual learning styles of Chinese DE students and how best to provide them with feedback.

Community support

Schools have made a great effort to use the campus and cyber-community cultures to create a unique environment helping students to be more aware of their role in society. Learning communities use BBS and chat techniques to give information about activities on campus, and to create links between the teachers and

students, and among the students. They allow full-time and part-time students to make friends as well as doing course work, and they help the students to obtain support from their co-workers and families (Chen Li, 2005a).

3. E-learning Resources

In 1999, the government established the National Education Resource Warehouse of DE. With support from universities and educational institutions nationwide, the Warehouse has collected a vast amount of teaching materials and courseware, and has become the foundation of DE resources. According to the 2003 annual report of China Modern DE, 18,493 courses had been developed nationwide by that time, using college textbooks, other books specially designed for DE, and adult or correspondence education books (Table 4.3). To serve them, 7,318 sets of courseware were developed, 3,758 of them in 2003 alone, and over 80 per cent of course materials by the schools themselves. Courseware here refers to complete online courses (full sets of software with all content course-based), and online or console versions (may not cover all content). By the end of 2003, 24 schools were using courseware covering 5,000–9,999 hours of study, and seven had courseware covering over 10,000 hours. The schools had invested extensive resources in courseware development and utilisation, resulting in a large set of materials for DE use. In addition, over 20 per cent were sharing resources with each other, and 50 per cent of schools had joined the programme for inter-school credit recognition. By the end of 2005, the MoE had invested in over 300 New Century online courses (web-based materials and resource databases of case studies and exam questions), selected more than 450 national top courses from nearly 20,000 courses and planned another 1,500.

Table 4.3 Sources of Teaching Material in 2003

<i>Source of teaching material</i>	<i>Number of courses</i>
Adult/correspondence higher education textbooks	1,351
College textbooks	9,575
Textbooks specially designed for DE	3,977
Other	3,590

Source: Government of China (2003).

4. Quality Assurance and Management

There is a three-level structure to guarantee network performance in DE. The primary level is the schools' own management and control assurance system; the second is the work of the National DE Collaboration Group of Chinese HEIs—a guild-like organisation of network education colleges; and the third is government macro-monitoring, management, evaluation and certification, usually carried out by the MoE and provincial education authorities (Ding Xingfu, 2005a). The MoE takes most of the responsibility, and has adopted a set of policies for business approval, recruitment, specialities, diploma, degree, graduation certificates, length of schooling, charges, management of off-campus learning centres and resources development and standards. From the project's launch in 1999 to the end of 2004, the MoE enacted 24 decisions governing e-learning, including the "Proposal about Improving Education Quality of Modern DE by Enhancing Administration (2002)" and the "Tentative Measures on Managing Off-Campus Learning Centres" (2003). An annual reporting and inspection system is applied to all educational institutions, and an online monitoring mechanism is used for DE performance.

The MoE also stresses the need for standards to regulate educational resources. In 2000, the DE Resource Committee released the "Regulations on DE Resource Technologies" and in 2001 the MoE DE Technology Standardisation Committee issued the "Regulations on DE Technologies". These serve as a frame of reference for China's educational resources. The Ministry also organises regular meetings, workshops, seminars, forums and symposiums to promote discussion and research on how to ensure and regulate DE performance. The main indicator of a school's DE performance is the student performance assessment, governed by an open but strict policy known as "easy to get in, hard to get through" (Ding Xingfu, 2005b). Special attention is paid to the homework scores. Students who have not completed all courses, done the homework, or failed assessments, are forbidden to take the final exams. The process is monitored via formative and summative evaluation methods. In addition, a Ministry approved project promotes the development of theory and research relating to a network education certification system. The current guarantee and management systems within the schools will remain incomplete,

however, unless schools raise more funding in collaborations with the business community. By the end of 2003, 41 per cent of schools had taken this joint-investment approach, and were proactively seeking external support with good support from the corporate world. In fact, DE in China is becoming increasingly commercialised, changing the way in which it is managed.

In order to encourage e-learning and to raise funds for the ICT infrastructure, the MoE has allowed pilot schools to develop joint venture programmes. This decision opened a new “golden era” for Chinese DE with businesses keen to invest in it. By the end of 2002, 53 per cent of all 67 pilot schools gained their financing from joint programmes with the business community. Some investors also participated in running the DE venture (Table 4.4). In this increasingly market-driven mode, the costs and benefits of DE in higher education are being intensely examined.

Table 4.4 Operation of Pilot Schools (2001–03)

<i>Number of schools</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>
Run by school independently	23	42	52
Run by both school and investors	22	23	15
Other (the Central Conservatory of Music)	0	1	1

Source: Government of China (2003).

The costs of Chinese e-learning in higher education may be examined in terms of course development and delivery, and fixed assets and depreciation.

Course development and delivery

1. **Equipment:** Some schools need to buy computers and software for their employees, while others ask them (especially part-time workers) to bring their own.
2. **Materials:** Buying existing materials and researching new ones.
3. **Development:** Printing and packaging paper materials, manufacturing discs and audio/video recording.
4. **Testing:** Checking the value of existing materials and pilot-testing new ones (Zheng Qinhuo and Chen Li, 2004).

5. Modifications: Re-developing and updating course content.
6. Delivery: Of course materials and support via mail, telephone, fax, satellite transmission, e-mail, BBS, chat rooms and/or news groups, Internet access, equipment and staff training.
7. Labour: Course planning and development, compilation of materials, software programming, multimedia design and marketing, audio/video recording, integrating, testing, modification and personnel training.

Fixed assets and depreciation

The calculation of fixed assets and depreciation involves:

- assessing the remaining and depreciable life of fixed assets and figuring out the accrued depreciation;
- identifying the annual pre-paid expenses for land use or other long-term assets; and
- calculating the annual depreciation costs of websites and all kinds of software.

The cost accounting procedures for schools include: identifying cost objects and period, setting cost accounts, recording, accumulating, apportioning expenses and calculating costs and preparing cost analysis summaries. The process involves dividing the expenses into teaching and non-teaching groups.

CONCLUSIONS

This review has indicated distinct differences between the evolution of DE in the K-12 and higher education fields, but also many similarities in the problems have been encountered in these areas. DE in China has developed with great speed since the Modern DE Project was foreseen in the late 1990s. Since then, DE has evolved from a means of pre-service education into in-service education in China's lifelong learning process. Today, most DE students are in-service, and only a minority is pre-service. Most enroll in degrees or diplomas, while a few select non-certification courses. To serve these new demands, DE has had to change with

respect to its objectives, content, administration and the use of ICTs, and have encountered numerous problems in the process.

The DE schools and their staff still lack a sufficient knowledge of DE standards and procedures. The annual report of China Modern DE in 2003, showed that they do not have a clear orientation to their DE work, and tend to enroll recruit students without considering their backgrounds and abilities. They lack experience in e-learning methods, and need to develop their relationships with off-campus e-learning specialists and to standardise the management of off-campus learning centres. In 2002–03, the MoE created various documents to regulate the management of DE, and many schools have made good progress in the development of high-quality online courses. Others have ignored the MoE document, however, and have found that their approaches have been incompatible with those of other schools in the region. As a result, disorderly and sometimes vicious competition has developed between some schools for student enrolments, their learning centres have failed to realise the benefits of sharing resources and wasteful duplication of effort has resulted. Though schools have taken some measures to guarantee DE teaching quality, the quality assurance system itself did not come into being in 2003, and many problems still exist. For example, student messages and requests cannot usually be communicated to the course organiser in a timely fashion, and often need to go through a middle service agency. In addition, China does not yet have a set of mature methods for cost-effective analysis of DE to compare with those of its traditional educational system. Research into the processes and cost-effectiveness of modern DE should focus on how to establish and enhance a school's own quality assurance, and to build up distinctive brands of online education.

An ideal goal of DE research in China will be to develop an integrated teaching design to suit all students' needs, and resources capable of providing effective independent and customised learning. China's DE teachers need to increase their understanding of "learner-centred" education, and of the ways in which ICT methods and materials can be designed to support learners' individual needs. In 2005, Beijing Normal University (BNU) was permitted to offer DE as a Master's level programme, stimulating research and professional development in these areas. In other universities, however, DE still exists as just one

programme in the educational technology field. The number of students so far specialising in DE is too small to meet society's demand for professional DE skills.

Elite education has been the main philosophy of mainland China in the past. This can be inferred from the meagre 10 per cent enrolment rate in higher education, whereby only elite students have the privilege of an education. As economy and society develop, however, an increasing proportion of the population needs and wants a higher education. The face-to-face teaching methods used in higher education from the bachelor's degree upwards cannot support this demand; and applications of ICT and e-learning are needed to support more flexible learning formats. Using ICT-based interactive platform, students can discuss with their teachers and tutors to realise their academic goals. E-learning will lift Chinese higher education to a new level, transforming it from serving not just the elites of society but the general public, as a crucial component of China's lifelong education system.

Attitudes to Distance Education in China

5

China: *Chen Li* (survey coordinator) and *Wang Nan*

INTRODUCTION

The analysis of Chinese distance education (DE) in the previous chapter is extended by an in-depth survey of the nation's DE practices, and of attitudes to them. Current factors affecting DE adoption are revealed by consultations with a comprehensive range of teachers, students, managers and policy-makers. The survey reveals lessons for DE development in China.

RESEARCH METHODOLOGY

The project examined the development of DE in China through document reviews, focus group discussions, field trips, questionnaire surveys and semi-structured interviews. The responses of students, educators and managers were considered. This report concentrates on the survey findings not reported in the previous two chapters. As the main survey tool, a questionnaire originally developed by the PANdora network's Mongolia and Viet Nam teams was customised for administration by the China team. The validity and reliability of the questions were checked, and some items were revised to improve their specific reference to DE in China. Some of the questions were adapted to deal with the country's different socio-economic factors.

A careful sampling approach was used to ensure that the breakdown of male/female and urban/rural respondents was as balanced as possible. In all, 533 completed questionnaires were received from urban (52 per cent) and rural (48 per cent) respondents. The sub-division of the sample according to gender was 54 per cent male and 46 per cent female (Table 5.1). Semi-structured interviews were then conducted with selected participants, based on the survey results.

Table 5.1 The Survey Sample (N = 533)

<i>Sub-groups</i>	<i>Gender</i>	<i>Urban</i>	<i>Rural</i>	<i>Total</i>
Students	M	135	116	251
	F	123	98	221
Teachers	M	5	8	13
	F	6	12	18
Managers	M	4	18	22
	F	2	6	8
Total analysed		275	258	533

Source: Authors.

The study's findings are reported in the following sections.

DISTANCE EDUCATION AT TERTIARY LEVEL

I. DE Facilities and Resources

Types of learning centres providing student support services

In China, DE is served by online colleges, which have major responsibilities for planning, developing and monitoring DE resources. There tends to be no one person in the universities who is fully responsible for DE. The current survey focused on one of these colleges, with approximately 30,000 students, and supported by two types of learning centres. One is in the college system, and is managed through teaching quality control. The other is in the public service system and is managed through negotiation with the system. The average number of students served annually by these online college learning centres in China is approximately 200, compared with an average of 10 students in the public service centres.

Types of educators providing academic support for students

Three types of teaching staff in China's online colleges provide the students with academic support. Well-known professors and experts are invited to support the students' curricular needs. Face-to-face tutors from local institutions give back-up support on difficult teaching points, and before examinations. Other online

tutors, often senior students in the colleges, answer students' questions online. There are currently only 52 online tutors in the online college surveyed, and the online teacher–student ratio is thus 600:1. The lack of online teachers reduces student involvement in online learning.

The primary DE model involves face-to-face instruction in regional centres

There are three main sources of DE in China: face-to-face delivery in regional learning centres, print handouts and CDs, and online courses. The survey results indicate that more than 90 per cent of all participants prefer the face-to-face teaching and learning model. The dominance of the face-to-face educational model is commonly supported by the argument that Asian students are culturally and psychologically dependent on physical interaction with their teachers.

A minority of DE students use Internet methods

Most of the student sample uses the Internet, either from home (79 per cent), or from the home and office (38 per cent). Students tend to choose online methods because of their flexibility in relation to time and place of learning. Eighty-two per cent of the online students prefer the flexibility of web-based learning owing to their physical distance from educational institutions. In China, universities have started to include Internet usage in the tuition fees, with each student receiving a username and password to log in to university portal sites in order to check their examination records. They also have free Internet access to university libraries.

Types of Internet resources

The online methods used by the online colleges include e-mail, online resources and asynchronous discussion forums. Audio/video communication methods and synchronous (real-time) chat techniques are rarely used. While students generally praise the face-to-face model, those with ICT skills evidently recognise the advantages of ICT and want more opportunity to take part in

ICT-based DE. Others state that they lack the time to acquire the ICT skills to make use of multimedia learning materials, CDs and Internet-based material. Print handouts are also the medium they can most readily access.

Time spent in DE studies

The survey showed that DE students in China spend between 1 and 60 hours in studies per week, with an average of seven hours. Sixty per cent of them would like more time to spend on their studies, and estimate that they could spend up to 10 hours each week if appropriate DE courses are made available to them. The responses of learning centre managers indicated that the main criteria for selecting a DE medium are its interactivity and accessibility (Table 5.2). They rate these higher than the medium's acceptability to students, although these factors are obviously connected.

Table 5.2 Learning Centre Media Selection Criteria

<i>Managers' ratings of media selection criteria (1 = low importance; 5 = high)</i>	<i>Min.</i>	<i>Max.</i>	<i>Mean</i>	<i>SD</i>
Interactive potential of media	3	5	4.3	.65
Availability of technology	3	5	4.3	.75
Accessibility to students	3	5	4.2	.63
Availability of software	3	5	4.2	.70
Suitability of the subject matter	2	5	4.1	.71
Acceptability to tutors	2	5	4.1	.83
Acceptability to students	2	5	3.7	.80

Source: Authors.

2. Students' Responses about DE Development and Design

Most distance learners have a positive attitude to DE

In interviews and focus group discussions, students agreed that online forms of learning help them to understand the lectures and to revise for exams. Fifty-six per cent of them expressed an interest in web-based learning; 34 per cent would like to combine web-based learning with in-class training; and 22 per cent would

like to receive web-based tuition only. Their survey responses indicated that their online learning activities concentrate mainly on reading online course material, viewing course-related video material, submitting assignments and self-testing. They value the opportunities that the Internet provides to communicate with teachers and classmates “about web-based learning, life and work”.

Students' online activities

The survey showed that students regard activities such as online browsing and participation in discussion forums as important, but many complain about the time it takes for teachers to reply to their questions and to correct online homework (Table 5.3). Some state that they do not receive enough information about how to use online DE resources. On the other hand, it should be noted that many of them participate actively in online activities that are not related to their studies: for example, chat rooms, forums, photo galleries, and games. So it is not likely to be a major problem for them to learn how to use these media for educational purposes. It is probably more difficult for their teachers, from another generation, to define and teach these skills.

Table 5.3 Students' Online Learning Problems

<i>Students' ratings of online problems (1 = low importance; 5 = high)</i>	<i>Min.</i>	<i>Max.</i>	<i>Mean</i>	<i>SD</i>
Learning independently	0	5	3.7	1.05
Time taken to receive teacher feedback	0	5	3.5	1.08
Time management	0	5	3.5	1.12
Having a slow Internet connection	0	5	3.2	1.18
Too many resources (e.g., features in web-based learning platforms, links)	0	5	3.2	1.07
Time taken to type online contributions	0	5	3.1	1.19
Technical problems (computer crashes, web-based platform malfunctions, etc.)	0	5	2.9	1.19
Difficulty of expressing personal opinions in web-based learning	0	5	2.8	1.04
Inconvenience of locating Internet access at university, library or work	1	5	2.8	1.19

Source: Authors.

Students look forward to more interactivity and guidance in their course activities

The web-based course materials of China's online colleges are typically in a three-part format: video lectures, PowerPoint presentations, and text-based resources. These media suffer from a lack of teacher–student and student–student interaction, and learning skills guidance, and do not meet students' DE needs. The high level of importance students attach to telephone-based and other interactive learning methods is shown in Table 5.4. It is highly desirable that they should also be provided with facilities for using synchronous conferencing methods so that they can listen to and take part in real-time sessions with lecturers from abroad.

Table 5.4 Students' Perceived Importance of Interactive Media

<i>Student responses (%)</i>	<i>Telephone w/instructor</i>	<i>Telephone w/students</i>	<i>Chat room participation</i>	<i>Posting and responding</i>
Most important	17	13	29	19
Important	45	39	49	38
Medium	28	31	15	37
Unimportant	8	17	5	6
Most unimportant	2	0	2	0

Source: Authors.

Students look forward to more flexible activities

Students' survey responses expressed dissatisfaction with the inflexible nature of the resources, and a preference for guided learning activities and participation in discussions. Many students in the China sample indicated that they think online learning requires strong skills in independent learning, time management ability, resource processing, typing speed and use of network technology. They indicated the importance of guidance in developing these skills. They would also like online resources to be used for alumni communications.

Course resources are insufficiently updated

Students stated that DE course updates are not organised on a regular basis. Lecturers need to improve their DE material

preparation skills, and it is noted that younger lecturers tend to be more familiar with techniques for the development of online multimedia materials (for example, PowerPoint). An interview with the manager of an online college indicated that it cannot afford the human and financial resources or material needed for course updating, and that large-scale resources improvement is needed. The college is considering small-scale materials updates including added interactivity and learning skills guidance.

Audiovisual course materials are well suited to students' DE needs

Students suggested that their education should include more practical exercises and the use of multimedia training materials. The most convenient media are audio, VCD and textbooks, especially in DE and in view of the widespread inaccessibility and expensiveness of the Internet. Students like to learn from visual images (75 per cent), especially if they are animated (85 per cent). It is unfortunate, therefore, that rural students cannot take advantage of the wide range of multimedia learning material available on the Internet, and need to travel to an Internet café to participate in any kind of online DE. Mixed-media approaches are well suited to adult learners' needs, allowing flexibility of time and space. Combining online and face-to-face methods fulfil complementary needs. Efforts to adapt to the specific needs of DE students are being made in China's online colleges.

Cell-phone messaging would improve individualised guidance

The students' responses also indicated that online colleges provide limited learning skills guidance—mainly in the first week of each semester, by the course teacher using the face-to-face mode. Each student designs a learning schedule, and the teacher helps them to make it reasonable and efficient. This early process strengthens communication between teachers and students, and the students' understanding of and active participation in the online learning process. Students indicate, however, that it focuses on the group, and that more individualised learning approaches are needed: for example, measures of online learning style which would allow students to adopt a learning schedule based on their own strengths and weaknesses. The learning centres concentrate

on providing web-based information and respond to individual student phone calls and e-mails. Students would welcome cell-phone text messages from the learning centres with, for example, electronic library and online resource information, and assignment reminders.

Students stress the importance of face-to-face teaching and consultation

Each course at the online college organises face-to-face tutoring on at least three occasions. All of the students interviewed, without exception, feel that this component should be increased. They indicate that without it, they receive little emotional and psychological support for their work, especially in the DE mode. They would welcome face-to-face social activities to strengthen peer support and teacher–student communications, and to provide career planning information.

2. Teachers' Responses DE Development and Design

Distance educators lack experience

Most of the educators surveyed were part-time and under 40 years old. Few of them use web-based methods, however, because they do not fully understand DE technologies and jargon. Most lecturers and tutors are hired from traditional schools, with experience of face-to-face instruction, but limited in DE experience. Over half have been involved in DE for less than six months, and have worked in one DE course only. Only 40 per cent of the teachers stated that they include a final assessment at the end of a course; 35 per cent reported featuring assessment methods during their courses. Educators prefer a combination of web-based and face-to-face tuition, with the web-based component lasting 4–6 hours per week.

Teachers' technology skills

The survey of educators indicated that 68 per cent of them have the basic technology skills for DE work. They receive this training

online at school (58 per cent) or at home (35 per cent). Online training is especially convenient for on-campus graduate students and for part-time teachers with other jobs. Of the teachers, 74 per cent have mastered network skills, and 19 per cent claim a range of skills: for example, operating MS Office and e-mail software, video/audio player software, uploading and downloading files and participating in synchronous and asynchronous discussion methods. Collaborative learning strategies are not generally used.

Teachers' problems in teaching online

The survey with the educators revealed that they face particular problems in relation to the need "to think a lot to encourage students to be engaged in online learning", "to match students' learning approaches with a teaching model" and "lack of discussion support from other teachers". Table 5.5 indicates that one of the problems discussed by the teachers most often was the lack of ICT facilities and skills.

Table 5.5 Problems Faced by Distance Education Teachers

<i>Teachers' ratings of online problems (1 = low importance; 5 = high)</i>	<i>Min.</i>	<i>Max.</i>	<i>Mean</i>	<i>SD</i>
Encouraging students to participate online	2	5	3.8	0.93
Lack of faculty support	2	5	3.7	0.91
Matching students' learning approaches with teaching models	0	5	3.5	1.34
Students' lack of experience with web-based instruction	0	5	3.3	1.30
Adapting teaching styles to the web	0	5	3.3	1.14
Time to choose appropriate resources	1	5	3.3	1.11
Time to read students' contributions	1	5	3.2	0.96
Time to contribute online	0	5	3.2	1.19
Time to provide online support	0	5	3.1	1.15
Time to answer technical questions	0	5	3.0	1.25
Using web-based tools that are not suited to the cultural context	0	4	2.7	0.91
Lack of technical support	0	4	2.6	1.06

Source: Authors.

Teachers are not used to designing self-study activities

The survey with the educators showed that in face-to-face teaching, they are used to designing systematic presentations,

question-and-answer sessions and discussions about traditional instructional strategy. In online instruction, they try to transfer the same approaches to the Internet, and fail to apply collaborative study strategies even though these are generally regarded as beneficial for students' understanding. The main reason is lack of training in how to design these online activities, and to advise students' independent learning processes.

Advantages and disadvantages of DE

The survey responses from educators indicated that the main advantages of DE are "the ability to send and receive feedback about assignments" and "linking course information to external resources". The option "to communicate with many students at once", considered by some to be the most important advantage of DE, was not foremost in their responses. When asked about the disadvantages of DE, educators most commonly stressed the inefficiency of online communication compared with face-to-face teaching, and the possibility of online cheating and false identities. They also felt that students do not actively participate in online learning activities, and that the greatest difficulty faced by DE teachers is encouraging students to do so. They suggest that students do not appreciate the importance of online learning.

A typical student case

Teachers' survey responses suggested that a typical DE student may participate in all of the available face-to-face course sessions, but never logs in the online teaching platform, or even uses it to submit assignments. The student's final examination results may show outstanding knowledge, but because of lack of online learning participation, the overall score in the course is not as excellent as the student expected. This leads to confusion on the student's part. Many students apparently do not understand the concept of DE and still use the traditional methods of study even in the DE context.

3. Management and Quality Assurance

Off-campus learning centres serve too many DE institutions at once

Interviews with the managers of the online colleges indicated that off-campus learning centres are currently responsible for serving too many DE institutions simultaneously. They provide student admissions, teaching and examination services with limited staff and high workload. The result is reduced quality of service. The questionnaire survey of off-campus learning centre managers also indicated the difficulty of reconciling the requirements of different educational institutions, especially in relation to student admissions (Table 5.6).

Table 5.6 Off-campus Learning Centre Difficulties

<i>Managers' responses (5-point agreement scale)</i>	<i>Mean</i>	<i>SD</i>
Students are not active in web-based group study	3.9	.74
Tutors lack Distance Education skills	3.5	.68
Examinations are strict, and many students enroll at other schools	3.3	.92
The effectiveness of web-based learning is not understood by students	2.9	1.08
Tutors who give face-to-face tutorials are part-time, and not positive about web-based instruction	2.9	.97
Competition between institutions in recruiting students is severe	2.7	.80
There is little communication between lecturers and tutors	2.6	.67
Network and equipment are often out of order	2.4	.93
Students are not active in face-to-face tutorials	2.4	.76
Many students quit during web-based learning	2.4	.81
Too many students cheat in examinations	2.3	.88

Source: Authors.

The reputation of the schools served affects the online colleges' ability to attract students

The managers of online colleges also indicated that the success of their institutions relies on the reputation of the universities with which they are associated. The reputation of online colleges is mostly based on that of the associated universities, and the online colleges with higher reputation attract more students.

ISO9000 standards provide efficient internal quality assurance

The managers reported that some online colleges have established internal quality assurance (QA) methods based on ISO9000 standards. To improve inter-departmental coordination and supervision, colleges have developed rules for each task and the managers showed the researchers the flow charts that their departments have produced for this purpose. For example, one task is to organise the students' final examinations. The flow chart dictates that the departments first send the examination papers to the off-campus learning centres; second, the centres send the examination results to the departments; third, the departments input the results into the examination record. These QA procedures improve the efficiency of work flow sequencing.

Online colleges train their tutors through off-campus learning centres

The online colleges in China have started to provide DE training for their teachers. As many teachers are scattered throughout the country, it is inconvenient to organise face-to-face training. So, the colleges have divided its training programmes into two phases, train the off-campus learning centre managers first, so that the managers can then train the teachers in their regions. The survey of online learning centres, however, revealed that only 20 per cent of them have done so, and that these have provided training in the network and web-based instructional management skills, rather than in DE theory and practice for teachers.

Lack of research in distance education

The interviews with online college managers revealed that departments with research and development responsibilities conduct little scientific research. The survey responses from the off-campus learning centres revealed that 70 per cent of them had never conducted any DE research, and that their managers did not understand its importance. The remaining 30 per cent claimed to have conducted such research, though did not seem to attach importance to it. In China, DE as a research branch of educational technology currently exists at Beijing Normal University only, which has offered a DE Master's degree since December 2005.

The number of graduates from the programme is insufficient by far to meet DE's social demand.

The online colleges cannot adequately supervise the off-campus centres

Although off-campus learning centres are the main agencies for DE student support, the online colleges they serve have difficulty in supervising their work, and the quality of off-campus student support is sub-standard. The relationship between the colleges and the learning centres is cooperative, but the colleges do not have the authority to appoint and dismiss staff in off-campus learning centres. One college manager stated that he would like the college to establish its own off-campus learning centres, but that national policies do not give it the right to do this.

The online colleges cannot adequately supervise their faculty members

The majority of faculty members in the online college are part-time assistant lecturers employed by the off-campus learning centres, and not directly managed by the colleges. The colleges often do not even know the number of assistant lecturers available to them, and lack the authority to require them to participate in college activities or to heed suggestions and requests for improving teaching quality. These problems seriously impair the development of DE quality.

The perceived role of the online college

The interviews with online college managers indicated the role that they perceive the colleges are fulfilling. One manager pointed out that a current emphasis of online instruction is degree education, which should be an integrated process "to shape a man". He believed strongly that this process is not just one of knowledge delivery, but should nurture interpersonal interaction skills. Networked activities are insufficient for this, he stated; the online college must pay attention to the possibilities of online education while continuing to provide face-to-face instruction.

4. E-learning for Disadvantaged Groups

In China, DE methods have been implemented with the goal of serving lifelong learning and continuing education needs, rather than catering to social elites. The current DE curriculum does not meet the needs of marginal students, however, and this reduces the social recognition of DE qualifications.

Adult education funding

Online learning is a natural course for the adult students in full-time employment, who represent the majority of online college students. Currently, however, the Chinese government does not provide scholarship programmes for adult students who also work, and online colleges have to raise their own funds for this. The main explanation given for this is most adult students at work have their own jobs and families, and money is not a major problem for them. When individual students in online colleges have serious financial problems, they can accept donations from college personnel.

Gender issues

Male and female students have equal opportunities to participate in higher education in China, but no special provision is available for the female population which has a particular need for education. The interviews with online college managers confirmed that at present they have no special priorities for male/female recruitment, enrolment, examination or graduation. Yet adult females in Asian society have to bear extra burdens such as house-keeping and raising the children. Time and energy to study is less available to them and the online colleges are now planning to adopt special measures to assist female students to complete their studies successfully.

Geographical issues

Some of the Chinese universities have special policies for students in rural areas, but cannot always fulfil their priorities for

two reasons. When the online colleges were first established, policies to expand the scale of national education did not stress support for remote areas. In addition, in economically under-developed areas, network and computer facilities are weak, and it is difficult to develop the effective collaborations that online colleges need with other organisations. Greater emphasis is now being placed on the need for technical and management sectors to adapt to local economic development needs.

Students with disabilities

The Chinese online colleges do not reject students with disabilities, and there is no discrimination against them. They are treated the same as other students, and no specific priority policies are in place for them. This causes those students many problems, however.

CONCLUSIONS

As other Asian nations, China urgently needs DE methods in order to provide quality education for people scattered across vast landscapes; and China has a particular need for it to help educate its huge population. Students have a positive and optimistic attitude to the goals of DE owing to its flexibility of time and place. DE delivery methods involve combinations of Internet, audio and video, CDs and textbooks. Students like to use multimedia content such as images and animation, but in economically under-developed areas they suffer from lack of Internet access. Many DE students do not actively participate in online learning activities, therefore. Currently most of them still prefer face-to-face education in regional learning centres. How to increase their enthusiasm for web-based learning becomes the most important problem currently facing online educators.

With the introduction of new ICTs, DE has scope to improve significantly, benefitting both students and teachers. The main

recommendations of this project for China and other Asian developing nations are as follows:

1. ICT-based DE has great potential for resource sharing, for delivering vocational and degree qualifications to rural areas and disadvantaged populations, and for enhancing educational equity in Asian nations.
2. DE institutions require a significant amount of start-up funding and policy. It is desirable to obtain these from government sources, and understanding and support from government is vital. If government cannot provide support, DE institutions should seek to cooperate with companies and enterprise groups.
3. The foundations and strategies of DE differ greatly from those of conventional education, and it is not efficient simply to copy traditional models in DE teaching and learning. Professional development in these areas should be a high priority in DE institutions.
4. The educational traditions of Asian countries differ from those western countries, and attention to the local DE situation should be paid from the outset. In China, adult learners are more used to learning through face-to-face lectures, and are unused to self-directed learning. It is important to provide learning skills training programmes at the beginning of Asian DE courses.
5. The most promising ICTs cannot improve teaching and learning automatically, but require high-quality methodologies. Increased attention should be paid to the instructional design of DE courses and learning support.
6. Applying ISO9000 methods can improve the quality assurance of DE institutions, and can help to develop a more efficient industrialised education model than is possible in traditional education.
7. Asian DE institutions should develop appropriate cross-border standards for sharing DE methods and materials, and for increasing the international acceptance of DE in general.

Distance Education Policy and Practice in Mongolia[§]

6

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Hong Kong: *Weiyuan Zhang (sub-project advisor)*

INTRODUCTION

This chapter examines the current implementation of distance education (DE) in Mongolia, reviews its DE policies and evaluates its current uses of educational media. It also investigates the benefits of DE for disadvantaged groups, including women, disabled people, people in low socio-economic groups and in remote areas. Based on this analysis, the study aims to develop recommendations for policy-makers and practitioners for the future development of DE in Mongolia and other parts of Asia with similar conditions.

DISTANCE EDUCATION IN MONGOLIA

National policy in Mongolia aims at establishing the information society, and laying the foundation for the nation's knowledge-based society by enhancing extensive applications of ICT in all sectors of society. By 2012 Mongolia aims to become one of the top 10 ICT-developed countries in Asia. It has become one of the countries to have eradicated illiteracy among its adult population, for which it was awarded UNESCO's Literacy Prize in 1970. Since 1921, after the Mongolian Revolution, radical reforms in

[§] This chapter is written in collaboration between the Health Sciences University of Mongolia and its PANDora project advisor, Dr Weiyuan Zhang of Hong Kong University. The authors express appreciation to their secretarial staff, and the teachers, facilitators, methodologists, students and staff of ministries of the two countries for their active participation in the project and important suggestions.

education and in other spheres of social life occurred. For example, Mongolia has been successful in achieving universal equal access for girls and boys, though recent statistics indicate a lower number of males in higher education. A means of redressing this gender imbalance in favour of the men is required. Mongolia's allocation of unit costs to education appears to be higher than that of many developing countries. Costs per student are estimated to be Togrog (Tg) 137,000 for pre-school, Tg 61,000 for primary and secondary education, Tg 148,000 for technical and vocational training and Tg 185,000 for higher education. The kindergarten budget is high, but as the entry age to primary school falls a gradual shift in resources from the kindergarten to primary levels is expected. The government's plans to further diversify the sources of finance for technical, vocational and higher education should gradually reduce budgetary pressure, allowing additional allocations to be made for basic education and much needed investments in quality.

Specialised vocational training plays a key role in generating the manpower needed for national economic development. Today, however, Mongolian vocational and technical education and special attention is not cost-effective. Since 1990, there have been positive changes in vocational and technical education, and special attention has been paid to training highly skilled workers/craftsmen. Some institutions have merged and the number of students in vocational schools has decreased. Since 1993, there has been a drop of 5,705 students and the total enrolment is now 17,382. Training in the vocational centres is mainly limited to agriculture, construction and industry, and has been subsidised by central and local budgets. Despite initiatives to increase enrolment, access to education is becoming increasingly difficult for the poor. As more people access educational opportunities, it becomes more difficult for impoverished people to access the same. Many families cannot afford to pay the costs of school meals, and in some families there is a lack of clothing supplies. The heating and financing for schools has decreased, and some schools have deteriorated physically so that parents do not send their children to school. Some herders do not send their children to school because they lack dormitories.

DE is seen as a valuable means of relieving these problems and achieving universal access in Mongolian education by:

- ensuring that all out-of-school youth (in primary and secondary school age groups) have educational opportunities at primary and lower secondary levels;
- ensuring that all adults, especially women and disadvantaged groups, have access to free and quality literacy and post-literacy programmes, and also to affordable and quality skills programmes and lifelong learning;
- improving the quality, relevance and results of all continuing education (complimentary primary and lower secondary programmes, literacy, post-literacy and life skill programmes) for youth and adults up to age 40;
- developing a comprehensive national strategy for affordable and relevant continuing education, lifelong learning opportunities, in order to build a learning society; and
- strengthening the management capacity of continuing and non-formal education (NFE) at the local level.

DE is a new educational sector in Mongolia, where it is defined according to the country's specific priorities and attributes. It is based on new information and communication technologies (ICTs), on daytime, evening, part-time and full-time training elements, and on self-education principles whereby students choose their subjects and modes of interaction with their teachers without restriction as to location and time of study. DE organisations in Mongolia serve the following public groups, whose educational needs cannot be supplied by traditional means:

- youth who need additional qualifications for university entrance;
- people with an interest in postgraduate training;
- people in remote areas;
- people whose job situations restrict their opportunities to study;
- marginalised people who cannot study outside the home;
- soldiers, officers and their family members;
- talented people who wish to obtain a qualification in a short period;

- people who wish to study in a foreign educational organisation;
- people from abroad who wish to study in Mongolia; and
- prison inmates, immigrants and unemployed.

To achieve its educational goals, Mongolia is collaborating with agencies including the Asian Development Bank, the European Union's TACIS programme, German Technical Assistance, the International Development Research Centre (IDRC), the Japan International Cooperation Agency (JICA), the Mongolian Foundation for Open Society (Soros Foundation), the United Nations Development Programme (UNDP), the World Bank and the governments of India and Korea. Funding from these agencies has gone to central and local budgets for projects benefiting Mongolia's remote regions, for example, the Need for Informal Education for Women in the Gobi Region, the Learn and Work projects, and numerous health, e-government, e-commerce, e-industry, e-education and e-citizenship projects. The vision of these initiatives is to provide the population with equal rights whatever their situation. The specific advantages of e-education are that it:

- permits interaction with specialists;
- delivers up-to-date information in a timely manner;
- enables equal access to a high standard of education by urban and rural people;
- provides a bridge between rural and urban sectors;
- reduces the cost of education for low-income people;
- provides rural people with new technologies and services; and
- opens up new methods of continuing education and training.

The cost-effectiveness of DE can be assessed:

- in comparison with traditional teaching methods;
- in relation to the goal of studying while working;
- as a means to study at any time students wish;
- as a means of serving increasing numbers of students;
- as a means of harnessing effective ICTs;
- in relation to teachers's ability to adopt new practices;
- in terms of penetration to remote regions; and
- as a solution for social problems.

The overall impact of DE can be measured in terms of its impact on this situation, via measures including enrolment, retention/dropout and graduation. It would also be ideal for DE quality to be measured by a national test of learning achievement, though none exists in Mongolia at present.

The success of DE in Mongolia depends on good relationships between organisers, tutors, students and government members. Before they embark upon a course of DE study, the students must be interested in studying, aware of the nature of DE methods and able to participate actively. They must also be able to mobilise themselves in their studies via skills of self-education. DE professors must be flexible regarding pupils' changes of interest and needs, and able to improve their own skills of teaching and ICT knowledge. Tutors must be able to prepare enough materials for the students, to register them, order handbooks, develop equipment schedules and organise reports. Facilitators must be able to organise activities and be a bridge between the teachers and students. The government is the most important contributor to well organised DE in Mongolia, with an important contribution to make from the earliest planning stages.

MEDIA USES IN MONGOLIAN DE

DE has evolved in Mongolia through the correspondence model, the multimedia model, the tele-learning model and the flexible learning model (Taylor, 1995). Mongolia uses two DE delivery methods: *Sinkhron* (real-time) and *Asinkhron* (asynchronous). The *Sinkhron* method enables teachers and students to interact at a distance via tele-conferencing, computer-based conferencing and Internet chatting. By the *Asinkhron* method, the teachers and students can use e-mail, audio/video recordings and online materials to communicate without having to be in the same place at the same time. In general, the DE media of Mongolia have been the traditional hard copy in combination with the telephone, computer, digital telephone and satellite. Print is typically used for delivering general information and study guides; faxes can be useful in sending urgent announcements and submitting homework on time; interactive audio/video technology gives participants the opportunity to listen to and see each other; and so

on. Other methods include voicemail, listservs and audio/video callback methods by which students in remote areas can take suggestions and connect with their teachers and each other.

Personal computer usage is increasing rapidly in the country. Computer-based training programmes use e-mail, computer conferencing, audiographic techniques, programmable CDs and DVDs and the Internet. Audio-video technologies use one-way and two-way methods. The one-way mode involves non-interactive presentations by teachers to students by satellite, for example. The two-way mode allows teachers and students to discuss complex moving images in high quality. All of these media are now becoming commonplace in Internet-based online systems, which bring many advantages combined with cost and accessibility problems. The Internet was first introduced into Mongolia in 1994, and is now serviced by nine companies (Bodicom, Erdemnet, Magicnet, MCS, Micon, Mobicom, Railcom, Sky C&C and Winet). Erdemnet provides Internet connectivity in the high schools and universities. At present, over 35,000 customers use the services of these companies, and 16 universities and over 200 high schools, including 102 schools in rural areas, have Internet connectivity. An important factor in the development of online DE in Mongolia has been the National Electronic Mongolia programme initiated in 2005. The immediate goals of Mongolian DE are to:

- develop advanced curricula;
- provide opportunities for participants to choose their educational approaches;
- develop evaluation criteria; and
- provide high-quality equipment and resources.

Technological developments are, however, educationally useless if they are not accompanied by an understanding of the principles for using them effectively. The following sections therefore stress the principles that Mongolian educators strive to apply in their uses of the media for DE.

I. Developing Print Materials

The development of DE materials requires an understanding of DE principles and technology, as well as of the course content.

It should follow a model consisting of a statement of objectives and an appropriate selection of methods for students to access the content, and to complete exercises, homework, tests and examinations. The DE experience gained in Mongolia through such projects as “Need for Informal Education for Women in the Gobi Region” and “Learn and Work” has shown that at the beginning of a course pupils often admonish themselves for failing to master the DE methods, then gain motivation and interest as they engage with the materials. Mongolian educators have developed a model of DE materials design, including the following elements as needed:

- learning content and modules;
- goals and objectives for each module;
- independent learning activities;
- exercises, tests, case studies and questionnaires;
- guided readings relating to subject matter; and
- conclusions, glossary and final tests.

The learning materials are typically structured as follows:

1. Cover: Showing the title of the course and an appropriate picture.
2. Inside cover: Stating the author’s name, the book name, the editor and the objectives.
3. Foreword: Noting the target group, the number of sections and their objectives, and the expected outcome.
4. Handbook guide: Containing a guide for using the handbook, glossary and appendices.
5. Exercises: In support of the content.
6. Evaluation guide: Feedback about correct test answers.
7. Explanation of glossary: Containing brief, clear items.
8. Reference list: Full list of books and resources used.
9. Summary and comment: Noting the learning outcomes expected upon completion of the course, and motivating the students’ next learning interests.

2. Producing Radio Materials

Radio is inexpensive and quick to produce, and hence an important, although often neglected, DE medium. Three types of radio

education are recognised: a) *programmes* that broadcast general information to all audiences regardless of age, education, lifestyle, characteristics, job and educational needs; b) *radio learning* aimed at a specific target group and imparted through a definite curriculum and methodology; and c) *radio training* involving the transmission of knowledge and skills to specific groups at specific times. Basic accessories of radio-based education are:

- textbooks, handbooks and guides for self-study;
- records and CDs;
- technical instruments; and
- other kinds of display, pocket books and support materials.

The radio education team includes:

- a textbook and hardcopy designer;
- a producer and editor;
- a presenter and correspondent(s); and
- rural area specialists.

After identifying the subject matter and most suitable format, the planning team chooses the most appropriate teaching method. The usual planning sequence involves:

- planning the content;
- choosing participants, music and sound effects;
- designing access schedules; and
- obtaining and summarising feedback.

3. Producing Tele-training Materials

Tele-training materials are usually video productions lasting 10–15 minutes. They are popular throughout Mongolian society, regardless of age, gender, society or religion, and are accompanied by textbooks and handbooks. Tele-training can take many forms depending on its content, objectives and target groups: for example, interviews, explanations, question-and-answer material, competitions, role-playing exercises, short movies and cartoons. The materials have four requirements: to be brief, clear,

correct and distinctive. They should be broadcast frequently and on time, once or twice a week depending on the subject matter. Repeat broadcasts at different times of the day allow students to experience and re-assess the productions at convenient times.

A tele-training materials preparation team includes subject matter experts, DE specialists and technical specialists who perform the following functions:

- Researchers and methodologists: Conduct research of the target group and formats.
- Editors and producers: In DE contexts, the editor writes and refines the materials in conjunction with the producer.
- Designers: Have a high level of responsibility, enhancing the formats with colour, light and movement.
- Audio designers: Attend to volume, pronunciation, etc., and the need to attract students' attention at appropriate moments via music and sound effects.
- Graphic designers: Use computer and other media to create special visual effects.
- Assembly editors: Generate the final, ready-to-broadcast materials.

Final assessments of tele-training materials are important for improving the production quality, and designing new materials. Evaluation involves determining the students' aptitude for the material, the ways in which it may have changed their knowledge, attitudes and skills, and how it has satisfied their needs and affected their lives.

4. General Media Production Principles

Important principles in producing educational material via each of the above media include:

- having clear objectives and interesting subject matter;
- a friendly and accessible format;
- delivery that is brief, easy to understand and definite;
- no excessive use of words or movement;
- minimal use of compound sentences and pronouns;

- clear connections between content, figures and illustrations;
- concise and clear summaries; and
- clear pronunciation if foreign or professional terms must be used.

FOCUS GROUP DISCUSSIONS

A series of focus group discussions (FGDs) was conducted in order to determine the current status of DE practices and policy in Mongolia, to evaluate DE implementation and to make recommendations for practitioners and policy-makers. Twelve FGDs were held with 76 participants between October and December 2005. Each group comprised six persons. The full sample included secondary school teachers (eight); university students (19); hospital residents, master students and physicians (six); education coordinators (17); university lecturers (13); university presidents (five); informal DE centre staff (four); and MoE staff (four). Eight members of the sample, specialists responsible for education policy and monitoring and staff of DE infrastructure, received follow-up interviews about the FGDs' findings. The following questions were asked, and discussion of examples, definitions and types of DE was encouraged.

1. FGDs with DE Teachers and Administrators

- Do you know about DE?
- Do you know how DE is organised in Mongolia?
- What do you think about the problems of DE in Mongolia and how should they be solved in:
 - the government sector?
 - public and non-governmental organisations?
 - stakeholder groups, municipal organisations, IT organisations and others?
 - student groups?
- What do you think about governmental support for the sustainable development of DE in Mongolia:
 - relating to regulations and policy?
 - to improve knowledge of teachers and facilitators?

- to develop syllabus?
- to improve the quality of learning activities?
- to improve and provide equipments?
- What is your opinion about the appropriateness and acceptable types of DE in Mongolia?
- What do you think about the types of student that need to be involved in DE?
- What are your suggestions for the development of future DE activities in Mongolia?

2. FGDs with Students

- Do you know about DE?
- What is the current attitude of students towards DE activities?
- What do you think of the requirements of DE teaching organisations?
- Which organisations do you think are the most appropriate to conduct DE activities for different types of student, worker and age group, and in different types of location?
- What is your opinion of DE teachers and facilitators in terms of their knowledge and specialities?
- What do you think about the kinds of DE activity that should be provided for students in Mongolia?
- What type of study is appropriate for DE (degree courses, public courses to improve life quality, etc.)?
- What technologies are acceptable for DE study (books, TV, audio, video, Internet)?
- What should we do to improve the technologies of DE?
- What are the most appropriate times and durations for DE activities (by course type)?
- What is your opinion about how to improve the DE syllabus (by types of student and study)?
- Do you have a need to be involved in DE at present (examples)?
- What are your suggestions for the development of future DE activities in Mongolia?

3. Conclusions of the FGDs with Teachers and Administrators

DE has been successfully implemented in Mongolia's education system, so that learning can be enhanced across the country. Internet-based DE is being implemented in secondary and university education, and a national educational TV board will be established by government to organise DE. School dropouts school can attend formal DE to learn from specialists, work in rural areas and be retrained. Rural area specialists can be retrained via the Internet. Informal education methodologists suggested that organising DE in rural areas using hard copy and TV is useful, and that students should study in pairs in rural areas to enhance class attendance and interest. DE specialists who have organised DE for high-school dropouts in rural areas described the need to develop continuing DE curricula for these children. There are problems in the implementation of these plans, however:

- Many institutions organise DE but do not cooperate with one another. There is little information about their activities, and general monitoring of the DE process.
- Many DE initiatives have been funded by international agencies, but the future financing of DE is unclear.
- Many teachers who prepare DE materials have technical problems owing to their lack of computer skill.
- The computer skills of learners are low, and their attendance and quality of learning are not at the required level.
- There is a general lack of self-motivation and ability to study.
- Some online learners utter obscenities, or monopolise the equipment, preventing others from getting online.
- Online materials tend to include lecture materials only, owing to a shortage of online learning specialists. As a result, the materials are unclear and uninteresting.
- Microsoft Windows does not recognise the local script, so documents are unclear. There is a need to install additional fonts.

Additionally, university administrators mentioned that the organisation of DE is problematic. Tutors indicated that they lack the skills for preparing DE content and curricula, and

are unprepared to use DE technologies and techniques at the Bachelor's degree level and above. Requiring them to develop self-teaching skills is not enough. One University lecturer (male, 36 years) said:

Presently, we do not have enough knowledge about DE content, curriculum requirements and principles. That's why we develop some DE materials as traditional lecture and practice. But DE materials should be different from traditional materials. (Lecturer qualitative response, 2006)

A high-school tutor (female, 29 years old) said:

Tutors are unable to prepare their lectures using technology. The lecture material is mostly hand-written. If they have to prepare lectures and other materials by computer, these are prepared by an assistant. A requirement of DE tutors is computer skill. Computer skills training should be organised for tutors. (Tutor qualitative response, 2006)

4. Conclusions of the FGDs with Students

Students agreed that they do not have enough information about the present state of DE in Mongolia or elsewhere. Much information about DE is out-of-date, and a national DE centre should be created to remedy this. DE courses are inadequately advertised, and many students do not read daily newspapers. It would therefore be better for DE courses to be advertised in cinemas, on FM radio and on billboards in the street. They encouraged the use of FM radio in particular because of its wide accessibility. They regarded it as important to develop DE teachers' skills through training. A sophomore student (male, 20 years old) said:

We are agreeable to having our lectures by DE. Sometimes we cannot get enough understanding of lecture content because of the tutor's poor teaching skills. In this situation it would be more effective to deliver the lecture by distance methods. (Student qualitative response, 2006)

The students felt that Bachelor's and Master's degrees could be offered in distance mode to allow the students to practise and

revise at their own pace. The overall quality of DE has improved, but the content of distance courses is too demanding for many students. It is important for courseware designers to organise the content effectively and to avoid jargon. Computers are scarce, their power is low and there is a lack of technical support. Working on the Internet takes too long if the connection is slow. Insufficient information is available on the web in local languages. It was suggested that training in DE learning skills would be useful (for example, how to search for information on the Internet), and that DE might be more effective if the students and tutors were of a similar age. Students said that the most convenient DE medium is audio, followed by VCD and the textbook. These are effective, accessible, have no time limits and are not expensive like the Internet. In online DE, there is insufficient facility for interaction, because chatting and e-mail time are limited, and there is only time for interacting with tutors. Student forums should be made available so that students can learn from one another. A student in her fourth course (22 years) said:

In our university (HSUM) it is only permitted for a student to use the Internet for 40–45 minutes. This is not enough to learn, only to search for materials. Also there are no computers with CDs, or ports for flash disks. Only 20 computers in HSUM is not enough. Therefore, we do not have a good situation for learning by Internet-based DE. (Student qualitative response, 2006)

5. Follow-up Interviews with Policy-makers

To pursue these conclusions, interviews were conducted with members of the policy management division of the MoE Culture and Sciences (MoECS), and with staff of Informal Education and DE centres. These specialists are responsible for managing Mongolia's national DE programme, which governs informal and formal education services, access, quality, effectiveness, promotion and development of life skills. Within the framework of the national DE programme, programmes have been organised on policy development, management systems and human resources management, to prepare DE specialists and to improve quality and access to ICT environments. Interview participants stated that the DE network

has been successfully implemented and is proving important and effective across a wide area. Traditional DE media are useful in remote areas that do not have Internet access.

The interviewees noted some difficulties in developing DE, however. The MoECS DE centre and the informal DE centre are financed by the national central budget, loans, donations, assistance and service prices; but this finance is insufficient. The development of educational TV facilities, for example, is not going well for financial reasons. The cost of preparing DE materials is high, with the result that amateurs rather than specialists are producing them. Students are inadequately motivated and lack creative self-learning skills. There is a shortage of DE specialists in rural areas, and a lack of cooperation between educators and companies that work in DE, which leads to duplication of effort. Ways of solving these problems were suggested:

- Prepare DE specialists via administration and technology courses at the Pedagogical University.
- Train more DE rural area specialists.
- Develop DE networks to increase cooperation and to provide administration in rural areas.
- Create additional salary and incentives for tutors.
- Develop DE content that increases student participation.
- Promote DE by offering the following subjects: Life Skills, Quality of Life, Family Finances, New Technologies.
- Organise DE activities including annual meetings, competitions and promotions in urban and rural areas.
- Identify specific organisations to take a prominent role in DE development.

A national DE centre

The Government Resolution Number 14, issued in 2002, re-organised the National Centre of DE to manage and provide DE and informal education in Mongolia. In the opinion of the MoECS interviewees, the National Centre of DE should be responsible for the establishment of a database of DE studies in Mongolia. The National DE Programme should provide all necessary information for DE stakeholders.

ICT companies

The ICT sector has specialised knowledge that can be essential in DE development. An ICT employee mentioned that his company conducted a survey on the use of software in universities and colleges, and found that costs were too high, an excessive study and development period was needed, and useable materials in other countries only work in the hands of specialists here. Although, by the national programme *Tsahim*, Internet connections have been made available across the whole country, there are still peripheral areas that have not been connected. In planning to develop DE, one must be aware of the specific characteristics of the location.

A scientific institute

The Institute should create a DE database for improving the public's general knowledge in such areas as history, archeology, paleontology, geography, biosphere, geology and natural resources.

CONCLUSIONS AND RECOMMENDATIONS

DE projects in Mongolia have demonstrated that ICTs including the Internet are viable methods for developing knowledge and skills in a variety of areas. The current study has established that Mongolians are receptive to these new educational methods. The study has generated 10 major recommendations for the next stage of DE development in the country.

1. Develop a network for DE cooperation:
 - between education institutions;
 - with a shared DE database;
 - with a handbook for the preparation of learning materials;
 - to develop DE standards;
 - to prepare specialists in DE technology; and
 - to develop DE software programmes.

2. Intensify activities of the national programme for developing DE: The DE Council was established according to the national DE programme. However, the Council has not been able to manage DE at state level. Many organisations in charge of DE did not join their activities. There is a need to develop activities, such as meetings and competitions, for joining together and sharing experiences.
3. Help students to communicate: Students like to connect and discuss with each other, and they need Internet chat rooms for this purpose. Such measures will improve their self-study skills and initiative.
4. Reduce Internet connection fees: In 2005 the Electronic Mongolia National Programme was initiated, representing a major opportunity for the development of online education. Due to high connection costs, however, the Internet so far has relatively few educational users. The Mongolian government should decrease the connection fee for DE users.
5. Improve computers and their maintenance in DE organisations: More computers and ancillary equipment are needed for DE use, and students should be provided with an ID number for use in accessing educational networks.
6. Use FM radio for DE: FM radio-based learning is strongly recommended. Many young people listen to FM radio, which is useful and inexpensive. In rural areas, radio is particularly common. Foreign languages and basic scientific subjects can be taught by this medium.
7. Establish a TV channel with a DE programme schedule: An educational channel was established as a part of the national programme for DE development, but was closed owing to lack of funding. Financial resources should be obtained to reactivate this plan. Private channels should be responsible for regular DE programming, which should be free of charge.
8. Cooperate with international schools in online Bachelor's and Master's degree training: Internet-based education is not only needed inside Mongolia. Cooperation with foreign schools should be encouraged so that experiences can be shared and teaching quality improved.
9. Improve DE for dropout children: DE for dropout children should be supported. Many parents prefer DE to traditional

schooling, and the number of dropout students in DE could be decreased.

10. Create mobile libraries: Participants suggested creating mobile libraries, to provide information and reference material for the public and provincial libraries, to copy from books and newspapers and to organise short courses.

In general, the cost-effectiveness of DE and the demand for ICT-based education in Mongolia are expected to grow substantially over the next decade, allowing DE to become a major educational force in the country.

Distance Education Policy and Awareness in Cambodia, Lao PDR and Viet Nam[§]

7

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INTRODUCTION

Distance education (DE) is developing at different rates in Cambodia, Lao PDR, and Viet Nam (CLV), as may be seen from the number of distance-based programmes in the three nations, and in the extent to which national policies have been developed to support them. This report describes a PANdora project designed to:

- survey and take stock of existing educational scenarios and problems in CLV;
- document the CLV policies and research relating to DE practices in CLV;
- draw appropriate learning from established DE institutions in Asia;
- discuss recommended policies and practices with national core groups, policy and decision makers;
- initiate strategies for networked collaboration among CLV's educational institutions;
- build capacity by "training the trainers" in a variety of distance teaching and learning skills; and

[§] The chapter adds document analysis and gender-related evaluation results to an earlier report by Doung Vuth et al. (2007).

- formulate recommendations for the development of detailed distance-based initiatives in the three nations.

THE CLV COUNTRIES

Cambodia, Lao People's Democratic Republic (Lao PDR) and Viet Nam (CLV) share a deep need for DE, but a general lack of public understanding of its validity. The great majority of their populations are rural and remote (United Nations, 2006), and are in serious need of training to increase their livelihoods in, for example, the agriculture and fisheries industries. Early attempts to launch DE and e-learning methods in CLV have been described by Pepall (2004), Materi and Fahy (2004) and Abdon and Ninomiya (2007). Obstacles to this process remain, however, in terms of attitudes and awareness regarding DE among teachers, administrators, policy makers and the public. The design of effective DE practices cannot be attempted until these hurdles have been overcome. The current study represents an original, three-country collaboration between CLV government and educational specialists, conducted in order to investigate their individual and shared hurdles to DE implementation, and ultimately to identify ways to overcome them. This chapter begins with a background analysis of the educational systems in the three nations.

I. Cambodia

Higher education in Cambodia embraces a private as well as public university model (Abdon and Ninomiya, 2007). Private universities have increased each year, and the nation now has more than 30 universities including the public institutions. All of Cambodia's universities employ traditional face-to-face, classroom-based delivery. In early 2005, e-learning was introduced for the first time in the country, by the International Institute of Cambodia (IIC) in Phnom Penh, providing and promoting tertiary education in Cambodia. This pioneering work was conducted with the joint support of agencies including the International Development Research Centre (IDRC), The Asia Foundation

(TAF), the United States Agency for International Development (USAID), Internews Network and SDLearn.net ICT school.

2. Lao People's Democratic Republic (Lao PDR)

Lao PDR is a small, land-locked country in the Greater Mekong Sub-Region of Southeast Asia, bordering with Cambodia, China, Myanmar, Thailand and Viet Nam. The National Science Council (Prime Minister's Office) has introduced computers in urban and rural regions of Laos since the mid-1980s. In 1994, the IDRC's Science and Technology Research Project promoted information and communication technology (ICT) activities in Laos. At that time, there were an estimated 1,000 computers in the country (Uimonen, 1999), rising by 2004 to an estimated 20,000 and increasing at a rate of approximately 300 per month (Somphayvanh, 2004). Since 2004, distance learning technology issues have been coordinated by the National Science Council (NSC); Science, Technology and Environment Agency (STEA); Ministry of Education (MoE) and National University of Laos (NUoL). This process has revealed many steps that need to be taken in terms of infrastructure, human resources development and the optimal conditions for promoting sustainable DE.

3. Viet Nam

With 85 million people, Viet Nam has the largest population of the three countries (Internet World Stats, 2007). Its universities, colleges and schools are primarily located in the major cities and towns. Seventy-five per cent of the nation is mountainous and thinly populated, with inadequate schools for the children of those areas. The trained labour force is predominantly in towns and the industrial field, and is low in number. Viet Nam's efforts to deal with these problems by applying DE methods began in 1993, when the government created two open universities to help develop DE in Hanoi and Ho Chi Minh City. Other centres have recently been established in nine other universities to deliver DE programmes and e-learning options have been developed in projects funded by the IDRC and World Bank, and conducted by organisations including Viet Nam Development Information

Centre, Viet Nam Data Communication Centre, Da Nang Polytechnic University, the Institute of Information Technology, and the Fisheries College, Bac Ninh (Materi and Fahy, 2004).

4. Basic CLV Comparison

Concerted implementation of DE policy and practice has been slow to evolve, however, in all three nations. The current project brings together representatives from the CLV nations for a 2005–07 study of how to overcome the problem. The overall objective of the project is to develop a series of recommendations for improving the DE capacity of CLV to the level achieved by other Asian nations.

DE IN THE CONTEXT OF EDUCATIONAL POLICY

An assumption underlying this project is that effective policy definitions assist the adoption of new DE technologies as they emerge in the various countries and are considered appropriate for use. A second assumption is that DE adoption depends on organised training efforts (“capacity-building”) in each country. The PANDora proposal identified three questions by which the sub-project could examine these assumptions:

1. What are the policies required to govern the use of new distance learning technologies (DLT)?
2. Do Asian countries already have specific policies for DLTs? and
3. What lessons can be learned from other Asian countries with DLT experience?

1. Policy Analysis

The project therefore undertook a review of policies and planning in the three countries, comparing their relative strengths and weaknesses so that each country could learn from developments in the other two. National policies on general educational issues were examined, and policies relating to the adoption of ICTs on which DE depends. In addition, vocational training policies

were studied in order to assess national priorities with respect to DLT capacity building. The final section of the analysis examined the DLT practices with the greatest potential value in the three countries, and the extent to which existing national policies provide adequate support and encouragement for them.

Seventy-eight policy and planning documents, and reports of relevant studies, were initially identified by the co-investigators within each country. Of these, seven documents could not be traced. The remaining 71 documents were collated in print and/or electronic form during February 2007 visits to Vientiane (Laos) and Ha Noi (Viet Nam) by the principal investigator, Doung Vuth. He was accompanied in these site visits by Dr Jon Baggaley, the PANdora project's academic advisor, who assisted in the analysis. The following documents were collated:

- General education and training: Eight national policies and plans were identified for each of Cambodia and Viet Nam, and one national policy, the Education Development Plan (2006–07) for Laos (Table 7.1).
- ICT and DE: Two national policies and plans were identified for Cambodia, five for Laos and four for Viet Nam (Table 7.2). National statements relating specifically to DE were identified in Viet Nam only.
- External papers and reports relating to these issues were also assembled: Cambodia (seven); Laos (17); and Viet Nam (four) (Table 7.3).
- An additional 15 documents were rejected from the analysis, being too informal (for example, undated or unattributed) to be regarded as reliable sources.

The final collection on which the analysis was based therefore contained 56 documents (classified from 1–56 in Tables 7.1 to 7.3). Most of the Cambodian policies and plans can be downloaded in English from the website of the MoE, Youth and Sport (www.moeys.gov.kh). The Lao policies are primarily available in the Lao language and, in some cases, English, from the Science, Technology and Environment Agency (STEA) of the Government of Lao PDR. The Viet Nam documents, two of them in English, are available from the websites of the government ministries responsible for them. The language differences facing the analysis were overcome by the local site visits, during which the Laos and

Table 7.1 General Education and Training Policies

CAMBODIA <i>(mostly in electronic files)</i>	LAO PDR	VIET NAM <i>(Viet language only)</i>
¹ Education for All 2003–15 (<i>Khmer only</i>) Education Strategic Plan 2004–08 (MoEYS, 2004) <i>(electronic file: ESP200408)</i>	⁹ Educational Development Plan 2005–06 (MoE) 2006–07 updated <i>(Lao language only)</i>	Strategy for Human Resources Development 2000–10 (Min. of Fisheries); renamed as Strategy for Education Development 2001– 10 (MET); (PMO decision, 2001); updated, 2005–06
² updated 2006–10 (MoEYS, 2005) <i>(electronic file: esp06–10)</i>		¹⁰ updated, 2006–07
³ Expanded Basic Education Programme 2006–10 (MoEYS, 2005) <i>(electronic file: ebep06–10)</i> Education Sector Support Programme 2004–08 (MoEYS, 2004) <i>(electronic file: ESSP 2004–08)</i>		¹¹ Human Resources Development Planning 2006–15 (MET)
⁴ updated, 2006–10 (MoEYS, 2005) <i>(electronic file: essp 06–10)</i> Education Sector Performance Report 2004 (MoEYS, 2004) <i>(electronic file)</i>		Building the Educational Socialisation Pro- gramme 2005–10 (MET proposal, 2005)
⁵ updated, 2005 (MoEYS, 2005) <i>(electronic file: espr 05)</i>		¹² (PMO decision, 2005–10) Learning Society Development Project 2005
⁶ Policy for Curriculum Development 2005–09 (MoEYS, 2004) <i>(electronic file)</i>		¹³ (PMO decision, 2005–10) Vocational Training (General Directorate of Vocational Training proposal)
⁷ National Policy on Non-formal Education (MoEYS, 2002) + online material		¹⁴ (Decision 448)
⁸ Education Indicators 1999–2003 (MoEYS)		¹⁵ Educational Management (MET proposal); (Decision 29)
		¹⁶ Government Circular on Directions for Im- plementing the Reformed Education Laws, 2005
		¹⁷ Strategy for Aquaculture 1999–2010 (Ministry of Fisheries)

Source: Authors.

Table 7.2 ICT and Distance Education Policies

CAMBODIA <i>(mostly in electronic files)</i>	LAO PDR	VIET NAM <i>(Viet language only)</i>
¹⁸ Policy and Strategies on ICT in Cambodia 2006–10 (MoEYS, 0412) <i>(print, and electronic file: ict_edu_en)</i>	<i>(a) ICT Policy</i>	²⁵ Project on Application and Development of OSS (PMO decision, 2004); <i>(English: electronic file)</i>
¹⁹ Enhancing Education Service Delivery through the Application of ICT (MoEYS, 2004)	²¹ Information Technology Master Plan (MoE, 2000)	²⁶ Open-Source Policy in Viet Nam (Ministry of Science and Technology); <i>(In English, electronic files: 235 QD TTg; OSS rc)</i>
	²² Harnessing ICT for Development in Laos (MCTPC: Ministry of Communication, Transport, Post and Construction)	²⁷ Open-Source Policy in Computerising the Activities of the Communist Party (Party Central Office); <i>(PowerPoint)</i>
	²³ Decision 3705 by Minister to Approve Testing of ICT use in Teaching Mathematics and Natural Science in Secondary Schools, (MoE, Nov. 2006); <i>(Lao language only)</i>	Developing Distance Learning 2005–10 (MEd proposal, 2005)
	²⁴ Internet Infrastructure in Lao PDR (STEA)	²⁸ (PMO decision, 2005–10)
	<i>(b) Distance Education Policy</i>	

Source: Authors.

Table 7.3 External and Internal Reports

CAMBODIA	
²⁹	Economic and Public Sector Capacity Building Project 2001–02 (Council for Administrative Reform)
³⁰	Khmer Internet: Cambodia Case Study (ITU, 2002) (<i>electronic file # 79475</i>)
³¹	Proposal to SIDA for Expanded Basic Education Program, Phase II 2006–10 (MoEYS, 2005) (<i>electronic file</i>)
³²	Inter-Departmental Committee on HIV-AIDS
³³	Results-based Management
³⁴	Secretary of State's address to IDRC DLT meeting (MoEYS, 2004)
³⁵	Cambodia Progress Report (AFACT Year Book, 2006)
LAO PDR (<i>electronic files</i>)	
³⁶	Connecting Laos: notes from the peripheries of cyberspace (Uimonen, 1996)
³⁷	Education for All 2000 Assessment: Lao PDR (MÉd report to UNESCO, 2000)
³⁸	ICT Use in Education: Laos (UNESCO Meta-Survey) (<i>electronic file</i>)
³⁹	Asian Forum on ICT Policies and e-Strategies (UNDP, 2003)
⁴⁰	Lao PDR Economic Monitor (World Bank, 2005)
⁴¹	Lao PDR: the Northern GM Subregion Transport Network Improvement Project (ADB, 2005)
⁴²	e-Governance Action Plan for Government of Lao PDR (Government of India, 2006)
⁴³	BIT Bridging Programme 2004 (Faculty of Engineering, NUoL): see NUoL Literary Academic Curriculum
⁴⁴	Continuing and Distance Education Centre (CEDEC, NuOL, 2006)
⁴⁵	Lao Broadband Test Bed (NUoL application to EU AsiaITC, 2004)
⁴⁶	ICT Related Challenges and Opportunities for the Government of Lao PDR: report to SIDA (Sohderburg and Pehrson, 2004)
⁴⁷	Harnessing ICT for Development in Laos: report to SPIDER (Goransson, 2005)
⁴⁸	Vientiane Gigabit Network (Pehrson et al., draft report to SIDA, 2005)
⁴⁹	Internet Infrastructure in Lao PDR (Asia-Pacific networking Group, PowerPoint, 2004)
⁵⁰	Survey Research on e-learning in Asian Countries 2002: Lao PDR (unattributed)
⁵¹	Development of Enabling Policies for Trade and Investment in the IT Sector of the SM Subregion: Lao PDR (Joseph, undated)
⁵²	Impact of ICTs on Rural Households: Lao PDR (Gi-Soon Song, UNDP report, undated)
VIET NAM	
⁵³	Open-source Governance Applications for the Health Sector in Viet Nam (UNO) (<i>notes: 12</i>)
⁵⁴	Project management guidelines for Viet Nam Blended Learning Programme (World Bank, AUSAid, 2003–07); Viet Nam Blended Learning Programme (Global Development Learning Network: 2005–07): (World Bank) (<i>notes: 19</i>)
⁵⁵	OSS Resource Centre, Hanoi (MST, 2004) (<i>English: electronic file</i>)
⁵⁶	Introduction: Content of Education Law 2005 (unattributed)

Source: Authors.

Notes: The items collected in this table are unpublished reports studied by the authors *in situ* during visits to government ministries in Cambodia, Lao PDR and Viet Nam.

The note cues in the text ahead correspond with the education policy documents compiled and numbered (1–56) in tables 7.1, 7.2 and 7.3.

Viet Nam partners translated the key sections of the documents not in English for the benefit of the other two country teams. Following the documents' collation, the partners in each country were asked to decide whether there were significant omissions. They confirmed that the collection gave a reliable reflection of their countries' educational and ICT policy developments to that point. The policies were examined in their most recent versions only.

2. Policy Findings

General education and training

The total number of relevant documents in each country reflects the extent to which the three national educational systems have been defined in detail (Table 7.1). Cambodia and Viet Nam each have a wide range of policy statements and plans relating to national education (basic education, literacy, sector support, sector performance, curriculum development, non-formal education, vocational training, educational socialisation and management and learning society development). Most of the documents are current (2005–06), and have fulfillment dates of 2010 to 2015. Laos' educational policy and planning is expressed in its 2006–07 Educational Development Plan,⁹ covering the three-way provision of education in Laos (formal, non-formal and informal), and stressing the importance of vocational education. DE and training are implied in the emphasis on non-formal education in Lao policy, though not explicitly. None of the three countries explicitly stresses DE as a national option. Cambodia has a specific policy for non-formal education⁷ which implies distance-based methodology though does not go into detail about it, and Viet Nam has a range of educational training and socialisation policies^{10–14} which refer to DE specifically. All three countries place their greatest emphases on DE development in their ICT policies.

ICT and distance education

All three countries stress ICT as crucial to their development (Table 7.2). Cambodia's national ICT policy¹⁸ stresses the need for

technological support in the schools and higher education, teacher training, non-formal education and specifically, distance learning. It draws particular attention to the work of the Open Forum of Cambodia in the development and training of ICT uses such as e-mail and website development. The lack of ICT infrastructure in Cambodia is cited as evidence for the need to improve educational radio and TV options. These issues are discussed in detail in the 2004 document¹⁹ on enhancing education service delivery.

Laos has several policies and plans relating to technological development. Its science and technology policy²⁰ covers a wide range of social and environmental issues, and lists education as an area in which technologies are being successfully applied. In its list of action plans to the year 2010, educational technology is cited in relation to the general need for improved infrastructure and connectivity. Laos's information technology master plan²¹ includes a detailed analysis of the types of hardware and software that can be of value in office automation, education and training, and it gives the example of the computer system planned for Dongdok University.

Viet Nam has ICT policies covering the same areas as in the other two countries,²⁵⁻²⁸ including the only document in the three countries that specifically covers DE.²⁸ This document contains project goals and solutions for DE implementation: for example, the need to strengthen the distance-based delivery of the open universities in Hanoi and Ho Chi Min City, and to reorganise traditional educational institutions with DE in mind. It also stresses the need for cooperation between institutions in the design and sharing of course materials and tools, the need to raise social awareness of DE and the need for international cooperation. Other policies²⁵⁻²⁷ provide useful practical emphases on the implementation of DE in Viet Nam using, for example, open-source software.

Other reports

All three countries have received numerous proposals and action plans relating to DE from external organisations, for example, UNESCO, UNDP, SIDA and the World Bank (Table 7.3). In March 2006, for example, the Government of India presented the Government of Lao PDR with a detailed action plan for

e-governance⁴² that could also be harnessed to good effect by the educational system. It is assumed that these proposals are being actively considered in the countries, and that the most acceptable aspects of them will be incorporated into updates of the national plans targeted for 2010 and 2015.

SURVEY OF DE FACILITIES, TECHNIQUES AND ATTITUDES

To shed light on the current public awareness of and facilities for DE in CLV, an interview survey was conducted in each country, investigating:

- the computer facilities of CLV learners and teachers;
- computer-based work methods; and
- attitudes to DE generally.

The basic survey design was developed by the project core group in Cambodia in August 2005, and was communicated to the project partners in Laos and Viet Nam for translation into their own languages. The survey method involved one-on-one interviews in the three countries, conducted primarily by local teachers and graduate students. Before the questionnaires were administered, a series of interviewing procedures was prepared by the Cambodia core group, and was provided to the local interviewers by the country project teams. The aims of this training process were to improve the knowledge and skills of the project assistants in questionnaire administration, interviewing skills, and data coding. A *Microsoft Access*TM database was developed for tabulation of the data and the graphing of key findings. This survey tool was also made available online to the other IDRC projects in the PANdora network, so that they would not have to duplicate the effort in conducting similar surveys.

I. The Survey Samples

In Cambodia, the survey was conducted on 100 participants in three districts: Phnom Penh, Kampong Cham, and Banteay Meanchey. The Laos survey was conducted with 205 participants

in the nation's capital city, Vientiane. The Viet Nam survey was conducted with 145 participants in five provinces: in the south, Ho Chi Minh City, and the coastal province of Binh Dinh; and in the north, Hanoi city, Bac Ninh and the coastal province of Quang Ninh. The participants in all three surveys represented the private sector and non-governmental organisations, universities and schools (lecturers and students) and government officers.

Age

Half of the CLV sample was less than 25 years old, with most of the Cambodia and Laos sub-samples being in that category, and most of Viet Nam group in the 25–34 age range.

Occupation

The CLV sample contained respondents from a wide range of occupations in universities and schools (lecturers and students), private sector, government and non-governmental organisations. In Cambodia and Laos, a high proportion of respondents was students or worked at educational institutions. The Viet Nam sample contained a relatively high proportion of administrators in business and other sectors. The main areas of specialisation of respondents in all three countries were IT and Business.

Education and language

More than half of the respondents in all three countries received their education from a campus-based institution or an open university. The national language is the predominant medium of instruction in all three countries, although a higher percentage of schools in Cambodia and Laos use English as the medium of instruction compared to Viet Nam.

Gender

The CLV sample overall was male (65 per cent) and female (35 per cent). The Laos sub-group contained a slightly higher percentage of women than the other two countries. The male respondents

in the Laos group were predominantly students, while the female respondents were students, teachers and administrators in almost equal proportion. Sixty per cent of the male respondents in the Viet Nam sample were campus or college-based compared with only 41 per cent of the females. A greater proportion of women in the Viet Nam sample had been involved in distance education (30 per cent) compared to the males (3 per cent), while the men tended to work in the IT industry (37 per cent) compared with the women (6 per cent). In the Cambodia sample, differences were noted between the occupations of male and female members, with the men tending to work in business and IT and the women in education.

2. Results

Uses of ICT

In each of the three countries, the samples gave similar responses regarding their uses of ICT, and their awareness of its uses and potential in DE. The proportion of educational TV and video users was highest in Laos, while the widest range of media used was reported by the Viet Nam sample. Approximately a quarter of the Cambodian respondents indicated that they have used TV and videotape as a medium of instruction, though a high proportion has evidently not used any educational medium. In Viet Nam, the location of media appears to be evenly distributed between schools and universities, home and the workplace. Lao respondents accessed media in schools and the workplace, while Cambodian respondents accessed them mainly in schools, universities and Internet kiosks.

Personal computers were widely used by the respondents in all three countries. The Cambodia and Viet Nam samples predominantly used Windows XP, while the sample also used Windows 2000. The Viet Nam sample tended to be the best equipped and informed on ICT topics: most knew the RAM size of their computers, for example, with nearly half of them stating that they have 256 MB. Cambodia and Lao respondents indicated computer RAM sizes between 128 and 256 MB. Their lesser knowledge of these technical details may be because many of them do not own their computers but use them in Internet kiosks. Overall, men tended to be more knowledgeable about RAM size than women. Relatively few Laos and Cambodian respondents

reported having their own computer at home, compared with the Viet Nam respondents, and the survey showed that home-based Internet access in Cambodia is less available and more expensive than that of the other two countries.

The Viet Nam respondents reported higher Internet connection speeds, with the majority using Asymmetric Digital Subscriber Line (ADSL). Relatively high proportions of the Cambodia and Laos samples indicated no knowledge of the speed of their Internet connection, again possibly owing to their greater use of kiosks. Laos and Viet Nam respondents described their Internet connections as generally reliable, while Cambodian respondents tended to have no opinion on the matter. A relatively high proportion of the Viet Nam sample tended to use a firewall with their Internet connections. More females in the Viet Nam sample (23 per cent) were unaware of whether their computers used a firewall, compared with the males (7 per cent), and the women in the sample had a more positive perception of their connections' reliability than did the men. Similar result was noted in the Laos sample.

Almost all of the Viet Nam respondents, and most of those in Cambodia and Laos, stated that they have at one time or another used e-mail. Web use is found to be common in all three countries, although the use of online discussion boards is rare. Almost all of the Viet Nam respondents, however, indicated that they have used online text chat rooms. Use of this technique appears fairly common in Laos, and rare in Cambodia. In Viet Nam a higher proportion of the female respondents claimed to have used them compared with the men. The use of Internet audio and video software, learning management systems and open-source software was not found to be common in the three countries, although it is developing rapidly in Viet Nam.

The Internet is far less used in the three countries than the cell-phone. Nearly all of the Viet Nam respondents stated that they send text messages daily, often or sometimes, and the corresponding proportions in Cambodia and Laos were almost as high. The male sample's responses indicated a higher usage of text-messaging than was observed in the female sample.

Attitudes to DE

The survey also investigated the recognition of DE in each country. The majority of those surveyed showed positive attitudes

towards DE's potential, though noted that much remains to be done in developing the training programmes, course materials, institutional infrastructure and support and public and political awareness needed for its development. A strong consensus was observed in all three countries that DE can provide a means of delivering education to remote communities, and the Lao respondents were overwhelmingly positive on this. In addition, an overwhelming majority of respondents from all countries agreed on the positive role of DE in assisting women's groups. The perception of DE varies between the countries, however. In general, the Viet Nam respondents were more positive, whereas a high proportion of the Cambodia and Laos respondents seemed unsure of whether DE will ever be accepted by the general public and politicians. This may be explained by their doubts that DE can ever effectively replace the traditional education delivery system. Interestingly, the male sample agreed that DE is potentially valuable for assisting women's groups, while the women were less decided on this.

DISCUSSION

In Cambodia, the widespread opportunities offered by ICTs (Internet, mobile phone, etc.) for organised DE currently have very limited application. Most Cambodians are unaware of DE; and of the many public and private universities, colleges and institutes, the IICUT has been the first to offer formal courses with e-learning as a delivery method (Abdon and Ninomiya, 2007). The general public typically cannot afford the costs of DE tuition, and PC and Internet access, however; and incentives are needed (for example, national ICT development funding) to higher education providers to develop online access. There is also limited technical capacity to support a broad-based move towards e-learning at this stage, and strong competition amongst institutions for the limited human resources involved.

The Laos analysis indicates that ICT opportunities (Internet connections, Internet cafés, mobile phone, etc.) are widespread in the country for undertaking comprehensive DE activities, although these are so far used on a very limited scale. Almost all public and private sectors, including professional organisations, universities, private higher education and institutes, still have

a limited knowledge of these DE opportunities. There is a need to create concrete conditions and incentives in the country to enhance education and online access. Greater technical capacity needs to be developed to enhance the e-learning process and to initiate the early stages of formal DE development cost-effectively and fruitfully.

Currently, however, the quality of DE across Viet Nam is low. Few universities pay attention to developing training courses to increase and upgrade knowledge for the mass population, especially working people. Few managers and instructors are formally trained, and some institutions plan training programmes that exceed their management capabilities and resources. Some teaching aids (videotapes, CDs and cassettes) are available, but these are not often used. Support materials are designed for face-to-face courses, and are unsuitable for distance delivery. Most training is designed locally and delivered with the assistance of teachers who visit the region once a semester, returning later to conduct the final exams. Online learning methods are currently in basic planning stages at individual universities and colleges, and widespread public suspicion exists about the quality of online and other DE methods generally.

An active network of DE educators and specialists is under development in Viet Nam, however. Since 2004, continuing education centres have been in operation in every district to receive these DE programmes; and more than 80 per cent of communities and districts have a community learning centre. Using these facilities, the 2005–10 National DE Development Project aims to provide local ICT training for the following groups:

- officers from state organisations in management, politics, computer use, and foreign languages;
- eighty-five per cent of agriculture, aquaculture, and forestry workers in life quality and work skills; and
- eighty per cent of officers from communities and districts in management, law, economics and social studies.

The majority of those responding to the current project's survey showed relatively positive attitudes towards DE's potential in all three countries, and it is encouraging that they are educated people who are, or who will become, key decision-makers in the countries. It must be stressed, however, that the consensus in

all three samples is that DE can never be as good as face-to-face education. In part at least, this view may be due to the inadequacy of Internet-based methods. It is interesting, therefore, to note the overwhelmingly high proportion of cell-phone users in the three countries; and it is clear that this technology has the potential to become a useful DE medium in these countries.

CONCLUSIONS

The development of DE in Cambodia, Laos and Viet Nam is already encouraged in the three countries' national policies and plans, if not in detail. Although their general education policies do not cover DE methodology specifically, their ICT policies contain numerous priorities that imply it. The one country with specific policies about DE and the ICT applications supporting it (for example, open-source software) is Viet Nam. All three countries place a high priority, however, on vocational training and the education of remote communities. The *DE Guidebook* produced by the PANdora project (Belawati and Baggaley, 2010) is proving valuable in this training effort, including guides on best practices, including planning and implementation of DE policy, appropriate technologies including online methods, learner support systems, study strategies, assessment and evaluation techniques, training in DE management and economics and DE research and evaluation methods. Training courses will continue to be conducted in each of the partner countries, to guide the planning and implementation of organised DE initiatives. The gender differences in the current survey data indicates that women have a particular need for the training that will make DE viable in CLV.

The rapid emergence of the mobile phone in CLV provides particularly timely opportunities for the development of innovative DE systems that are accessible to the widest possible community of learners. New efforts to fulfil this goal are required from all CLV stakeholders with an interest in technology-based education. The limited resources and growing private sectors suggest that governments should take a more enabling and proactive role in the process, developing strategies and policies, and providing significant investments in institution-building and delivery.

In general, the current project has consolidated the national discussions on these issues by identifying strategies for collaboration among CLV's DE institutions, and by developing plans for "training the trainers" in a variety of distance-based teaching and learning skills. In the final phase of the project (2007), a public seminar was organised in each country (in Phnom Penh, Vientiane and Hanoi) to give students, educators and policy-makers an opportunity to discuss how the nations' educational priorities can be fulfilled using DE methods. The formation of a steering group has been encouraged in each country for this purpose. In Cambodia, numerous specialists are available for this initiative. Two-hundred and seventy students in six provinces (Kampong Cham, Pursat, Battambang, Banteay Meanchey, Pailin and in the town of Sihanoukville) have now graduated from the International Institute of Cambodia (IIC), and 46 facilitators (teachers in the IIC) with additional qualifications from the SDLearn.net ICT school have been identified. In Laos, a DE steering committee could include members of Lao-American College, Lao Union of Students and Engineering Associations, MoE, NSC, NUoL, STEA and students from NUoL and private education institutions. In Viet Nam, planning groups may be identified from institutions including Hanoi Open University, Ho Chi Minh City Open University, Hanoi Teachers' Training University, Hue University, Hanoi University of Foreign Languages and Da Nang University. The project team will discuss ICT and DE policies and practices with interested parties from these and other national core groups, including policy makers, to move DE interests forward.

It will be interesting to see if the attitudes revealed by this study will change as users become more familiar with the Internet's newer interactive options (audio- and video-conferencing, etc.). Training in these areas is to be encouraged in all three countries. The greater use of DE in general is recommended, for upgrading the educational systems, reducing the educational gap between cities and remote areas and providing increased study opportunities for busy people and the rural population. Society in Cambodia, Laos and Viet Nam is hungry for the educational application of ICT in the interests of developing their national economies and eliminating poverty.

Open-source Software for Learning Management[§]

8

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INTRODUCTION

Online Learning Management Systems (LMSs) are useful tools that can be used to enhance the delivery and sharing of educational material. As yet, many Asian institutions are unaware of the opportunities offered by LMS packages, or are not taking full advantage of them owing to the difficulties of customising LMS software to their specific needs. One problem is the lack of adequate local-language documentation provided with many LMS products for non-technical staff. Another problem is poor performance of LMS software in Asia's low-bandwidth situations, a factor not usually taken into account when the software is designed for use by the corporate training industry in developed countries. The current study has evaluated a range of open-source software (OSS) packages with potential value for LMS delivery in Asian educational institutions specifically. It has identified the *Moodle*TM LMS software as particularly suited to Asian needs, and makes recommendations for the online and offline of *Moodle* materials.

In Asia, higher education is regarded as a privileged opportunity for students to acquire academic qualifications through a process managed by a credible educational institution. The managed process of teaching and learning ensures that students are not left alone to conduct their studies independently without supervision, and that the institution can evaluate their performance according

[§] The authors of this chapter wish to thank their collaborators at the ASEAN Foundation in Jakarta, Indonesia and the Institute of Information Technology in Hanoi, Viet Nam.

to agreed criteria. The success of the process, however, depends very much upon the adequacy of the available facilities. At the University of Colombo School of Computing (UCSC) in Sri Lanka, face-to-face teaching and learning in a classroom are considered to be effective when the class size is no greater than 40, and the teacher–student ratio is on average 1:20. In a teacher-centred learning environment, students can obtain direct assistance from the teacher, but this dependency can impair the development of the students’ learning skills. The same can be true, of course, of an excessively learner-centred environment. A flexible approach is desirable, leading to a good compromise between these two extremes. For this, collaborative environments are useful, in which students can learn actively through various types of interaction, and can help each other to reach prescribed learning objectives (Davis, 2002; Rau and Heyl, 1990).

In general, a collaborative learning environment has advantages for both teachers and students:

- creating positive change in individual learners;
- engaging students and teachers as full partners in the learning process;
- giving the students primary responsibility for their learning decisions;
- creating and offering as many learning options as possible;
- helping students to develop and participate in collaborative activities; and
- defining the facilitator’s role according to the learners’ evolving needs.

At UCSC, collaborative learning activities allow students to play a teaching role, giving instructions and assistance to fellow learners as well to the teachers. This can motivate them to interact openly with others and to contribute knowledge from their own experience and research, generating new foundations for learning as well as for disciplinary research and development. Via this approach, teachers are not restricted to a direct assistance or authority role, but become facilitators or delegators for the students, and even have an opportunity to learn from the process and to correct their own misunderstandings. The experience can be particularly motivational for academics in higher education owing to the increased opportunities it presents to learn something new from each class.

When class size becomes too large for a collaborative environment to be practical, LMSs offer useful facilities. LMS software packages offer a range of features including teaching and learning activities (e-mail, discussion forums, chat sessions, etc.), records management and reporting, help desk support and online assessment. Most LMSs are web-based to facilitate “anytime, any place, any pace” access to learning content and administration. They are developed using a variety of techniques ranging from open-source *MySQL* and PHP-based architectures to commercial *Microsoft.NET*. Open-source LMS options are proliferating in the education and business worlds, offering greater access to the LMS source code than the closed-source commercial alternatives.

The use of LMS tools at UCSC not only serves the university’s conceptual approach to teaching and learning, but also assists in meeting the practical demands of increased student numbers. UCSC has been conducting degree programmes in Computer Science since 1989, on full-time basis for undergraduates and part-time for postgraduates. Multimedia learning and teaching activities have been common at the School from the outset. The original 1989 intake was small at 20 students and the management of the programmes’ teaching and administration activities was not a big issue. By 2004, owing to a high demand for the programmes and at the Government of Sri Lanka’s request, the intake was increased to 160 students. Physical resources for the programmes’ teaching and learning activities were augmented to accommodate the new intake, but the teacher–student ratio could not be improved. As a result, a deteriorating teacher–student interaction was experienced, and student performance and pass rates in the annual examination substantially declined (Government of Sri Lanka, 2005).

Meanwhile, in 2000, owing to high demand from industry for software developers, UCSC had introduced an external Bachelor of Information Technology degree programme. In the University’s external degree programmes, the teaching is conducted by private external organisations while the University’s institutes conduct the examinations. Communication between UCSC and the students is maintained through a web portal (www.bit.lk), which provides the students with all educational and information resources including curriculum, lecture notes and previous examination papers. Faced with the challenge of supporting the vast new student population, both internal and

external, UCSC expanded its ICT infrastructure and established an e-learning centre to manage it. To enhance the centre's activities, an e-learning project was initiated in 2002, with the support of the Swedish International Development Cooperation Agency (SIDA). Collaboration between Swedish and Sri Lankan universities focused on the development of training/learning methodologies and pedagogically designed materials for the BIT programme. As a result of this collaboration, knowledge was shared with respect to educational technology, instructional design, digital learning environment, pedagogies and e-learning management. The project funding provided the e-learning centre with the hardware and software necessary to provide its first Internet-based service to BIT students, to which, in 2003, the centre added an LMS-based service. The LMS service used a Swedish commercial software called *Theeducation* (www.theeducation.se), although this proved difficult to customise to academic requirements. An additional problem was that the initial payment for the product, enabled by the foreign-funded e-learning project, could not be sustained based on income generated. This early LMS experience, however, had laid a useful foundation for ongoing research into the design and implementation of virtual learning environments, and for partnership in the IDRC's PANdora project on the evaluation and development of LMS systems.

The PANdora LMS project was conducted from 2005–07, with major support from one of the PANdora network's Mongolian partners, InfoCon Co. Ltd. in Ulaanbaatar. Other members of the project team have included partners from Indonesia and Viet Nam, all sharing the same need for a system to enhance the learning process at their higher education institutions. This collaborative approach has been valuable in making the project team aware of differences between the teaching, learning and the learning management needs of different national educational systems.

LMS DESIGN: CONCEPTUAL AND TECHNICAL

In terms of their complexity and implementation costs, LMS approaches are similar to Enterprise Resource Planning (ERP) systems (Davenport, 2000). As with any large enterprise application, LMS installation and customisation requires ongoing ICT support. While the corporate world can choose to purchase and support an enterprise-level LMS, educational institutions

often cannot afford such large investments. Commercial LMS softwares are certainly too costly for typical Asian educational institutions, and lack flexibility in terms of their customisation potential. Cost-free, open-source software (OSS) products are the best candidates for those organisations. The degree to which OSS tools can be utilised and customised is limited only by the knowledge, learning and innovative energy of the end users, and not by the proprietary rights and prices of the vendors (Weber, 2003). Institutions still need a high level of IT expertise in order to implement on OSS-based LMS. An advantage of many OSS products, however, is the presence of a large online community of volunteer programmers to provide free modules and advice, and the fact that academic staff can play a major role on the course development team, in customising the delivery system according to the specific teaching and learning needs of the course and the academic institution as a whole. In addition, open-source LMS software often contains multiple language options important for societies with multicultural backgrounds and varying language abilities in their individual members.

UCSC's early studies of LMS architecture have created a good conceptual basis for the ongoing customisation of LMS software according to Asian needs. An LMS should enable the management, delivery and tracking of learning content for teachers/instructors and registered students, and should integrate these activities with supervisory tasks that automate and streamline the system's overall cost and impact. In the process, the LMS should support a collaborative learning community by means of multiple learning modes including self-paced coursework (web-based seminars and classes, downloaded material, CD-ROMs and videos) scheduled classes (live instruction in classroom settings and online), and group learning (online forums and chats). A robust LMS should have an architecture capable of supporting and modifying all of these functional requirements depending on the organisation's evolving needs. It should include:

- **Registration:** Students usually register at the beginning of a study programme, though there may be subsequent registrations based on the student's learning path. Registrations are valid for a particular period and expire at a particular time.
- **Monitoring:** The organisation is responsible for monitoring students' attendance and performance. When the number of

students is small this is not difficult, but when the number is significantly increased, monitoring attendance and performance becomes a complex administrative activity.

- **Controlling:** In order to maintain course quality, it is important for proper assessment of the student's skills to occur before accreditation is given.

In order to achieve these high-level functional requirements, an LMS can be designed as a collection of subsystems on top of a single database. UCSC has identified the following five subsystems as fundamental features of an efficient LMS, enabling features to be flexibly added or removed according to individual course needs.

1. Registration Subsystem

This component identifies the valid users to the system. The first time they access the LMS, users have to provide their username, identity card number and a validation code received from the institutional administration. The username and password are used to authenticate their subsequent accesses.

2. Scheduler Subsystem

All courses are expected to have a fixed timetable published in advance. Enrolment and the ongoing activities performed by the registered students need to be managed by an event scheduler. This subsystem manages all courses and students, avoiding conflicts of activities and impossible workloads arising from enrolment in multiple courses simultaneously.

3. Information Exchange Subsystem

When course enrolments are large, it is particularly difficult to maintain one-on-one communication between students and the teacher/instructor. The information exchange subsystem provides essential teacher–student interaction via:

- exchange of messages and files;
- forums and virtual classes;
- a notification subsystem (news and announcements); and
- collection and storage of Help information.

4. Management of Users and Groups Subsystem

Even registered students are not allowed to access all resources/courses offered by the LMS. They have to complete prerequisites in order to begin each new course. The passwords (enrolment keys) given to each student at the start of each course can be used to group students according to prior qualifications and other attributes for participation in specific learning activities. Membership in these subgroups needs to be managed by creation, revision and removal routines.

5. Administration of Courses Subsystem

Courses are developed according to the overall programme curriculum and specific course syllabi. For consistency between these, the LMS should be capable of importing part or all of a course from a published source or repository of materials.

EVALUATION OF LMS SYSTEMS

Hundreds of commercial and non-commercial LMS software are now available (EduTools, 2010). These products are not all equally efficient, however. Many contain hidden costs, unclear user, developer and administration manuals and limitations with regard to interoperability, integration, localisation, and bandwidth requirements. Farrell (2003) ranked the *ATutor* and *ILIAS* packages highly out of 35 OSS products evaluated for the Commonwealth of Learning (COL). Subsequent versions of these products have been found to have some of the above problems (Hotrum et al., 2005), while *Moodle* was found to have superior attributes in both studies. As no LMS evaluation studies appeared to have taken place in the Asian online environment, it was decided to conduct a new evaluation study for this purpose.

I. Methodology

Various methods are available for LMS evaluation. The “heuristic evaluation” approach stresses problems relating to the usability of the system interface (Nielsen and Mack, 1994). A complementary approach to evaluating the pedagogical dimension of computer-based instruction was offered by Reeves (1994). More recently, a comprehensive framework for evaluating online software has been developed by the American Society for Training and Development (ASTD), and has been used specifically in evaluations of online DE software (Belyk and Feist, 2002). The ASTD evaluation criteria include: cost to institution and user, complexity, control, clarity, Common Technical Framework and sub-sections of each. After considering each of these methods, it was decided to combine the ASTD approach with that used by Farrell (2003). Permission was obtained from COL for this purpose. The partners from Indonesia, Mongolia and Sri Lanka collaborated on the evaluation’s design, with the help of a mailing list and a collaborative website at www.pandora-asia.org. The Viet Nam partner was not involved in the project at that stage. Each team was assigned to evaluate a sub-set of OS-based LMS products from a total of 61 options. It was decided not to include any commercial LMS products in the evaluation since these do not support open localisation. The following products were shortlisted for consideration based on the previous findings of Farrell (2003) and Baggaley et al. (2002–06). These were: *ATutor*; *Claroline*; *DoceboLMS*; *Dokeos*; *Magic Tutor*; *MimerDesk*; *Moodle*; and *WordCircle*.

Questionnaire

The evaluation survey took the form of a questionnaire designed to collect data from: *a)* DE students; *b)* DE teachers; and *c)* DE technical personnel. The questionnaire also included questions about LMSs found to be valuable, and about how they could be improved. The questionnaire was distributed to each country team, and the respondents were given 1–2 days to complete it.

Sample

By the end of 2005, data had been collected from an *ad hoc* sample of 44 students, 26 technical personnel and 12 academics from

Mongolia (17), Sri Lanka (55) and Indonesia (10). The institutions represented included:

- Mongolia: The Health Sciences University of Mongolia; the National University of Mongolia, the University of Science and Technology and IT companies;
- Sri Lanka: University of Colombo School of Computing; and
- Indonesia: Universitas Terbuka, the Microsoft Indonesia Training Centre and the ASEAN Foundation Collaboratory.

Gender: Of the 44 students, 80 per cent male and 20 per cent were female. Of the 26 technical personnel, 65 per cent were male and 35 per cent were female. Of the 12 academic staff, 58 per cent were male and 42 per cent were female.

Age ratio: Of the students, 80 per cent were 20–25 years old; 18 per cent were 26–30; and 2 per cent were 31–35. Of the technical personnel, 30 per cent were 20–25; 35 per cent were 26–30 years old; 11 per cent were 31–35; 4 per cent were 36–40; 15 per cent were 41–45 years old; and 5 per cent were older than 45. Of academic staff, 50 per cent were 20–25 years old; 42 per cent were 26–30; and 8 per cent were 31–35.

Education: Of the students, 27 per cent possessed qualifications lower than the Bachelor's degree; 66 per cent had a Bachelor's degree; and 7 per cent had higher qualifications. Of the technical personnel, 58 per cent had a Bachelor's degree in an IT field; 23 per cent had a Master's degree in an IT field; 4 per cent had higher qualifications in an IT field; and 15 per cent did not have a degree. Of the academic staff, 92 per cent had a Bachelor's degree and 8 per cent had qualifications higher than the Master's level.

Occupation: Of the students, 82 per cent were full-time, 7 per cent were part-time and 11 per cent were professionals. The occupations of the technical personnel were: software developers (38 per cent), instructional designers (12 per cent), webmasters (11 per cent), server administrators (8 per cent), database designers (4 per cent) and others (27 per cent).

Exposure to e-learning methods: Of the students, 38 per cent had never completed any e-learning courses; 16 per cent had completed at least one e-learning course; and 2 per cent had

completed at least two e-learning courses; 43 per cent of the sample did not answer the question. Of the technical personnel, 35 per cent had never maintained e-learning software previously, 35 per cent had maintained one or two e-learning systems; and 8 per cent had maintained three or more e-learning systems; 22 per cent did not respond. Of academic staff, 50 per cent had used at least one e-learning software for teaching purposes, and 50 per cent have not used any e-learning system for teaching or did not answer the question.

Missing responses: A total of 26 technical personnel attempted the survey but only 13 gave valid response.

2. Results

Only one product, *Moodle 1.5*, was well known to the sample. Of the 82 sample members, 23 cited *Moodle* as the best LMS for their purposes (Table 8.1). It was not seen as the best product in all respects, however. Table 8.2 indicates the ratings of *Moodle* by those members of the sample who had experience of it. Their particular approval of the product's wide range of features is noted. Table 8.3 indicates the generally positive reactions of the sample's 13 technical members to *Moodle*.

DISCUSSION

Major findings of the evaluation were as follows.

1. The most useful OSS software for e-learning in the Asian institutions represented in the study: 46 per cent of the total sample reported *Moodle* to be the most useful LMS in online training; *ATutor* and *Dreamweaver* each received 4 per cent of the votes, while *Blackboard* and *Flash* each received 3 per cent. The remaining 28 per cent named other software such as *KEWL*, *Mambo*, *Presenter* and *Redbox*.
2. The best features of *Moodle*: 44 per cent of the respondents said that it is feature-rich. The lowest rating (7 per cent) was for its display loading speed.

Table 8.1 Software Found Useful in Online Learning (N = 82)

<i>Software</i>	<i>Respondents</i>	<i>Typical comments</i>
<i>Moodle</i>	23	All areas are smoothly handled. The software is easy to use, maintain and customise. Nothing else is good enough for my requirements.
<i>Flash</i>	3	Good but needs technical expertise. Database handling is difficult.
<i>ATutor</i>	2	Easy to install and use. Lots of features.
<i>Dreamweaver</i>	2	Useful for template and HTML creation. Programming, customisation and maintenance easy. Can use javascript.
<i>Others</i>	14	<i>KEWL, Redbox, Presenter</i> and <i>Prometric</i> are useful.

Source: Authors.

Table 8.2 Overall Ratings of Moodle (N = 82)

<i>Moodle features</i>	<i>Good</i>	<i>Fairly good</i>	<i>Not very good</i>	<i>Poor</i>
Ease of use	41	48	10	0
Variety of features	44	41	12	3
Display loading speed	34	48	10	7
System interface	26	55	19	0
Template/theme selection	19	50	25	6
Security	32	55	13	0
Technical support/manual	35	39	26	0

Source: Authors.

Table 8.3 Moodle Feedback from Technical Staff (N = 13)

<i>Moodle features</i>	<i>Good</i>	<i>Fairly good</i>	<i>Not very good</i>	<i>Poor</i>
Overall ease of maintenance	67	33		
Installation and upgrade	67	25	8	
Hardware, software requirements	75	25		
Ease of backup, restore	75	25		
Security	67	33		
Permissions, roles and user privileges	83	8	9	
Multi-language	33	42		25
Localisation	42	50	8	
Multiple + custom-designed templates	33	33	34	
Technical manual	67	17	16	
Intelligibility of source code	42	42	8	8
Ease of programming new modules	33	33	9	25
Display loading speed	11	55	11	23
System interface	33	58	9	
Unicode support	67	17		16

Source: Authors.

3. Students requested improvements to *Moodle's* e-mail and multimedia environment, and SMS integration.
4. Of the 13 technical personnel who gave valid responses, nine stated that they use *Moodle*, and one used *WebCT*. The other three respondents did not name an LMS.
5. The most common problem in maintaining DE software was localisation (38 per cent), English language barriers (31 per cent), source code licence costs (15 per cent), additional requirements (8 per cent) and other factors (8 per cent).
6. From the perspective of the technical personnel, the three best features of *Moodle* were: permissions, roles and user privileges (83 per cent); ease of backup and restoration (75 per cent); and hardware, software requirements (75 per cent).
7. The three aspects of *Moodle* with the lowest ratings by the technical support personnel were: ease of adding and programming new modules (25 per cent); multi-language support (25 per cent); and display loading speed (23 per cent).

CONCLUSIONS

A project team of researchers, educators and software developers in Mongolia, Sri Lanka and Viet Nam examined 56 open-source and web-based learning management systems, and identified *Moodle* as the most suitable for their purposes. The project survey revealed that students in all three partner countries would like their distance learning materials to make greater use of multimedia and interactive content. LMSs such as *Moodle* are designed to cater to such needs, and are effective for online learners with fast Internet connections. Delivering LMS content to students in many parts of Asia, however, is not viable owing to the lack of high bandwidth connections. In the three partner countries, multimedia audio-video CDs are popular, overcoming the problems of delivering material online. It is recommended that offline versions of *Moodle* materials should be produced on CDs and for other portable media (for example, cell-phone "texting" techniques). In this way, a single course materials development process can be customised to different local conditions simultaneously.

Developing an Asian Learning Object Repository

9

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INTRODUCTION

This chapter reports the observations of a collaborative project between Asian universities in developing a local repository of digital learning objects for distance education (DE). A review of the literature on learning objects and metadata, repository design and similar initiatives is presented. Development activities and obstacles are discussed, and lessons learned from the effort are reported with recommendations for the future development of learning objects and repositories.

The Internet has become the world's most heavily used multimedia communication network. Though network quality varies according to the infrastructure available in certain locations, the Internet has been and will continue to become a reliable, fast and dependable means of multimedia communication network in most parts of the world. One of the Internet's particular strengths is that it overcomes barriers of time and space to communication, with the result that participants do not have to be available in the same place and/or at the same time. It does not matter if one participant is asleep a thousand miles away when another sends a message. The receiver can pick up the message at the earliest convenience. Internet applications such as e-mail, file transfer, website presentation, e-learning and e-commerce are no longer a novelty in many countries, and many Asian institutions consider the utilisation of e-learning methods as a major symbol of their modernisation. Consequently, online content development has become a trend among these institutions, triggering the birth of the learning object (LO) repository.

Many educational institutions, especially those practising open and distance learning (ODL), have developed some kind of ICT-supported LO system, and are using it to deliver learning content through the Internet. A common problem faced by many institutions with regard to content development is its high cost. In addition, there is a lack of exchange of LOs among educational institutions, and a lack of formats for developing multi-disciplinary curricula in a compatible and interchangeable manner. As a result, much similar and redundant content is being developed at different institutions. This duplicative effort decreases the institutions' capacity to keep their materials up-to-date. To solve this problem, and to create more cost-effective methods of LO development, standards-based exchanges of educational resources are required, developed via collaborative harmonisation attempts.

Numerous LO repositories have already been developed internationally. As content and repository development require substantial human, financial and capital investments, most of them have been developed by large, affluent institutions in their own languages, or by international organisations using English as a common language. In Asia, the Library and Information System (LIS) based in Singapore is a repository enabling teachers and students in the member institutions to share syllabi, lesson plans, LOs and teaching materials (Chaudhry and Khoo, 2006). Educators in Thailand have developed a digital e-learning library in an effort to share its limited learning resources among teachers and learners in K-12 schools (Hasan, 2007). Indonesia, through one of the Ministry of National Education's centres (Pustekkom), has also developed online content for K-12 education through its Edukasi.net portal. This initiative has been established to provide teachers and K-12 students with enriched learning materials supplementing face-to-face instruction in schools, and to help teachers in the preparation of their lesson plans. A Japanese initiative (Shimizu, 2006) has developed a "Gateways to Learning for Ability Development" (GLAD) portal at the National Institute for Multimedia Education (NIME-GLAD). This system aims to provide learners at all levels of education with links to all LOs accessible through the Internet. The functions of GLAD are searching and retrieving information, providing learning and course management functions, a course authoring system, learner registration and enabling international collaboration.

To this point, however, relatively few Asian educational institutions have been able to develop their own LO repositories, or to take advantage of existing English-based LOs available worldwide. In addition, the existing repositories still contain gaps in specific areas of knowledge, and there is a clear need for training in the skills needed to generate more LO repositories in the region. The current project aims to address this problem through enhanced, sustainable collaboration between Asian educational institutions, aimed at developing an integrated platform for the open exchange of LOs, to develop examples of LOs for selected curricula, and to evaluate the useability of the LOs. Important aspects of the project are the localisation of content in four different languages (English, Indonesian, Thai and Khmer) and the development of a flexible and maintainable environment for LO exchange.

RESEARCH AND DEVELOPMENT METHODOLOGY

The current project has involved five partner institutions: Universitas Terbuka (UT) in Indonesia (project leader), Sukhothai Thammathirat Open University (STOU) in Thailand, the International Institute of Cambodia University of Technology (IICUT) and Allama Iqbal Open University (AIOU) in Pakistan. An LO repository has been developed collaboratively by the four institutions, and its content has been developed at STOU and UT. The project has considered the:

- standard LO definitions;
- collaborative framework and “granularity” scheme required for sharing LOs;
- development and adoption of a repository platform;
- development of LOs and metadata; and
- the need for evaluation of LOs by prospective users.

I. Learning Object Definition

Chaudhry and Khoo (2006) identified three issues relating to the development of an LO repository: the development and size of

the LOs themselves, the manner in which they are managed so that users can easily find LOs meeting their specific needs, and the design of the “metadata” used in the repository’s cataloging system. Many definitions of LOs have been proposed. It derives from the idea of using small “chunks” of re-usable instructional content, enabling efficient organisation and cataloging, and allowing easier access and more frequent use of objects. Johnson (in Smith, 2004) has defined an LO as any grouping of materials that is meaningfully structured and tied to a specific educational objective. Similarly, Wiley (2000) defines an LO as “any entity, digital or non-digital, which can be used, reused or referenced during technology supported learning.” These definitions seem to include any material that can be structured in a manner that supports learning. On the other hand, Gibbons et al. (2000) have defined LOs as specifically digital files used to generate e-learning. This definition seems the most suitable for today’s digital world. Most objects can now be digitised, and digital representations of e-learning material can easily be transported and exchanged through the Internet.

Based on these definitions, an LO in the current project was operationally defined as a digital smallest learning unit with the following attributes:

- in a digital format;
- structured in a meaningful way and tied to an educational objective;
- self-contained and “stand-alone”, so that it can be used independently or in combination (aggregated) with other objects as required;
- available on demand across different learning systems;
- tagged with descriptive metadata, allowing it to be easily found and used;
- containing sounds and/or still images, video clips and simulations;
- containing visualisations not exceeding 3 minutes of viewing; and
- designed for 30 minutes of study time.

In keeping with this definition, each LO was expected to consist of at least six essential phases in order to provide students with a coherent learning experience.

- Introduction: context and learning objective(s).
- Preparation: Prerequisite skills, knowledge or equipment, and a pre-assessment as necessary.
- Study materials: Presentation of knowledge or skill with informal formative assessment.
- Self-assessment: Immediate feedback of formative assessment.
- Offline task(s): Application of the knowledge or skill in an active, real-world setting.
- Activity records tracked in a learning management system, relating to:
 - when the learner starts and ends the activity;
 - what the learner does with the LO; and
 - the results of exercises, quizzes, and tests.

2. Granularity

The granularity scheme relates to the size of the LO. As mentioned earlier, a major justification for developing LOs is the possibility of reusing them in different situations, either in the form of a whole course, or as a topic within a course, through the Internet and other IP-based computer networks. The scope of the instructional objectives determine the size of the LO to be developed. A large LO can have many instructional objectives or one overall objective. The larger and more general the LO, the smaller its reusability will be for specific purposes. The criterion of reusability stresses the need to develop materials with the flexibility to be used for many purposes, and the LO's size is therefore an important factor.

For the purposes of the current project, the size of an LO was defined based on the way in courses are organised and structured at UT and STOU. The workload of courses at the two institutions is measured in units (STOU) and credit units (UT). In a given curriculum, course workload varies from one to four units. Each unit consists of three learning modules, and each module has one general instructional objective and several specific instructional objectives. Each specific instructional objective is elaborated with a learning activity consisting of material presentation, examples and exercises and a formative test. In the current project, the approximate size of an LO is dictated by a given learning activity

or learning unit with one specific instructional objective. By conceptualising them in this way, LOs have a higher reusability, for they can be shared between courses with overlapping topics or competencies. Courses in foundation mathematics, social sciences and even areas of electrical, mechanical and civil engineering have a high likelihood of dealing with similar competencies, and can, therefore, share LOs with an appropriate granularity and catalogued in a repository using appropriate metadata.

3. Developing the Repository Platform

The basic function of the LO repository is to store materials of different kinds efficiently, using a well-designed metadata cataloguing system and searching mechanism. The development of the repository by the current project was a relatively simple and straightforward matter. Its functions were defined at the first project core-group meeting (July 2005), as follows:

1. Storage of:
 - LO metadata; and
 - LOs (including URL links).
2. Interface for:
 - contributors to add LO metadata and LOs; and
 - users (clients) to:
 - search for LOs via keywords and related metadata terms;
 - access LOs; and
 - download LOs.
3. Recording of:
 - contributors; and
 - users (clients).
4. Facilities for managing access profiles of:
 - contributors;
 - registered users; and
 - guests.

5. Statistics relating to:
 - accesses;
 - use of LOs by subject; and
 - downloads.
6. Security measures:
 - backup facilities; and
 - disaster recovery mechanisms.

After defining these functions, a team of repository developers at UT then examined the available systems to identify those meeting the repository's specified needs. Specific attention was given to the:

- management of content;
- clarity of the system documentation;
- ease of modification;
- ability to handle Shareable Content Object Reference Model (SCORM) and Aviation Industry Computer-based Training Committee (AICC) compliant LOs; and
- mechanism for uploading and downloading content.

Many repository platforms are available, based on commercial or open-source software (OSS). So that the repository's use may be sustained beyond the lifetime of the project, it was decided that the repository platform should be based on an OSS platform. The platforms considered included *PhpNuke*, *PostNuke* and *XOOPS*, all featuring user-friendly storage and searching system. These three systems differed with regard to metadata structure, however. It was decided to adopt the *XOOPS* system because of its superior download mechanism, via which a registered contributor can submit the LO and its metadata simultaneously on a single online form. *XOOPS* also has a useful feature for setting up a submission system with or without a review and approval mechanism.

Metadata standards for LO repositories include the Instructional Management System Global Consortium, SCORM, AICC, ARIADNE, DublinCore and CANCORE. The metadata structure of the current project's repository was based on the IMS-Global

Learning System (IMS Global Learning Consortium, 2001), with some minor modifications. (The IMS-Global Learning Consortium standard is basically the standard to which other standards refer while using modified fields suiting their specific needs.) The final repository created for the PANdora project can be accessed at pandoralom.ut.ac.id/

4. Developing the LOs and Metadata

To give the repository universal usability, it was decided that STOU would develop LOs in Mathematics and Statistics, with UT developing LOs in Chemistry, Physics and Biology. To increase their reusability, the LOs would be made available in four languages: English, Indonesian, Khmer and Thai. The process began with a comparison of syllabi at STOU and UT. The teams at these two institutions selected learning units meeting the project's LO definition within the chosen disciplines, and identified the units that would be developed as LOs. The project partners then agreed that the LOs to be developed would be for 1st year university programmes. This was to ensure that the LOs would be relevant to the curriculum of both universities. Once the learning units were agreed, the STOU and UT teams developed the LOs independently, using different approaches.

In order to increase the capacity of academic staff for developing LOs with adequate knowledge, understanding and technical competence, UT decided to recruit academic staff (faculty members) to develop the LOs with some technical assistance. The expectation was that since academic staff members are already familiar with the learning content, they will produce better LOs once they become familiar with the development tools. This approach is in line with UT's capacity-building programme. The development process at UT began with training covering the basic notion of LOs and LO development, and the use of development tools. *Macromedia Flash* was selected as the main development tool, and face-to-face and online training were provided in its use for developing animation and simulation objects. After this training, the academic staff members were expected to play the roles of content experts, instructional designers, as well as media developers/programmers. In anticipating the difficulties they might face, however, a team of instructional designers, *Flash* programmers, and audio-visual developers from UT's Centre for Multimedia Production was made available to advise them. Regular meetings

were organised to discuss problems encountered, and to check the progress of the LO development.

Meanwhile, STOU set up a committee to carry out the project, and has taken a team approach to developing the LOs. The development team consists of content experts, instructional developers, graphic artists and animation developers. The committee has provided training workshops and orientation in LOs development methods, and has established three sub-committees to monitor LO development in the assigned subject areas. Two sub-committees have developed the LOs in Mathematics and Statistics, while the third is responsible for translating the LOs in Chemistry, Biology and Physics developed at UT. Each sub-committee comprises content specialists, instructional and graphic designers, programmers and metadata creators. The development process at STOU began with the preparation of LO scripts by content specialists. The scripts were then reviewed by the other sub-committee members and by the invited content specialists. The reviewed scripts were then translated into storyboards by the instructional designers, and the storyboards were reviewed by the members of sub-committee and content reviewers. Interactive content was produced for the approved storyboards using *Flash* software. The LO metadata, defined by the content experts, were then entered into the repository system by the repository administrators.

Overall, the project produced 209 LOs and LO translations (77 in English, 60 in Thai, 64 in Bahasa Indonesia and eight in Khmer), using a wide range of animated and interactive multimedia methods.

EVALUATION METHODOLOGY

I. The Evaluators

A team of 89 evaluators was assembled from STOU, UT and International Institute of Cambodia University of Technology (IICUT) (51 from STOU, 28 from UT, eight from IICUT and two unknown). They were instructors knowledgeable in the content of the LOs who were asked to evaluate. Most of them (79 per cent) were 36–55 years old, and in the middle of their distance teaching careers; 54 per cent of them were female and 46 per cent male. Table 9.1 shows the division of the evaluators between the three universities.

Table 9.1 Characteristics of the Evaluators

Age	Male (N = 41)				Female (N = 48)		Total
	STOU	UT	IICUT	Other	STOU	UT	
18–25	1		2	1			4
26–35	1		6	1	1	1	10
36–45	4	7			12	8	31
46–55	9	6			18	6	39
56–65	3				2		5
Total	18	13	8	2	33	15	89

Source: Authors.

2. The Objects Evaluated

A cross-section of 74 of the 209 LO versions was formally evaluated (13 in Thai, 29 in Bahasa Indonesia and 32 in English). Owing to logistical difficulties, it was not possible to evaluate the Khmer LOs. Each evaluator was asked to rate three different LOs, although some only completed one or two LOs, for an overall total of 238 evaluations. The instrument is accessible on the repository website (pandoralom.ut.ac.id). Table 9.2 lists, by their English titles, the 32 individual LOs evaluated.

The evaluators' ratings were collected via an online evaluation instrument containing 4-point Likert Scale: 1 (poor); 2 (satisfactory); 3 (good); and 4 (very good). The study focused on two main issues: the *accessibility* of the LOs in the repository, and their *reusability*. For additional insights into the accessibility issue, data regarding the computer and Internet facilities used by the evaluators during the evaluation were collected.

Prior to the evaluation, a meeting was conducted at each partner institution to explain the evaluation procedure. An explanation of the instrument was given; then the evaluators were requested to evaluate three LOs; and then to enter their responses on the online instrument. The instrument was designed in such a way that an evaluator reacting to more than one LO was required to give personal information just once. The evaluation data were stored in an *MySQL* database, and downloaded for analysis into an *MSAccess* database through open database connectivity (ODBC). From the *Access* database, the data were transferred to *MS Excel* and to *SPSS v.13* for the final descriptive analysis in the form of cross-tabulations.

Table 9.2 The 32 Evaluated Learning Objects (English Titles)

English titles of the 32 evaluated objects

1. Asexual Reproduction	12. Definition of Functions	23. Permutation
2. Basic Counting Principles	13. Derivatives	24. Physics
3. Biology	14. Determining Chemical Reactions	25. Sample Space and Events
4. Human Blood Circulation	15. Ecology	26. Speciation Factors
5. Human Carbohydrate Digestion	16. Electron Configuration	27. Speciation Process
6. Chain Rules of Derivatives	17. Establishing Statistical Hypothesis	28. Statistics
7. Chemical Reaction	18. Formula Derivatives	29. Succession
8. Chemistry	19. Glycolysis	30. Human Digestion of Protein
9. Combination	20. Ionic Bonding	31. Water Transportation in Plants
10. Index Numbers	21. Mathematics	32. Weighted Price Index
11. Covalent Bonding	22. 1- and 2-tailed Tests	

Source: Authors.

RESULTS

1. Computers

The evaluators were asked about the types of processor and Random Access Memory (RAM) in the computers they used to evaluate the LOs. The majority (82 per cent) used *Pentium IV* or *Athlon* computers; 48 per cent had RAM greater than 128 Megabyte; 21 per cent did not know both the type of processor and the RAM size of the computer they were using. Faculty members at UT were more unaware or disinterested in the hardware aspects of their computers by comparison with those at STOU.

All of the evaluators reported that they had multiple Internet access options including home, office and Internet kiosks. Twenty-one per cent of them (six from STOU and 13 from UT) believed that some of their students have Internet access; 14 STOU instructors and one from UT believed that “most” of their students have Internet access. Only three faculty members suggested that all students have access to the Internet. In general, this indicates that faculty members believe that STOU students have more Internet access than UT students.

2. Connectivity

The types of Internet connection used for the evaluation included dial-up connection (28.8 kbps and 56 kbps), asynchronous digital subscriber lines (ADSLs) and ‘other’ (primarily the local area network (LAN) of the university). At STOU, there were 30 occasions where the LOs were evaluated over an ADSL connection, compared with only seven occasions of at UT. This is understandable since ADSL connection in Indonesia is still relatively expensive for users, including UT staff.

As stated previously, the 89 faculty members participating in the evaluation were each asked to evaluate three LOs. Nevertheless, some of them completed one or two LO evaluations only. The 238 evaluation results obtained were classified in terms of the evaluators’ perceptions of the quality of response by the repository server, and the download time of the LOs from the repository. On these bases, 90 per cent of the evaluators perceived the connection to the repository server (located at UT

in Jakarta, Indonesia) as either “good” or “very good” (214/238 downloads). A minority of the connections used by instructors at UT in Jakarta was rated as “very good” whereas only six of the 150 downloads at STOU in Bangkok were rated as coming over a “poor” or merely “satisfactory” connection. The connections to the server in Jakarta were evidently better from Bangkok than from Jakarta itself.

In general, most evaluators at both UT and STOU did not appear to regard these connectivity problems as significant. With regard to download time, 196 out of the 238 occasions (82 per cent) were rated “good” or “very good”, and only 10 occasions (4 per cent) were rated “poor”. The lecturers at IICUT in Phnom Penh, Cambodia, however, rated the download time of the LOs as “poor” or “satisfactory”.

3. Content and Design

Using 4-point Likert scales, the LOs were evaluated in terms of their academic content and instructional design quality (attractiveness, clarity, etc.), user friendliness, applicability, interactivity, download time, adequacy of the amount of study time prescribed for them and the teachers’ willingness to use the object. Seventy-six per cent of the evaluators (181 out of 238) gave positive ratings (good or very good) for academic content quality; and 70 per cent (167) gave the same ratings for design and appearance. The results indicated a generally positive evaluation, with room for improvement.

The LOs were designed for a maximum of 30 minutes of study time. The evaluation results suggest that this decision rule was generally appropriate—69 per cent of the evaluations (167/238) rated the LOs good or very good in terms of study time. Many individual LOs, however, were found to need improvement. In terms of their interactivity levels, for example, 39 per cent (93/238) of the LOs were rated satisfactory or poor.

The evaluation also sought the instructors’ perceptions of whether each LO is motivating for students, and whether they will use it in their teaching. Forty-four per cent of the LOs (105/238) were rated “quite motivating”, and 19 per cent (45/238) as “very motivating”. Seventy-one per cent (169/238) were rated as good or very good in terms of the evaluators’ willingness to use the LOs

in their teaching. It should be noted, however, that 29 per cent (69 evaluations) of the LOs were rated as “not motivating”, that is, not sufficiently attractive to motivate students to learn from them.

4. Overall Accessibility and Reusability

In this study, accessibility is defined as a product of the quality of the user’s connection to the web server, and the time required to download each LO from it. Overall reusability is defined as the sum of ratings on content quality, instructional design, interactivity, time to learn, navigation menu, learning activity, language used, possible usage and motivational quality.

With a maximum possible score of 8, the average accessibility score of the LOs was 6.27—a notional success rate of 78 per cent. The individual LOs’ average ratings varied widely, however, between the lowest average observed (2) and the highest (8). The average reusability score of the LOs was 25.11, or 70 per cent of the maximum score of 36. The average reusability scores of the three language versions were 26 (Thai), 25 (English) and 24 (Indonesian). These scores also vary widely, however, with standard deviation scores ranging from 3.60 to 5.77.

Since the evaluation of LOs can be influenced by the language spoken by the evaluators, it is interesting to note that the STOU and UT evaluators give the highest average ratings to LOs in their own language. The large standard deviations of the scores, however, prevent these differences from being statistically significant. A t-test comparing the accessibility and reusability evaluations given by the male and female instructors also yielded no significant difference.

DISCUSSION OF RESULTS

The development of the LOs and their repository was initially expected to be completed within one year, though it ultimately took approximately two years. Based on information provided by the developers, the main reason appears to be their lack of technical skill. At UT, LO developers are supposed to work as both content experts and programmers. Owing to their lack of technical

skills, however, this approach does not seem to work well. The developers acted mainly as content experts and were discouraged by the detailed skills required by animation and simulation tasks. Many of the developers ultimately produced the scripts of the LOs only, and left their multimedia programming to others.

STOU in Bangkok approached the LO development task by establishing two groups. One group was responsible for developing the LO content, and another group was responsible for the objects' computer programming. Judging by the overall high ratings of most of the learning objects developed at STOU, this approach is concluded as having been effective, even though many developers at both STOU and UT also had other academic and administrative responsibilities and were unable to give the development of the learning objects a high priority. A technical problem affecting the project was that, while the accessibility of the digital LO repository was rated as good, it was not always easy to ensure that a connection between the user and the repository server would be established.

A psychological hurdle in the project was created by its requirement for the LOs to be produced for regional and international use. This demand seemed to intimidate some of the developers. This was apparent in their frequent changes in the content and script of the LOs, and the frequent delays this caused. In the regular progress meetings at UT, during which the LO drafts were peer-reviewed, many developers displayed anxiety every time they saw LOs developed by others, and subsequently made constant changes to their own LOs. Although this was encouraged as part of a useful learning experience, the apparently never-ending nature of the process frustrated them.

In addition, almost all of the developers had difficulty with the concept that an LO should convey the smallest unit of learnable content, and should be designed to achieve one instructional objective only. Most of the LOs aimed to achieve more than one instructional objective, and more time would have been necessary for them to be modified. For these reasons, the standard definitions of required LO granularity emerged from the study as academic and impractical.

Further problems arose from the project's aim to develop a repository of reusable LOs in collaboration between institutions

in different countries. The rationale for this was the belief that if the repository was collaboratively developed in local languages, and based on mutual needs, the instructors in the partner institutions would be willing to use the LOs in their instructions. The general logistical problems of the project, however, prevented the translation of many of the LOs from their initial English version into the local languages, which naturally reduced many instructors' willingness to use them. Asia is a very large region with many spoken languages and cultural differences, and this is clearly a major deterrent to the design of shareable learning objects. Even though the LOs developed in this project were on topics that are relatively value-free and culturally neutral, even subjects such as Mathematics and Statistics may still be bound by local context. To confirm this, the translation of the LOs would have to be completed, and another round of evaluation conducted.

CONCLUSIONS

In Asia, the number of universities using the Internet is ever-increasing in both DE and face-to-face instruction. The Internet's use has also generated new collaborative teaching and learning methods, using teaching materials stored in repositories for use on demand, and involving high levels of interactivity. The current PANdora project aimed to develop a repository of reusable learning objects, and the metadata required to make them accessible and shareable. The development of the repository itself was not a problem for the reports of many previous initiatives and standards are available to guide such a project, for example, Sharable Content Object Reference Model (SCORM), Institute of Electrical and Electronics Engineers-Instrumentation and Measurement Society (IEEE-IMS), ARIADNE and CANCORE. The most problematic aspect in the project was the development of the learning objects themselves, given the limited number of course developers at the partner universities, and the lack of staff skilled in learning objects programming.

The need to develop and share learning materials by media is particularly crucial in DE. When the quality and reliability of the Internet is no longer an issue, it promises to be the medium that

best overcomes the barriers of time, place and pace in distance-based learning. In Indonesia, educational uses of the Internet are on the rise, owing in particular to the Ministry of National Education's plans to provide high bandwidth network connections in most elementary and high schools, and in all higher education institutions in Indonesia and Jardiknas. Internet infrastructure is also improving in Cambodia and Thailand, and it is to be hoped that its reliability, and that of the skills to use it, will ultimately improve to the point that the Internet can be used for the wide and economical sharing of materials such as those created in this project.

To this end, capacity-building in the development of interactive digital objects will be essential. Many educational institutions in Asia, including those involved in the current project, lack the facilities and human resources to utilise the Internet to its fullest extent. Comprehensive policies are required, creating an atmosphere for supporting learning by providing shareable and reusable learning objects. Such policies should permit workload adjustments for faculty members who are involved in developing learning materials, to keep workload to acceptable levels, and to prevent overload, poor performance and job dissatisfaction. In addition, a critical mass of skilled materials designers should be developed by professional development programmes.

Mobile Technology in Non-formal Distance Education

10

The Philippines: *Angelo Juan O. Ramos* (sub-project leader) and
Jerome P. Triñona

INTRODUCTION

Mobile technologies enable communication between individuals worldwide, and provide access to online information, activities such as taking photographs, video and listening music, and sharing of all these functions with friends and colleagues. Developments in cell-phone technology therefore have immense educational potential. The current report illustrates the development of cell phone-based materials for delivery of distance education (DE) courses in the Philippines and Mongolia.

Cell-phones are not just devices for new modes of communication interaction (Prensky, 2005); they are also computers that fit in the pocket, with processing power far greater than the 1990s' PCs. They are also ubiquitous, and nearly always switched on. Unlike other communication and computing devices used in education, cell-phones can be used on a mobile basis, and are a central focus of the current emphasis on mobile learning (m-learning). M-learning is a sub-set of e-learning using mobile devices (Brown, 2005). In regions such as the US and Europe, *Windows* and palm-based personal digital assistants (PDAs) are being used to provide media-rich educational content, while in developing Asian countries such as Mongolia and the Philippines, the high cost of ownership and connection of these devices make their educational use impractical. In these areas, however, the more accessible and popular cell-phones can be used instead.

In the Philippines, the mobile telecommunications industry is experiencing unprecedented growth. This is indicated by the National Telecommunications Commission report (Government

of the Philippines, 2005), which shows the domination of the mobile phone industry in the Philippines by the duopoly of *a*) Smart Communications and its subsidiary Pilipino Telephone Corporation (Piltel) (combined subscriber base of 20 million) and *b*) Globe Telecoms with its subsidiary Innove (combined subscriber base of 17 million). By the end of 2006, it was estimated that the penetration of cell-phones in the Philippines had reached over 40 million for all providers, and almost 50 per cent of the total Philippines population of 88 million (China ASEAN ICT Cooperation, 2007). The number of owners of cell-phone subscriber identity modules (SIMs) does not precisely represent the number of subscribers, for individuals can own more than one SIM belonging to different networks; but the figures are nonetheless a clear indication of the popularity of the cell-phone as a primary, if not exclusive, means of inter-personal connectivity with, according to the 2005 NTC report, landline ownership lagging behind at 3.3 million. Most cell-phone users in the Philippines use their units for “texting” — sending and receiving text messages via short message service (SMS). In fact, the country has been cited as the “texting capital of the world”, with approximately 200 million text messages sent and received each day.

The Government of Mongolia has also demonstrated its commitment to developing an efficient telecommunications network as an integral part of its drive towards a market economy. Since the mid-1990s, Mongolia has seen a series of telecommunication reforms leading to effective liberalisation of all market segments, partial privatisation of the fixed-line operator, Mongolia Telecom, and the establishment of an independent regulatory authority. Competition is now in place for both fixed and mobile telephony in the country, including local, long-distance and international calling, Internet and use of voice-over Internet protocol (VoIP). While the fixed-line network has been slow to expand, the mobile phone market has seen a remarkable boom (*Broadband Today*, 2006). Mongolia’s Internet and communication technologies play a key role in advancing the country’s goals to connect its dispersed population, to provide social services including education and to manage the logistics and costs of international commerce. By the end of 2000, there were three public network providers in the country, two telecom operators, two cellular phone service providers, six Internet service providers and 10 cable TV operators (World Bank, 2007).

Despite the growing popularity of the cell-phone, however, its use by public and private organisations to deliver educational content is still limited, and its wide geographical reach for educational purposes is still largely unexploited. M-learning using the cell-phone can be a vital resource in developing countries, notably for adult and lifelong learners who require a more flexible type of learning and who wish to study at their own pace, time and place. It offers enhanced opportunities for more efficient interaction, and new possibilities for access to learning resources, for educators and students, especially those who are constantly on the move (for example, businessmen and professionals) and individuals in rural areas (Brown, 2005). At present, there are inadequate models for developing mobile applications in education. The challenge for educators and mobile content designers, therefore, is one of understanding and exploring the best ways to use these resources in support of teaching and learning.

PROJECT MIND

The Molave Development Foundation Inc. (MDFI) is leading a study to determine the viability of the use of mobile SMS technologies for non-formal education in Asia. Known as Project MIND (Mobile Technology Initiatives for Non-formal Distance Education), the study is a part of the PANdora initiative (2005–07) and involves partnership with the Alternative Learning Services (ALS) of the Philippines' Department of Education, and with two organisations in Mongolia—the Health Sciences University of Mongolia (HSUM) and the English for Special Purposes Foundation (ESPF). The study is based on an examination of the socio-economic and gender issues that motivate or hinder cell-phone subscribers in using SMS for non-formal DE.

I. Pre-implementation Activities

In both the Philippines and Mongolia, activities prior to the implementation of the SMS study were conducted, and the foundation laid for designing and developing learning content to be delivered in SMS formats (Ramos, 2006).

A *baseline study* has been conducted with 126 ALS students in the six districts of Manila. These students are out-of-school youth and adult learners that form the ALS main “clienteles”. The aim of the baseline study has been to identify student demographics, learning needs and cell-phone and SMS usage. Highlights of the results are:

- all of the students have a cell-phone, and 34 per cent have more than one cell-phone per household;
- forty-one per cent of the students allocate 51–70 per cent or more of their pre-paid credits to SMS; and
- eighty per cent of the students are open to the idea of ALS learning through SMS. Math and Science are the preferred subjects for SMS learning, with 34 per cent and 30 per cent of the respondents, respectively.

In Ulaanbaatar, Mongolia, the baseline study has been conducted by the ESPF, with 20 tellers from two national banks in the city, and with 20 waiters from three hotel restaurants. The results were as follows:

- forty-six per cent of participants are aged 18–22 years;
- sixty-two per cent are female and 38 per cent male;
- sixty per cent of participants are single;
- fifty-three per cent have a Bachelor’s degree;
- fifty-two per cent have elementary-level English proficiency;
- all of the participants have cell-phones;
- ninety-two per cent are pre-paid cell-phone users;
- twenty-nine per cent earn 190,000–280,000 Tg per month (USD 160–240);
- sixty-five per cent spend more than 6,500 Tg (USD 5.50) per month on cell-phone pre-paid cards;
- forty-one per cent spend 50 per cent of their weekly pre-paid phone credits on SMS;
- ninety-four per cent are willing to use SMS for learning English; and
- sixty-seven per cent are willing to spend 35–50 per cent of their SMS units for learning English.

Focus Group Discussions (FGDs) were conducted by both the Manila and Mongolian project partners. The FGDs’ aim was to

identify the needs of learners in specific subject areas, and their SMS and cell-phone usage habits and preferences. Highlights of the FGD findings were as follows:

The Philippines:

- All of the participants have cell-phones.
- All are SMS users.
- SMS is seen as a cheaper means of communication for both personal and business purposes.
- All participants are open to ALS learning through SMS.
- All agree that learning through SMS is convenient for people who are working, and for those who cannot go to school owing to household chores.
- The transportation costs previously incurred in visiting learning centres can be allocated to SMS learning.

Mongolia:

- All of the participants have cell-phones.
- SMS is an inexpensive, popular alternative to landline phones.
- There is some resistance to sending SMS messages, in view of difficulties in using the cell-phone keypad.
- The use of cell-phones for personal use is banned for bank tellers and waiters in work hours.
- Most participants regard their knowledge of English as poor.
- Participants agree that English skills will help them in their work and in improving their job prospects.
- Most participants view the SMS option as a key component in an English learning course, and are interested in the idea.

A *Consultative Meeting* with experts (ALS teachers and instructional designers) has been conducted in preparation for the development of module contents and design. During this meeting, issues and concerns affecting module design and project implementation were discussed, and the following issues were raised:

- possible negative effects of SMS on English language skills;
- limitations in social interaction;
- use of SMS to minimise the drop-out rate;
- possible opportunities for cheating using SMS methods;

- need to align SMS content with ALS learning strands;
- competencies of ALS implementers to handle ICT projects;
- technological limitations; and
- implementation and management issues.

2. The SMS Learning System

The project's SMS learning system has three major components: a) a GSM data terminal; b) original SMS software; and c) teacher/student support facilities.

The GSM data terminal

Developed by the Advanced Science and Technology Institute of the Department of Science and Technology (ASTI-DOST), the Global System for Mobile (GSM) Communication Data Terminal is a product designed to SMS-enable an organisation's information system. With this equipment, the organisation is able to send and receive text messages (PC to mobile phone, or PC to PC) using developed and customised SMS applications. These include: reporting and/or requesting information from the server via SMS, programmed sending of SMS to individual and/or group recipients, and machine-to-machine communication allowing two computers to exchange short data packages via GSM. The advantages of an integrated SMS system are as follows.

- It is a complete solution including both hardware and software.
- Developers do not need to handle the lower-level details of GSM communication.
- Applications can be customised to clients' specific needs.
- It runs on *Windows 2000/XP* supporting the use of visual programming tools, and on *Linux*, in which the programming is via web-based scripts.

The GSM data terminal runs on a computer with the following recommended specifications: *Pentium 3* or higher; 128 kps RAM; an available PCI slot; and a serial port. The GSM module with antenna is mounted on the PCI card. Data exchange is via the

serial port, and the system module is controlled internally by AT (Hayes) commands hidden from the user. To simplify SMS integration, a driver/gateway programme is provided. The programme handles all the GSM module's lower-level control functions: initialisation, sending of AT commands, handling of incoming SMS and acknowledgments, status messages, etc.

The Project MIND SMS software

The software was developed by MDFI to handle content delivery, student registration and database management. This is an integral component of the learning modules. The SMS software is designed to receive and processes incoming messages based on keyword and other specified parameters, followed by appropriate replies. The software includes menus and screens for:

- the student information database;
- quiz content and user keywords;
- user and quiz reports;
- system utilities; and
- help messages.

The student information database acts as the central repository of student information including name, age, date of birth and cell-phone number. The system also generates an unique ID for the student to use in registering, and for the SMS server to use as the basis for recording student activity. Information from the student database can be cross-referenced with reports generated from the quiz and user database. The system design also includes the definition of keywords, parameters and message formats for transactions including student registration, quizzes, requesting help and providing standard replies. The development of keywords and messages was carefully designed to conform to the 160-character limitations of the basic SMS-enabled cell-phone. The keyword parameters were also kept at a minimum to avoid confusion. The system generates reports including incoming/outgoing message logs, student information reports, quiz results and other activities. Important announcements are transmitted and automatic messages reminding inactive students to use the materials are sent.

Student registration

An unique system-generated number is assigned to each student record in the SMS database module. To register with the system, the student sends an SMS containing the keyword REG followed by the student number (for example, REG 2). If the cell-phone number of the student sending the message matches with the assigned student number in the database record, an automatic reply is sent to the student: for example "Thank you <student name> you are already registered. You may now proceed with the lesson". In case of discrepancies (for example, the cell-phone number does not correspond with a registered user), the student is asked to contact the ALS teacher for assistance. The teacher reports the problem to Project MIND so that the database record can be modified.

Quizzes and keywords

The SMS keywords used by the project modules have been designed to comply with basic cell-phone configurations, as well as to minimise costs for the user and the project. The keywords do not exceed four characters to reduce confusion and to help users to memorise them. The main keywords are:

1. ENG: to answer the English quiz;
2. MATH: to answer the Math quiz;
3. HELP: to request teacher (person-to-person) assistance; and
4. INFO: to request automated assistance.

To answer an SMS quiz question, the student has to send an SMS following the syntax: <Main Keyword> <Question Number> < Answer> (for example, ENG 1b or MATH 2a). If the student has followed the parameters correctly, the system recognises the SMS message and replies accordingly: for example, "<Student Name> you answered B. You are correct! Please proceed to the next question"; or "You answered A. Sorry you are incorrect. Please proceed to the next question."

When the keyword HELP is sent, the student request is recorded in the system and an automatic reply is sent to the student: for example, "Thank you, Project MIND has received your request and is processing it. We will contact you as soon

as possible.” Further assistance is available via an SMS chat between the student and Project MIND staff, or a personal call with the ALS teacher.

Students are then free to start either of the two lessons. Automatic reminder messages are sent to the students who are active but have not used the SMS facility for three days, for example: “You have been inactive for three days, please continue with your lessons or contact your teacher if you have concerns. If you are already finished with your lessons, please ignore this message”. A student who has registered but not used the SMS facility for six days is deactivated and receives an automatic message, for example: “You have been deactivated due to inactivity for six days. Please contact your teacher for further instructions.”

Technical and student support

An important component is the provision of technical and general support to the students as well as to the field officers:

1. **User orientation:** To prepare the ALS implementers to give student support in their role as field officers, an orientation is given on the use of the SMS modules, and how to respond to the students’ various requests and questions. Step-by-step instructions are given so that the implementers are familiar with the module contents and the technical aspects of the SMS system. Separate orientations for the students in the six districts are then conducted by the implementers, on how to register with the system, how the modules are used, and how to answer the SMS quiz questions. During the orientation period, the ALS implementers distribute the Project MIND Modules on Math and English to each student and 100 pesos (less than USD 1) as pre-paid load allocation.
2. **Field officer support:** The Project MIND staff provides the teachers and students with additional technical support, and responds to questions on issues such as data encoding and modification. The system and its activity are constantly monitored, and system messages and updates are sent to the students via SMS.

2. Content Design and Development

The baseline study and FGDs were useful in determining the scope of the content to be developed for the SMS learning modules in both the Philippines and Mongolia. In Manila, two subject areas have been identified for development into SMS-enabled modules: English and Math. In Mongolia, the ESPF has focused on the development of English learning modules for waiters and bank tellers, while the HSUM is developing obstetrics and gynaecology modules for their medical residents. A two-and-half day workshop has been conducted for the ALS implementers in the design and development of the project's learning modules, covering the basic principles of instructional design, blended learning and student assessment. Through this workshop, ALS implementers have been introduced to instructional design concepts including:

- assessment of instructional needs;
- analysis of learner characteristics;
- writing teaching objectives;
- selecting instructional strategies;
- developing learning materials; and
- evaluating the materials and student performance.

These principles have subsequently been used to formulate the content of SMS-enabled learning modules in English and Math. Through the instructional design process, content developers including the ALS implementers involved in the project have identified the best methods enabling students to attain specific goals in particular contexts. The learning content to be developed for use in the ALS literacy programme is being aligned with the requirements of the ALS curriculum. This reflects the skills and competencies that learners need in order to meet the minimum requirements of basic education. It is parallel to and comparable with the formal school curriculum (Government of the Philippines, 2004), while addressing the particular learning needs and interests of out-of-school children, youth and adults. The curriculum covers five learning strands:

- communication skills (English and Filipino);
- problem-solving and critical thinking (Math and Science);
- sustainable use of resources and productivity;
- development of self and sense of community; and
- expanding ones' world vision.

To serve these curricular needs, the project has developed two learning modules:

MIND Your English—with topics including:

- expressing oneself;
- language and grammar;
- reading skills; and
- letter-writing.

This module also includes an audio CD, containing the module lessons in audio form, to be listened simultaneously with the use of the paper-based module. This allows the students to learn the proper pronunciation and diction, while at the same time being entertained with voice skits. After each lesson, SMS-based quizzes (see Project MIND SMS learning system) help the students in their self-assessment of the knowledge that they gained. For a final activity, students also need to accomplish an assignment to be submitted to their teacher after using the modules.

MIND Your Math—with topics including:

- fundamentals of mathematics;
- area and perimeter; and
- percentage.

The *MIND Your Math* module also includes student pre- and post-tests. The results are fed back to the students, enabling them to monitor their personal improvement after using the modules.

In general, the SMS modules are designed to be visually appealing with graphical elements that do not distract the students from the lessons. The overall look is devoid of unnecessary clutter, and the size of the display was designed so that the students can easily refer to the modules at home. The *MIND Your English* module has a built-in sleeve containing an audio CD. The SMS component of the all of the Project MIND learning modules is designed so that student with a basic GSM cell-phone can use

the system as well as those with more advanced models. Quizzes and system messages have been designed to conform to the 160-character limitation of older phones.

EVALUATION

I. The ALS Test Criterion

On the ALS implementers' recommendation, the project's SMS modules were designed to supplement the existing ALS curricular materials in English and Mathematics, with the goal of helping the students pass the annual Accreditation & Equivalency (A&E) high-school level examination. The A&E tests lead to certification of learning achievements at levels comparable with formal elementary and secondary education. Students passing the secondary-level A&E test receive the equivalent of a high-school diploma, and have the opportunity to go to college, or to secure a job. Both levels involve standardised paper-and-pencil tests multiple-choice tests and composition writing. The test items are based on the learning competencies of the five learning strands of the ALS curriculum:

1. communication skills (listening, speaking, reading and writing);
2. problem-solving and critical thinking (numeracy and scientific);
3. sustainable use of resources/productivity (ability to earn a living through self-employment, outside employment, productivity, entrepreneurship and sustainable use of resources and appropriate technology);
4. development of self and sense of community (personal history, national history and identity, cultural pride and recognition and understanding of civil and political rights); and
5. expanding one's world vision (knowledge, respect and appreciation of diversity, peace, non-violent resolution of conflict and global awareness and solidarity).

The ALS-A&E tests are administered by the Center for Educational Measurement (CEM), to assess the knowledge gained

by learners while enrolled in the ALS literacy programme. CEM is a non-profit, non-stock, non-government institution that grew out of the centralised testing programme initiated by the Guidance and Testing Division of the Fund for Assistance to Private Education (FAPE). Through its present network of branches and test centres nationwide, CEM serves the assessment needs of both private and public sectors of education.

In February 2007, a total of 51,907 students took the A&E tests: 5,688 at elementary level and 46,219 at high-school level. Of these, 1,538 passed the elementary-level test, and 10,887 passed at the high-school level.

2. The Evaluation Sample

In late 2006, an evaluation sample ($N = 281$) was recruited from students enrolled in the ALS high-school literacy programme by the ALS implementers in their respective districts. They were selected according to the following criteria:

- During the implementation period, the student had to be actively attending learning sessions in the ALS school-based literacy programme.
- The student had to be at high-school level, on at least the first level of the high-school ALS curriculum.
- To ensure that the student has the ability to access the SMS content at all times, s/he had to be the primary user of a cell-phone.
- The student had to own a CD/VCD player, in order to play the Project MIND audio CD.
- The student was to take the A&E examination in February 2007.

The sample was divided into the following sub-groups:

- An SMS sub-group: 146 students with 1–3 years of high school in the six ALS districts in the city of Manila. Members of the group used the Project MIND SMS *Mind Your English* and *Mind your Math* modules in preparation for the A&E exam. Of the 146 students who used the modules, 142

subsequently took the February 2007 A&E exam. The sub-group included 75 males and 71 females, aged from 15–35 years.

- A non-SMS control group: 135 students was recruited from A&E takers in the same six districts of Manila, sharing the same socio-demographic profile as the SMS group, though not having used the SMS modules as part of their preparation for the A&E exam.

3. Evaluation Procedure

The students used the modules at their own pace and in their own time. Owing to limitations in the pilot-testing schedule, however, they were encouraged to finish the module within one month. They were provided with a 100 peso pre-paid load allocation to test the modules, and were not required to be present at the ALS learning centre to use them. As ALS learners, the students visit the ALS learning centre according to their personal schedules and activities. Regular schedules are set by the ALS staff, but individual learners are not required to visit the centres on specific days. This arrangement allowed the students to test the Project MIND modules during their free time, at home or at work.

Data from the SMS quiz (for example, number of errors per item) were generated automatically using the Quiz Report module, for analysis by the project team. A post-implementation FGD was conducted with 12 students (six males and six females) drawn from the six districts of Manila covered by ALS. A facilitator led the discussion using a set of prepared questions. The activity was recorded and notes were taken. The study compared the FGD participants' responses to assess if gender affected their views and attitudes towards their experiences with the project's modules.

4. Results

The A&E exam results were released in June 2007, and the results of the students in the evaluation sample were provided to the project team by the Bureau of Alternative Learning System (BALS) Examinee Report records (Form S-2007) of the Department of Education. The team used these results to assess if the students

who used the SMS modules had gained an advantage over the non-SMS students. The results of the A&E exam sections covering the content of the Project MIND SMS modules were examined. These sections were Part II (Communication Skills in English), and Part III (Problem Solving and Critical Thinking). The percentage correct responses of the students in the SMS and non-SMS sub-groups are compared in Table 10.1.

Table 10.1 The A&E Exam Results of the Two Sub-groups

<i>Percentage correct scores</i>	<i>SMS (N = 142)</i>	<i>Non-SMS (N = 135)</i>	<i>Difference</i>
Part II scores (mean, range)	78 (56–98)	73 (30–96)	+5
Part III scores (mean, range)	66 (44–90)	64 (36–90)	+2
Students' overall scores	49	35	+14

Source: Government of the Philippines (2007).

Table 10.1 shows that the mean per cent correct scores of the SMS sub-group were marginally higher than those of the non-SMS sub-group in both sections of the exam:

- Seventy-eight per cent (SMS) versus 73 per cent (non-SMS) in Part II (Communication Skills in English), with a difference score of +5 per cent.
- Sixty-six per cent (SMS) versus 64 per cent (non-SMS) in Part III (Problem Solving and Critical Thinking), with a difference score of +2.

Although the average scores of the two sub-groups were not statistically significant in either section of the exam, the ranges of scores in the two groups greatly differed. The lowest student scores in the SMS group were 56 per cent (Part II) and 44 per cent (Part III), compared with 30 per cent and 36 per cent, respectively in the non-SMS group. It is concluded that the modules may have helped some students in the SMS sample to avoid the low scores of some of the non-SMS students. This may explain why the SMS students' overall average score in the exam (49 per cent) was 14 per cent higher than that of the non-SMS group (35 per cent).

DISCUSSION

I. Usage Patterns

All of the female participants used the modules in the afternoon, as it is only the time when they do not have household chores or watch television. Two female participants who are employed said that learning through SMS did not hinder their work routine because reading the modules does not take long, and they were able to answer the quiz questions during their lunch breaks. Most male participants also used the modules in the afternoon as soon as they were distributed to them. Two participants commented that the afternoon is their only free time for study, for they work late at night as band members, and are asleep in the morning. All but one of the students finished the English and Math modules in a single day. The other took two days over them because he did not want to end the experience immediately. Only two students used the accompanying audio CD for the English module, because they gathered that the CD content was the same as that of the printed module, and assumed that it would provide them with additional information. Those who did use the CD, however, said that they were able to learn the proper pronunciation of certain words. One student did not use the CD because it was skipping tracks, but did not report the problem to her teacher so that it could be replaced.

Most of the participants initially read through all the modules and responded to the quizzes on paper. After finishing each module, they returned to the SMS quiz portion to send the answers they had recorded on paper. When asked why they had adopted this approach, they said that their teachers had told them that it would allow them to double-check their answers before sending them, to finish faster, and to save the pre-paid credit for other purposes. The students were also asked if it was possible for them to cheat on the quizzes because the teacher was not around to monitor them. Everyone agreed that cheating in this way is possible, but that they did not need to do this because the lessons were easy to understand. A female student said that if she cheats, she will be only letting herself down.

2. Content

The students found the modules easy to read and use. They did not experience any major problems in following the instructions about how to use the module and how to interact with the SMS server. They said that the instructions of the ALS teachers to them were helpful, and that the printed instructions were also easy to follow. One student commented that his teacher seemed confused when she was giving her instructions. But after consultation with the project staff, it appeared that her instructions were clear. The students regarded the modules as basic but helpful as a refresher course prior to the ALS A&E exam. They did not encounter any problems with the flow and structure of the lessons. When asked if they sought any assistance from the teachers, they said that this was not necessary because the lessons were clear and concise.

3. Value for Money

The students spent an average of 40 pesos to use the two modules. Except for two students who spend that amount on transportation to the learning centres, the use of SMS for learning actually costs more for them. They all agreed, however, that learning through SMS has more value for money because of the added benefit of not having to travel and of being able to learn from their homes or workplace.

Overall, the participants expressed curiosity and excitement about the prospect of using the new SMS methods to study. A few participants were initially dubious, being surprised that such methods were possible given the limited number of characters a cell-phone can send and receive. While SMS-related games, contests and lotteries offered by the mobile phone companies are burgeoning, none of the participants had been able to afford such pursuits. Participants were keen to answer the quizzes after reading the lessons because the process is like answering trivia questions where immediate feedback of results is given. The female participants said that the SMS method was helpful for them because they usually study from home while doing household chores. Two participants in full-time work commented on the value of the take-home modules.

4. Problems Encountered

Programme and hardware errors

The SMS learner management system contains numerous parameters and controls. During its original development, a week-long pilot-testing period was conducted with the help of five users with the same demographics as the test subjects. This beta test did not reveal any programming errors or problems. In the first week of the implementation period, however, programme conflicts developed between the PC host and the SMS server card which caused the system to hang. A reboot of the server did not remedy the problem, and the SMS hardware was transferred to another PC. The conflicts were immediately resolved, and the system programmer remained on-call. While this delayed the testing schedules, it did affect the overall implementation or results.

Data encoding

The SMS learner management system was designed to identify each assigned student number exclusively with an encoded cell-phone number. This procedure aimed to minimise cheating by ensuring that only cell-phones recorded in the system will be able to access the SMS quizzes. It caused problems, however, in relation to the handling of student records and the students' access to the SMS server. Some students changed their cell-phone numbers during the process or dropped out of the system without informing their teachers. The system then blocked these students from accessing the project quizzes until the records were updated or replacement students could be located.

Message delays

The system was occasionally swamped with incoming messages from the students using the modules. This caused conflicts in the autoreply system, and affected the replies' transmission. Users either experienced delayed responses, or received no reply at all. Most students immediately reported the problems to their ALS teacher who reported the problem to Project MIND for troubleshooting. An adjustment in the automated response timer resolved this problem with minimal delays.

Student errors

Other problems encountered during the testing period were due to errors by the students in sending the SMS keywords during the registration and quizzes. When a student sends an SMS message without following the proper syntax, an automatic reply is sent: for example, "Wrong keyword or Keyword does not exist. Please check on your instructions and try again." The student is allowed to make three such mistakes before another message is sent: for example, "You have reached the allowable limit of 3 attempts. Please check your instructions or contact your teacher if you have further concerns." The SMS server ignores future messages from the student until a message with the correct syntax is received. This procedure ensures that the system does not incur unnecessary costs due to user error.

5. Academic Outcomes (the Philippines)

The effectiveness of SMS in delivering DE content is tentatively supported by the positive evaluation of the students' A&E exam results. This reinforces the students' comments in the focus group discussion:

- answering quizzes through SMS is exciting, because it is like playing games and learning at the same time;
- learning through SMS enables the students to learn while doing other things such as working or taking care of the family;
- blending materials such as SMS, print modules and audio CDs enhance the learning experience; and
- SMS can be a cost-effective alternative to visiting a learning centre, because the transportation expenses can be used for additional SMS load credits.

Further studies should now be conducted to determine how SMS modules can be used to improve access to other educational content in formal and non-formal DE. To provide students with increased access to education, it is recommended that the Department of Education should develop policies and practices integrating the use of SMS blended learning modules in the ALS curriculum. This would allow students to learn a variety of topics

in their homes and workplace if they lack the financial means to visit ALS learning centres. In addition, government bodies such as the Commission on ICT should seek to expand the use of SMS in the delivery of DE content in the Community e-Centers across the country. SMS usage combined with technologies such as the Internet would provide more extensive education and information services to the Philippines's citizens as a whole.

6. SMS Potential in Mongolia

The challenge of installing an SMS-enabled learning system in Mongolia has proved less difficult than the PANdora project team initially expected, for the number of users of mobile phones in the country has increased steadily during the three years of the project. There is indeed a great need for Mongolians to improve their English-language skills, and this could be assisted by institutionalising the English curriculum in the formal education system, and by introducing the English language to students at an early stage. SMS has the potential to be an effective DE tool in this context. More still needs to be done, however, in harnessing this potential through the country's growing mobile telecommunications infrastructure. Since half of Mongolia's population is located within the area of the capital city, Ulaanbaatar, educational institutions and mobile phone companies could easily link up and develop SMS-enabled learning materials benefiting users within the cell-phone service areas. As in other parts of the world, the development of SMS materials should contain straightforward SMS instructions so that users can get used to the idea of learning through their phones, and can become skilled in the use of new, innovative techniques as phone services and user acceptance become widespread.

CONCLUSIONS

The potential of DE in Asia is vast, and many Asian stakeholders are following the example of DE initiatives conducted in the West. The region faces many challenges, however, with its vast geography and populations, and numerous cultures and languages. Many e-learning approaches implemented successfully in Australia,

Europe and North America have made use of technologies requiring major investments in hardware and software, connectivity and human resources that are currently beyond the means of most Asian nations. One technology with great potential to overcome the digital divide and to allow people in Asia to learn and share information is the mobile phone. This pervasive technology can contribute immensely to educational goals, both formal and non-formal, in order to teach and train millions of people who would otherwise have no educational access.

The PANdora network's Project MIND initiative has considered the viability of using mobile technologies, in particular SMS, to deliver DE in the Philippines and Mongolia. The study has focused on the non-formal education sector composed of out-of-school youth, adult learners and others who, for one reason or another, have been unable to complete their formal education, and have not been eligible for other tertiary-level e-learning programmes. This group also tends to be mobile, and lacks time for more traditional, face-to-face classroom instruction. The results of the current study are encouraging. Students who have taken Project MIND's SMS courses in English and Mathematics as part of a blended learning module have stated their interest in the method, and their readiness to use it at convenient times at home and work, using pre-paid credits. Students in the Philippines pilot study appear to have benefitted from SMS modules in their Department of Education examinations, while in Mongolia a sample of bank tellers and waiters have found SMS-assisted English language learning to be useful and effective.

SMS learning modules can be used with minimal human intervention. The integration of technical and student support into such systems, however, is an important aspect of their development, and an integral part of the learning process. To be fully effective, learning modules need the option of human interaction, and the assistance provided by Project MIND to field staff (ALS implementers) and students has been well received and appreciated. Expanded training and support is envisaged for key ALS implementers in ICT and mobile technology usage, so that they can pass it on to others. Enhanced student support would also be desirable, with greater access to quiz results and registration instructions, and interaction with the content developers and teachers. Increased access to online media is also

being planned, including a website linked to the Project MIND SMS interface, and links to an e-mail service so that students can send questions directly to the student support team. These measures will provide greater flexibility and wider access to the information students need.

The costs of these support systems will be a major factor in the development of future SMS learning modules. A workable balance must be found between providing adequate learning content and charging no more than students are willing to spend. Highly customised facilities such as the Project MIND SMS learning system are naturally subject to bugs and programming errors. Technical hitches, signal fluctuations and system bottlenecks can cause delays in the delivery of learning content, and affect students' motivation to interact with the system. Alternative systems and backups are needed to minimise delays and problems, and to create the efficient infrastructure that is vital to the smooth running of mobile learning systems.

Considering the population increases expected throughout Asia, educators can no longer afford to ignore the widely available mobile phone as a tool for delivering educational content. Recent complaints in the Philippines have lamented the massive cost of setting up broadband Internet connections via what is perceived as a spurious approach to "bridge the information gap". This view underlines the wisdom and logic of considering alternative technologies, such as the mobile phone, that are already widely available. Results of the current study can be used to advocate for training and capacity building in mobile learning, and for expanding content development. Emphasis is needed on ways to increase access to learning resources, especially for those citizens who have traditionally been marginalised in the educational process. Telecommunications companies must realise that they have a social responsibility to work closely with educators and to provide special rates and concessions for the educational use of their networks. Together, they must work closely with software developers to promote the use of mobile learning technologies, and to convince the public that their cell-phone can be used more powerfully and productively than for person-to-person communication only. The mobile phone is one of the great equalisers of the information age.

Training Asian Instructional Designers



The Philippines: *Felix Librero (sub-project leader)*

INTRODUCTION

The effective presentation and delivery of instructional materials depends on guidelines for instructional design (ID). The teachers and resource personnel who create the materials require training in these principles and in the design skills required by new technologies. The current study has surveyed the types of training received by instructional designers in Asian educational institutions, and the design models, if any, that they typically use. Based on the survey's results, a series of training modules is recommended for the general improvement of instructional design skills (ID) in Asia.

In Asia, there are varied levels of understanding of the ID concept, from a simple process of preparing materials for instructional use to a more general conception of the principles for their efficient design. Traditionally, ID is defined as a "system of procedures for developing education and training programmes in a consistent and reliable fashion" (Gustafson and Branch, 2002). This standard definition arises from early systems thinking which influenced educationists, engineers, biologists, mathematicians, psychologists, behaviourists and other social scientists, and led to a systematic view of how to prepare and deliver instruction with the assistance of skilled "instructional designers". ID is now becoming a key issue in distance education (DE) as the field is increasingly viewed by governments as a relatively inexpensive means of providing educational opportunities to a greater proportion of the population. DE increases the accessibility of education, and is a reliable means of providing quality educational services (Hawkridge, 2002). The balance between cost, access and quality, however, poses problems for DE policy- and decision-makers. When cost is reduced, access

and quality tend to decrease; increased access leads to increased cost, and may jeopardise quality; and improved quality can mean increased cost even when access is compromised. DE implementation creates particular problems relating to the development of high-quality learning materials and the process whereby they are delivered. Effective ID can play a crucial role in resolving these issues.

Serious problems exist, however, in relation to the building of ID capacity in Asia. Outside North America and the UK, relatively few instructional designers are well trained in DE. Formal training of Asian designers abroad might help to solve the problem, but ID training in North American and European programmes has shortcomings. For example, Hawkrigde (2002) has observed that educational technology training in these regions tends to emphasise media production and gives “scant attention” to ID. Second, many instructional designers, including those in Asia, still use behaviourist ID models introduced in the 1970s by, for example, Dick and Carey (1978) and Gagné and Briggs (1979). Effective DE implementation clearly needs principles based on a wider range of approaches, for example, constructivist. It has been noted that Asian learners depend on “culturally mediated social interaction and a shared vision” (Chen et al., 1999), a viewpoint that has received strong support from Nisbett’s (2003) description of the ways in which thinking and learning differ based on geographical factors. Nisbett observed that Westerners tend to learn discrete pieces of information and to combine them to form higher-level concepts. Easterners, on the other hand, learn better when they can see the entirety of what is to be learned. They wish to see the whole picture first to gain a “bird’s eye view” of what is to be learned, so that they can relate parts of the picture to the whole. Easterners are holistic learners, in other words, or in terms of the theory of “multiple intelligences”, global learners (Gardner, 1983).

In Asian DE, the standard principles of ID are being further challenged by the emergence of distinctly Asian approaches involving totally new forms of presentation. The media of mobile learning (m-learning), for example, are being developed in pioneering work by instructional designers of the University of the Philippines Open University (UPOU)—notably in the production of m-learning modules for delivery via mobile cell-phones

using SMS technology. Suplido et al. (2003) reported that as instructional designers of m-learning modules, they needed to be guided by nine guiding principles. These have since been summarised by Librero (2006a) as follows:

1. The accessibility and pervasiveness of the cell-phone mean that designers must anticipate the needs of a broad demographic of potential learners at any given time. They have to cater to learners differing in relation to intentions, purposes, abilities and learning styles.
2. The new media raise the need for new, automated interactive mechanisms between the teacher and learners. It is not possible for them to be continually connected, so the technology must provide asynchronous as well as synchronous connectivity options.
3. The perceived usefulness of the material to be learned is of utmost importance to the cell-phone user. If the learner suspects that the content being offered lacks relevance, s/he will disengage from the process immediately.
4. Cell-phone-based learning materials must be introduced unobtrusively so that the learner regards them as aspects of normal mobile phone activity. Once a cell-phone learner suspects that s/he is being led to perform actions that are not conventional cell-phone activities, s/he will quickly disengage.
5. Immediate feedback should be given. It is satisfying to know that one's actions are appropriate and acceptable. In the Philippines, cell-phone users enjoy positive "interactions" with their cell-phones, for example, laughing out loud in seeing a witty electronic response to a message s/he has sent. Engaging feedback of this type tends to be expected by cell-phone users and should be used in the design of educational cell-phone materials.
6. The learner needs to proceed at his/her own pace, and should be able to skip parts of the learning module when perceiving them to be unnecessary. The learner should not feel pressed to proceed, or obliged to perform actions if unwilling to do so.
7. Menus and instructions should be easy to follow and never complicated. Mobile learners do not tend to allocate

enough time to resolve complicated learning situations, nor to allocate time to sort out complex issues requiring substantial thought.

8. Throughout the m-learning process, the learner should be able to maintain privacy to avoid the stigma of poor performance. All outcomes of the m-learning interaction should remain a private matter for the learner and not broadcast to other learners.
9. The instructional designer should provide options that exploit the familiar formats of mobile communications technologies. This is currently problematic, however, for cell-phone displays have limited space, inadequate cursor adjustments and pointer capabilities, and monochrome images where colour may be educationally useful.

The UPOU experience has therefore highlighted practical issues that need to be addressed, including the following.

- Instructional designers need to anticipate the limiting factor of the 160-character cell-phone display. Creativity in the application of ID principles and techniques is important in this effort.
- The telecommunications company partner involved in the m-learning process must be reliable and able to provide round-the-clock service. Inefficient telcom service is extremely frustrating for cell-phone users.
- In-house technical support capability is essential for m-learning designers. The content provider (for example, the University) needs its own capability to deal with users' technical problems. Frequently, the problems encountered by mobile learners are such that they can be easily resolved by in-house technical staff immediately, thereby reducing "down time".
- There is a need to harness the advantages of multimedia messaging service (MMS) to deal with learners' multiple intelligences. Individuals may prefer audio- or visually-oriented materials, or a combination of the two.
- Short message service (SMS or "texting") technology should be promoted as an important m-learning tool rather than as merely a means of personal communication and

entertainment. Effort should be made to promote educational content as a regular, ongoing feature of telcom service.

SURVEY OF INSTRUCTIONAL DESIGNERS' TRAINING NEEDS

An intuitive perception of Asian instructional designers, specifically those working in DE programmes, suggests that they are western-trained and adopt traditional ID models almost mechanically, despite the unique new effects of recent developments in communications technologies on the delivery of instructional packages. It is often heard among Asian DE specialists that there is a need for local training of instructional designers in appropriate new ID models. As an initial step towards this goal, the current project conducted a regional survey to determine the training needs of instructional designers in DE, and to define the content of an ID training programme. A preliminary report of this survey was given by Librero (2006b). The study aimed to determine:

- the main responsibilities of faculty and staff performing ID tasks;
- whether instructional designers in Asian open universities have had formal training in ID;
- the nature of this ID training;
- if instructional designers in Asian open universities and dual-mode DE institutions would be interested in an updated training course in ID; and
- specific topics that the designers would include in an ID training course, also its delivery mode and duration.

I. Methodology

The survey was conducted in 15 open universities and DE centres in eight Asian countries from September–December 2005. A three-page survey instrument containing 22 items, designed and pre-tested among instructional designers of the Indira Gandhi National Open University (IGNOU) in India, was used

for the data collection. Contacts were established with key individuals at these institutions through the rectors of the open universities before and during the 19th Annual Conference of the Asian Association of Open Universities (AAOU) held in Jakarta in September 2005. Copies of the survey questionnaire were distributed to these contacts, who in turn requested instructional designers at their universities to complete the questionnaire. The contacts were given two weeks to retrieve the completed questionnaires and send them to the principal investigator at UPOU. In the event, however, it took over three months to retrieve the completed questionnaires. Of the potential total of 130 respondents based on the contacts' estimates, 70 useable questionnaires were retrieved representing a 54 per cent return. The data were processed using simple descriptive statistics.

2. Sample

Academic rank

The 70 respondents came from eight countries: India (19), Indonesia (11), the Philippines (10), Malaysia (nine), Thailand (eight), Bhutan (five), Sri Lanka (five) and Pakistan (three). Over half of them were senior academics (associate professors, 29 per cent and professors, 26 per cent), while a third (34 per cent) were assistant professors or lecturers. This indicates that many instructional designers have achieved academic seniority in their respective institutions. This is well reflected in their training: 43 per cent have Doctorates, 37 per cent Master's degrees, and another 20 per cent Bachelor's degrees. They had typically been designated as IDs by their universities and had undertaken ID training through workshops, short courses, formal credit courses or degree programmes.

Role perception

Seventy-five per cent of the respondents believed that their main role was as full-time faculty members doing ID work, while only 20 per cent described themselves as full-time instructional designers. As such designers, they listed varied responsibilities (Table 11.1).

Table 11.1 Respondents' Perception of their Role as Instructional Designers

<i>Perceived main responsibility</i>	<i>N (%)</i>
To design, develop and evaluate materials and programmes	32 (46)
To consult and advise colleagues on ID issues	25 (36)
To make presentations during training sessions	23 (33)
To design lessons, and develop assessment instruments	23 (33)
To undertake research and evaluation activities	22 (32)
To conduct formative and summative evaluations	20 (28)

Source: Author.

3. Results

ID models commonly used by the Asian designers

When asked which ID models they were most familiar with and were employing in their ID work, 30 per cent of the respondents mentioned *Gagné's model*, comprising 14 specific design stages. The first three steps focus on the determination of needs and goals at the curriculum level. The next two steps deal with course level analyses, and are followed at the lesson plan level with four steps including definition of performance objectives, preparing lesson plans or modules, developing and selecting materials and media and assessing student performance. The last five steps focus on evaluation. The Gagné model may have been popular with instructional technology students in Asia because of its relative simplicity and ease of application.

Twenty per cent of the respondents reported that they were familiar with and have applied the *ADDIE model*, a generic approach described by Gustafson and Branch (2002). This is a synthesis of other ID models, comprising five core elements: analysis, design, development, implementation and evaluation. Analysis includes specific ideas about needs assessments and problem identification; design covers formulating objectives, classifying types of learning and activities, and determining which media to use; development refers to preparing instructional materials; implementation includes delivering the instruction in the setting for which it was designed; and evaluation includes formative and summative evaluations. This model appears to be popular with younger instructional designers, that is, those who have obtained their graduate degrees in the last 10 to 15 years.

Seventeen per cent of the respondents mentioned that they were familiar with and have applied the *Dick and Carey model*.

This systems-oriented model contains 10 steps: identifying instructional goals, conducting an instructional analysis, identifying learners' entry behaviours, formulating performance objectives, developing criterion-referenced tests, formulating an instructional strategy, selecting instruction, designing and conducting formative evaluation, revising the instruction, and conducting summative evaluation. One can infer from the data that the designers familiar with the Gagné and Dick & Carey models are those who were in graduate schools in North America and Europe at least 15 years ago.

Seventeen per cent of the respondents also mentioned that they were familiar with *constructivist models*, though none actually mentioned any specific model. Constructivism posits that "knowledge is constructed (rather than received) by the individual learners and is embedded in particular experiences within specific domains" (Duffy and Jonassen, 1992). It has been suggested that constructivism is particularly useful in DE, since its assumptions fit well into the nature of independent learning that DE fosters. Merrill (1991), as cited by Mergel (2006), highlighted the following assumptions of constructivism: knowledge is constructed from experience; learning is a personal interpretation of the world; learning is an active process whereby meaning is developed based on experience; conceptual growth arises from sharing multiple perspectives and collaborative learning; and learning should be situated in realistic settings where testing is part of the task rather than a separate activity.

Behaviourism, the foundation of traditional models of ID, encourages "analysing a task and breaking it down into manageable chunks, establishing objectives, and measuring performance based on those objectives" (Mergel, 2006). In contrast, constructivism, Mergel points out, "promotes a more open-ended learning experience where the methods and results of learning are not easily measured and may not be the same for each learner." ID based on constructivist principles is not concerned with trying to pre-determine learning outcomes, but focuses on the design of learning environments that facilitate the construction of new knowledge. It is safe to conclude that the models used by senior Asian instructional designers have primarily been limited to the *behaviourist-oriented models* (Gagné, Dick and Carey, and ADDIE). There is, however, an increasing interest among younger designers in constructivist approaches to ID, particularly in relation to the independent learning process of DE.

This increasing interest in constructivism is influenced by the significant role of the new information and communication technologies in today's education. As a result of this growing orientation to constructivism, a discernible shift is being detected in the nature of the actual instructional materials being designed and developed in the Asian region. For example, there is an interesting shift away from the production of simple multimedia materials towards sophisticated, highly interactive multimedia materials very much in line with constructivist principles.

It is clear, however, that the rigorous practice of ID is slow to develop in Asia. While constructivist approaches have been practised for 25 years at the UK Open University (Hawkrige, 2002), they are just now beginning to influence the Asian region. The application of ID principles and techniques in course development in many Asian universities, including DE institutions, has not been as major an effort as it should have been.

Amount of ID experience

The respondents have a substantial amount of ID experience: 23 per cent of them have been doing ID work for 6–10 years, and 18 per cent for 16–20 years (Table 11.2). The 29 per cent who have been doing ID work for 1–5 years are the same also tend to report that they have used models with a constructivist orientation. The 44 per cent who have been doing ID work for over 10 years may therefore be regarded to be those who need to update their knowledge of ID principles and should be the target clients for ID training. Of course, it is equally possible that younger instructional designers may also lack up-to-date ID knowledge and skills for DE work, particularly in relation to new information and communication technologies.

Table 11.2 Respondents' Experience as Instructional Designers (N = 70)

<i>Experience</i>	<i>%</i>	<i>Experience</i>	<i>%</i>
< 1 year	3	21– 25	9
1–5	29	> 25 years	9
6–10	23	No response	1
11–15	9	Total	100
16–20	18		

Source: Author.

Training interests

The respondents suggested a number of specific topics that should be included in an up-to-date ID training course. “Methods and media” were mentioned by 46 per cent of them. Additional topics included: design of instruction and lesson plans, application of research and theory, curriculum design, evaluation techniques, development of instructional materials, context analysis, and needs analysis. The sample ranked their top six preferences for training course topics, as shown in Table 11.3.

Table 11.3 Preferred Topics of ID Training Courses

<i>Rank order</i>	<i>ID topics</i>
1 (high priority)	Application of research and theory in ID
2	Selection and use of methods and media
3	Review of technology trends
4	Evaluation techniques
5.5	Design of instruction and lesson plans
5.5	Development of multimedia instructional materials

Source: Author.

RECOMMENDED ID TRAINING MODULES

In the developing world, there is a clear need for ID training, in that too few instructional designers are currently equipped to do justice to their important institutional role. In Asia and Africa, the problem of the lack of well-trained instructional designers has been described as “almost overwhelming” (Hawkrigde, 2002), and is urgently recommended both for conventional and DE systems. As a result of this regional survey of instructional designers’ training needs, a training programme is recommended on the top six topics selected by the respondents:

- Module 1—*Models, theories and frameworks: Contributions to Our Understanding of Learning and Teaching*. This module should cover four major topics: orientation to study (vocational, academic and personal); definitions of learning (as increase in knowledge, memorising, acquisition of facts, abstraction of meaning and as an interpretative process); cue consciousness; and learners’ reading ability.

- Module 2—*Selection and use of methods and media*. The use of instructional media is a standard element in such training programmes, though the media selected for coverage can be inappropriate. In this module, the selection and use of media would be stressed, as appropriate to the task of constructing courses with specific needs and objectives. The module would aim to help the trainees apply criteria for selecting media, whether print-based, audio-visual or computer-based, to make instruction effective and efficient.
- Module 3—*Development of multimedia materials*. The multimedia materials used in Asian education tend to come from the developed countries, largely because of the lack of funds to produce them locally. Materials actually developed in the region tend to be simpler than those purchased from abroad in terms of the levels of interactivity they provide. The net effect is a culture-based mismatch between instructional design and learning style. This module would provide the Asian instructional designer with the skills to develop a wide range of locally relevant multimedia materials.
- Module 4—*Mobile technologies in learning and teaching*. The particular advances being seen in the use of mobile technologies in Asia have raised a particular need for instructional designers to learn how to use them in producing DE content. This module would cover the specialised procedures needed in the cost-effective use of mobile technologies by Asian teachers and learners.
- Module 5—*ID and learning materials*. This module would cover in practical terms how instructional designers can improve their overall skills in developing effective DE instruction. Emphasis would be placed on the special needs of designers in open and distance learning institutions. The module would examine the techniques associated with traditional ID models, while also providing opportunities for practice in newer constructivist techniques.
- Module 6—*Evaluation and quality assurance*. Across Asia, concern is frequently expressed about the maintenance of academic standards in DE programmes. Maintaining high standards and assuring a high quality of instruction begins with the efficient design of programmes and content treatment, a process within which ID is central. This module would cover the related principles of evaluation

and quality assurance, and would explain how academic quality can be assured through appropriate evaluation techniques.

CONCLUSIONS

Distance educators in Asia are bypassing online course delivery methods that have become standard in other parts of the world, and are developing new educational technologies, notably the mobile phone. In the process, the issue of appropriate instructional design principles for the new media has become a serious concern. The current project addressed this issue by analysing the training needs expressed by Asian instructional designers in open and distance education institutions across the region. A survey was undertaken in Southeast Asia (Indonesia, Malaysia, the Philippines and Thailand) and South Asia (Bhutan, India, Pakistan and Sri Lanka). The survey indicated that materials designers in Asian DE are interested in upgrading their practical and theoretical understanding of instructional design, new trends in the use of technologies in distance learning, the selection and use of appropriate multimedia techniques, and the evaluation of student learning.

To date, Asian instructional designers have mainly been trained in North America and Europe, in principles and procedures developed 15–25 years ago. They are quite familiar with the traditional models of ID, though in the last five years have found that the design of instruction delivered through mobile technologies may be more demanding than the traditional models suppose. The effective design of materials for the new media requires new principles about how variables such as mobility and display format can affect learning, and how to design mobile learning materials for easier, faster and better results.

While the survey sample regarded themselves as generally proficient in ID, either as full-time instructional designers or as faculty involved in ID work in their respective disciplines, they still felt the need for additional training courses, and most stated that they would be interested in participating in them. Most of the respondents reported that their universities have provided in-house courses on topics such as ID principles, development

of DE materials, conducting online tutorials and developing evaluation and assessment instruments. They indicated that the materials used in training courses reflect a wide range of styles and expertise, being produced in-house or at other institutions or by external consultants; and they expressed a firm wish for a standardised training approach involving ID trainers and trainees involved in Asian DE specifically.

The main topics that the designers suggested should be included in an up-to-date ID training course were: application of research and theory in ID; selection and use of media and methods; technology trends; evaluation techniques; design and development of instruction and lesson plans; and development of multimedia materials. Respondents who felt that they would qualify to serve as trainers claimed that they could handle topics including development of instructional materials, ID principles, media selection and production and curriculum design. Asian open universities are urged to upload appropriate course materials to their web servers, in whatever learning management systems they are currently using, and to offer them without charge as training materials for faculty members and instructional designers in their region.

In summary, the study has indicated these issues for consideration at open and distance education institutions across Asia:

- Non-formal training in ID is a viable option for Asian distance learning institutions, and can upgrade the ID skills of experts quickly and effectively.
- Regional ID programmes are needed for enhancing the use of new DE media. Training is urgently needed in the use of new approaches such as mobile learning.
- Training for Asian instructional designers would be particularly welcome if undertaken by regional experts who recognise cultural factors in the training process. Such training is an excellent means of sharing expertise and experience among the region's experts.

E-assessment Methods for Student Evaluation in Asia[§]

12

Pakistan: Nazir A. Sangi (*sub-project leader*)

INTRODUCTION

The chapter discusses issues and problems relating to online assessment in teaching and learning. The benefits and problems of e-assessment are discussed, and issues specific to Asian institutions, including the availability of appropriate technology. The potential of e-assessment in open and distance learning is examined via a survey of academic faculty and administrators. An e-assessment procedures checklist is offered to focus discussion on the issues and problems of e-assessment in Asian countries. An earlier version of this chapter has been published by Sangi (2008).

THE NEED FOR ASSESSMENT

Reliable assessment methods are essential for grading and certifying students and as a basis for selecting appropriate pedagogical methods and materials. E-learning is now widely used as a supplementary or exclusive educational approach, and requires complementary methods for the assessment of teaching and learning. As information and communication technology (ICT)

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continues to develop, online assessment (e-assessment) offers particular promise for the evaluation of students at a distance. It has also become a topic of discussion and difference among educationists, for it presents specific problems in relation to academic, social, administrative, technological and moral issues. In the flexible context required of open and distance learning, the challenge of reliable student assessment poses significant problems. Fairness to the student, objective testing of knowledge, the capacity of students to respond in electronic mode and the possibility of online impersonation and cheating, are significant challenges for e-assessment research and practice. These issues are being studied in a PANdora research project named *E-assessment methods and models for student evaluation in Asia*, with specific reference to e-assessment models and methods being used in Pakistan. This report reviews the current approaches to e-assessment, and their problems and potential.

What is assessment? Why it is needed? What types of assessment are there? What are the pros and cons of e-assessment? What are the tests and methods through which assessment can be made? What are the goals of assessment? How should assessment itself be assessed? Many researchers have considered the effects of assessment in the curriculum. Barnes et al. (2000) have shown direct causal links between changes in assessment method and classroom practice. Klein et al. (2000) indicate that changes in measurement criteria can dramatically, even falsely skew the outcomes of assessment procedures, while Black and Wiliam (2002) have shown that well-designed formative assessment can be associated with major gains in student attainment on a wide range of conventional measures. A major literature review commissioned by the EPPI Centre (2002) showed that regular summative assessment can have a negative effect on the performance of low-attaining students, but does little harm to high-attaining students.

In other words, without a reliable mechanism, assessment may not achieve the effects planned and expected by faculty members and institutions. It may actually work against these objectives. It is therefore important to develop high-quality measurement procedures which ensure the sanctity of the evaluation process. The assessment should reflect core educational goals and achievable rewards for the students (and teachers)

which will be of long-term benefit to them and to the global society in which they are expected to work (Ridgway et al., 2004). As with any pedagogical approach, it is important to align teaching and learning activities and assessment tasks, particularly where the intention is to encourage deep, rather than superficial approaches to learning (Biggs, 2003; MacDonald, 2005). Efficient feedback and interaction between designers, deliverers and assessors of learning outcomes produces a mechanism for continuous improvement.

I. Types of Assessment

Formative

Formative assessment is performed during the learning process for the purpose of having a positive early effect upon it. Such an assessment involves two steps:

- the student's learning is identified; and
- feedback is provided to the student.

The data can be obtained by either the teacher or student (self-assessment).

Summative

Summative assessments measure the learning achieved at the end of the process. Detailed data are usually required so that the student's learning can be thoroughly checked. This form of assessment does not normally involve feedback to the student.

Diagnostic

Diagnostic assessment is often used as an initial step in programme development, as a means to check whether the student has certain entry-level prerequisite skills. The numbers of students assessed in entry-level exams can be huge, and an automated assessment methodology may be necessary for their timely evaluation.

Adaptive

Adaptive assessments change themselves as the assessment progresses. For example, a student's response to early questions may alter the direction or difficulty of subsequent questions. Adaptive testing can be used for formative, diagnostic and (less commonly) summative purposes, and automated procedures are vital for its smooth operation.

2. Question Formats

E-assessment methods can provide different question/answer formats to support many types of test. In some cases, the evaluation can be fully automated, whereas in others requiring, for example, detailed descriptive answers an instructor may be needed for scoring and grading. E-assessment questions can be formatted in three ways:

- Closed-ended choice formats, for example:
 - simple binary choices (yes/no, true/false);
 - multiple-choice (choose one correct response);
 - multiple-response (choose all correct responses);
 - numeric entry (enter the correct number);
 - slider (move pointer to the correct value); and
 - hotspot (click on an image to identify a correct response).
- Open-ended formats

These usually require text-based answers varying from a single word or value to sentences and paragraphs, for example:

- fill in the blank (insert the missing words or values);
 - short answer (free-form text field); and
 - essay answer (long-response text field, likely to require manual grading).
- Ordering formats
- The question demands a response involving rank ordering, for example:

- drag and drop—place objects into the correct locations;
- order objects—rank objects according to the given criteria;
- match item—connect the objects in pairs; and
- connect the points—create an ordered connection of a set of points.

3. Test Formats

Attitude surveys

Opinion-related assessment is obtained through attitudinal surveys. Attitudes in this context relate to different aspects of learning such as the course and its elements, the learning process and the discipline. The simple Likert Scale or modifications of it are commonly used. Attitudinal surveys take many forms though usually involve a statement requiring a scaled agree/disagree response. Obtaining accurate attitudinal ratings can be difficult, however, as opinions can be formed by obscure biases and subjective elements such as family pressure, and economic or political conditions (Seymour et al., 1997).

Student Assessment of Learning Gains (SALG)

The SALG (Seymour et al., 1997) is an example of a web-based instrument used to grade levels of achievement or understanding. It consists of statements about the degree of “gain” (on a point scale), which students perceive they have made in aspects of the class. Instructors can add, delete or edit questions. The instrument can be administered electronically with summary results made instantly available in statistical and graphic forms. Such instruments are powerful tools and can easily be customised for efficient formative evaluation during a course or for faculty assessment.

Conceptual diagnostic tests

Students are often required to memorise theory, and can easily overlook sub-concepts. A conceptual diagnostic test presents

items in a multiple-choice or short-answer format designed with common misconceptions in mind. Such tests can be applied to assess how well students understand and apply key concepts. Immediate feedback on the level of class understanding is available. Instructors have reported substantial improvements in class attendance and attitude toward the course through the use of such tests (Zeilik, 2007). Self-diagnostic tests can be created, and can aid in refining the thought process and overcoming biases. Diagnostic tests can easily be automated in an e-assessment mode, and can have a direct impact on the student's development.

Performance assessment

Performance assessments measure a student's ability to use specific knowledge and skills. They usually require the student to manipulate available knowledge to solve specific problems or to perform a conceptual analysis of various situations. Multiple-choice and fill-in-the-missing items questions can be used. An efficient performance assessment can reveal various problem-solving approaches, and provide insights into the student's level of conceptual and procedural knowledge (Slater, 1997). Performance tests can be useful in disciplines involving scientific problems solving. However, a student's analytical growth can be difficult to measure accurately, and a more complete picture of student achievement can be achieved when performance assessments are used in conjunction with traditional forms of assessment.

Rubrics

Rubrics (scoring tools) are a way of describing evaluation criteria (grading standards) based on the student's expected performance and outcomes. Typically, rubrics are used in grading written assignments or oral presentations, though they may be used to score any type of performance. Each rubric consists of a set of scoring criteria and point values associated with them. In most rubrics, the criteria are grouped into categories so that the instructor and student can identify the categories with specific levels of performance. In classroom use, the rubric aims to

provide an objective external standard against which student performance can be compared. Rubrics sometimes generate conflicting scores on a given evaluation criterion, but generally provide an accessible means of communicating and developing assessment learning goals.

Portfolios

Portfolios are a collection of evidence prepared by the student and evaluated by the faculty member, to demonstrate mastery, comprehension, application and synthesis of concepts. In creating a portfolio, students organise, synthesise and describe their achievements, and communicate what they have learned (Slater, 2007). Portfolio assessment strategies provide a useful structure for long-duration, in-depth assignments. The use of portfolio techniques transfers much of the responsibility for demonstrating concept mastery from the teacher to the student. Online methods of e-portfolio development are rapidly emerging.

SURVEY

To investigate current awareness of these problems, and possible solutions to them, a baseline survey was conducted in higher education institutions of Pakistan, with the following main objectives:

- to collect information on operational policies and practices in e-assessment;
- to identify the current scope of e-assessment activities; and
- to collect information on current practices and preferences relating to e-assessment.

I. Methodology

A survey of e-assessment experiences in public and private educational institutions of Pakistan was conducted between October 2006 and March 2007. The first examined issues relating to the administration of e-assessment, and was targeted at institutional controllers, examination officers, faculty and managers

officially engaged in examination planning, implementation and results reporting activities. The second questionnaire targeted faculty members who evaluate students in their specific courses. The third questionnaire targeted students, to find out if they had been involved in an ICT-based assessment. Certain questions were repeated in the three questionnaires, in order to obtain input on common issues and practices. The questionnaire containing multiple-choice, closed-end questions were distributed to each group of participants. In a few cases, electronic copy was e-mailed to the participants. The questionnaires were sent to approximately half of the 113 degree-awarding institutions in Pakistan, and mainly to those with 2,000 or more student enrolments.

Responses to the questionnaires were received from 85 staff members and 60 students in 31 institutions, including Allama Iqbal Open University (AIOU), the Virtual University of Pakistan (VUP) and 29 traditional universities. A few of the latter had initiated pilot programmes in DE and online education. The responses were analysed in four categories:

1. Assessment practices (as defined by the institutions' policies).
2. The scope of assessment activities.
3. The current status of e-assessment activities.
4. Preferences/reservations related to e-assessment.

The first two of these sections mainly represented the views of the institutional administrators, while the faculty viewpoint was represented in Section 3. The responses of all three of the sample groups (institutions, faculty and students) were represented in Section 4.

2. Results

Assessment practices

Pakistan's educational institutions have adopted assessment policies and practices covering a wide range of activities, generally relating to summative assessment performed by their examinations controllers. They have also defined standard practices for the implementation of formative assessment, and post-assessment analyses. Issues as to who should prepare the question papers,

and when, where and how the assessments should take place are described in the institutions' examination regulations.

Examination system: From the responses of institutional examinations controllers about general exam procedures, the study identified that 84 per cent universities follow a semester-based exams system, only 6 per cent follow an annual exams system and 10 per cent use a mixed approach (both examination systems). The semester system was introduced in Pakistani universities in the early 1970s. Previously, all public- and private-sector educational universities in the country followed an annual examinations system. Gradually the semester system dominated, and many institutions converted their programmes to a semester basis. In a few cases, this development increased the workload beyond the capacity of the institutions' examination departments, and the publication of results was delayed. For this reason, some universities reverted to the annual system, and to this day the semester system is used in some programmes and an annual system in others.

Number of final papers assessed annually: Forty-eight per cent of the responding institutions conduct their terminal/final (summative) examinations twice a year, while 23 per cent of them conduct terminal examinations three times a year. Universities in the latter category add a summer semester, and therefore have three semesters annually instead of two. One university practises an unusual quarterly system, conducting examinations four times a year.

Marking schemes: Which marking scheme is used to prepare the student's final result? The survey responses show that most of the responding institutions (68 per cent) use a Grade Point Average (GPA) system to generate the student's results, whereas 29 per cent do not follow a GPA system. If we remove from the analysis the 10 per cent of institutions which follow an annual system, we find that 19 per cent of the institutions use students' percentage scores to determine their grades (A, B, C, etc.) or divisions (first, second or third), as in most annual systems. Interestingly, many students and institutions favour both types of results presentation, and the final student transcripts are prepared accordingly.

Evaluation methods: As a common practice, Pakistani universities use either external or internal assessment methods of

student evaluation. Most institutions that use a semester system have internal procedures for both formative and summative examinations. In annual examination systems, however, external evaluations are usually conducted. A few institutions deviate from this rule in implementing the generation of question papers and answer scripts with the help of an external examiner. Summative assessment is conducted using a centrally controlled examination system at almost all of the responding institutions.

Paper setting

- Internal examinations: The following question was asked—who prepares the question papers in internal/formative assessments? The survey results show that 68 per cent of the institutions use internal faculty members as paper setters, while 10 per cent of institutions use external examiners for this purpose. An appreciable number of institutions (23 per cent) use a combination of external and internal examiners for paper setting and moderation.
- Final examinations: The procedure used for summative assessment is almost the same as formative assessment. The survey responses show that 61 per cent of the responding institutions use internal faculty members as paper setters, while 13 per cent use external examiners. Twenty-six per cent use a combination of the two approaches.

In the semester system, the internal faculty members usually prepare the formative and summative question papers. They are regarded as more reliable for maintaining secure standards of efficiency and secrecy within the institutions. This method is occasionally criticised, however, for relying on individuals for all academic aspects of the process, and for the monotonous results that can arise when exam questions are used repetitively over extended periods. These are common reasons that some institutions favour a combination of external and internal faculty members as paper setters.

Final paper implementation: The final (summative) examination process is usually centralised. The survey results indicate that 71 per cent of the institutions use internal faculty members to assist in this centralised process, whereas in 13 per cent of the institutions, where university operations are spread over many

locations or there are many students, a decentralised examination system is used. Sixteen per cent of the institutions responding to the survey did not answer this question.

Assessment activities: Analysis of the survey responses identifies the activities on which basis students are electronically assessed. In general, the semester system uses assignments, quizzes, tests and laboratory projects as part of formative assessment. In summative assessment, a final paper is administered for theoretical courses. Otherwise, term papers and reports, laboratory tests, projects, and oral presentations are assessed. When asked about these assessment activities, the survey responses indicated that individual faculty members use different assessment methods in different courses. All of the reported activities have a high frequency of usage: assignments (97 per cent), class tests (90 per cent), quizzes (84 per cent), class presentations (81 per cent), class attendance (74 per cent), and projects (71 per cent).

Types of question in summative assessment: Traditionally, essay-type questions have generally been the main method used in final/summative assessments. This trend appears to be changing, however. In the current survey, 55 per cent of the responding institutions stated that they use an essay-type format for only approximately 1:4 of the questions in their final papers, and an equal mixture of fill-in-the-blanks, multiple-choice, true/false and short-answer formats in the remaining questions. This result indicates the value of automated assessment systems to support paper generation and evaluation of these different assessment formats. A further 17 per cent of the institutions stated that 3:4 of their questions are essay-type; and 14 per cent reported that about 1:2 of their questions are essay-type.

Are essay-type questions necessary?

Descriptive questions can help in assessing the knowledge and intellectual level of the student. It can be difficult and time-consuming, however, to evaluate essay-type descriptive questions; and the marking scale may vary between the individual graders. These are serious practical problems, especially in DE institutions with mass enrolments. The survey asked about the need for descriptive/essay-type questions. A majority (65 per cent) of the faculty respondents regards descriptive questions as necessary

in assessment, and only 19 per cent of them do not. Sixteen per cent of the faculty did not respond to this question.

Present status of e-assessment

Useful information was obtained on how far institutions have progressed in the development of e-assessment methods, and about their experiences and difficulties. The majority of responding institutions (58 per cent) do not have a computerised examination system owing mainly to lack of sufficient funds, resources and skilled manpower; while 28 per cent felt strongly that computerisation is not developed because they do not need it.

A question was asked about the examination-related activities that are conducted manually, electronically or in mixed mode. In most institutions, activities are performed manually (paper-setting, examination implementation, script evaluation, grading and results sheet preparation). The status quo of examination and e-assessment activities in Pakistani universities is shown in Tables 12.1 and 12.2.

Table 12.1 Current Status of Examination Activities (%)

<i>Activities</i>	<i>Manual</i>	<i>Electronic</i>	<i>Mixed</i>	<i>No response</i>
Paper setting	48	26	26	0
Examinations implementation	61	20	16	3
Script evaluation	77	10	10	3
Grading	58	23	16	3
Results sheet preparation	13	61	23	3
Results display	20	45	32	3
Student records maintenance	16	39	32	13

Source: Sangi (2008).

Table 12.2 Institutional E-assessment Activities (%)

<i>E-assessment activities</i>	<i>Yes</i>	<i>No</i>	<i>No response</i>
E-tests	58	32	10
T-tests by other organisations	42	48	10
Formative assessment	32	58	10
Summative assessment	26	64	10
E-assessment support for faculty	29	61	10
Contribution to e-testing projects	13	77	10

Source: Sangi (2008).

Technology failures

E-assessment methods appear to be emerging in various institutions at an experimental level, restricted to isolated courses. Most institutions use e-assessment for pre-admissions tests. Only a few use electronic means of assessment, however, for they lack the technology infrastructure for them. When asked about the common causes of failure in e-assessment technology, only 35 faculty members (41 per cent) replied, identifying the following problems: network faults (30 per cent), software (27 per cent), power failure (22 per cent) and hardware (8 per cent).

Faculty preferences for e-assessment

The survey indicated preferences for e-assessment methods among the faculty members of the responding institutions, and a very positive about the potential of e-assessment. Several issues and concerns need to be addressed before it can be effectively implemented, however. A major issue is the cost-effectiveness of e-assessment systems. The survey showed that 58 per cent of respondents consider it an expensive option, and that 10 per cent consider it very expensive. On the other hand, 23 per cent respondents regard it as cheaper than traditional assessment methods. The latter respondents are likely to be the early adopters of e-assessment, as long as their other concerns can be met. The main investment items for institutions in relation to e-assessment are: hardware, software, and manpower. The importance of these factors was positively rated ("strongly agree" and "agree") by 84 per cent of the sample. The issue of maintenance was rated as important by 74 per cent. Thirteen per cent of the sample did not respond to this question.

Types of evaluation support needed

As identified earlier, institutions use different combinations of question formats in assessment, including descriptive/essay-type and objective types (multiple-choice, fill-in-blanks, true/false, etc.). Multiple-choice assessment is the most commonly automated, while the most difficult to automate is the essay-type, descriptive answer which requires individual evaluation

by a faculty member. Considering the large volume of essay scripts in DE institutions, this is a critical area for consideration in e-assessment planning. The survey asked about the need for specific types of e-assessment support, and the responses were highly in favour of support for multiple-choice question formats, with good demand for support of case study formats (Table 12.3). The importance of the formats was rated on five-point Likert scales from “strongly agree” (SAgr) to “strongly disagree” (SDis), with a midpoint of “uncertain” (Unc).

Table 12.3 Question Formats Needing E-assessment Support (%)

<i>Importance of exam formats</i>	<i>SAgr</i>	<i>Agr</i>	<i>Unc</i>	<i>Dis</i>	<i>SDis</i>	<i>No response</i>
<i>Institutional responses (%)</i>						
Essay (subjective)	48	14	3	21	3	11
Objective (MCQ)	79	10	0	0	0	11
Case studies	34	21	14	10	0	21
<i>Faculty responses (%)</i>						
Essay (subjective)	42	22	11	11	4	10
Objective (MCQ)	51	43	6	0	0	0
Case studies	34	50	9	4	3	0

Source: Sangi (2008).

Software support for e-assessment administration

Institutional administrators indicate that their exams administration systems have three major challenges: software and operational support for the implementation process, secrecy of assessment documents and authentication of students at distance. Common implementation issues include the development of examination centres, and the need for assessment documents and staff at the centres, and student lists. Security and secrecy of assessment documents (question paper and answer scripts, etc.), and the authentication of students are common institutional issues. When the faculty members were asked about these issues, however, the responses were more divided, possibly owing to their lesser experience in examinations administration and implementation. Their responses nonetheless indicate the general importance of software support for these activities (Table 12.4). The importance of the types of support was rated on 5-point Likert scales from “strongly agree” (SAgr) to “strongly disagree” (SDis), with a midpoint of “uncertain” (Unc).

Table 12.4 Software Support Needed by E-assessment (%)

<i>Importance of software support</i>	<i>SAgr</i>	<i>Agr</i>	<i>Unc</i>	<i>Dis</i>	<i>SDis</i>	<i>No response</i>
<i>Institutional responses (%)</i>						
Implementation	69	10	4	0	0	17
Security	72	4	4	0	3	17
Authentication	65	7	0	0	0	28
<i>Faculty responses (%)</i>						
Implementation	28	47	12	9	1	3
Security	43	28	16	3	5	5
Authentication	43	28	9	6	3	11

Source: Sangi (2008).

These results indicate the major need for basic electronic methods in the assessment implementation process. Support for such issues as student authentication and secrecy is considered necessary for the reliability, uniformity and transparency of assessment, especially at a distance. In online DE institutions, this requirement needs to be carefully handled, as students are in large number and in remote areas. The implementation of e-assessment faces major challenges with respect to the high probabilities of technological failure and ineffective student authentication.

Student authentication in e-assessment

Authentication of students is a sensitive issue in e-assessment implementation. The survey showed almost unanimous agreement on the importance of this issue, and on the need for all the authentication methods proposed. Sixty-five per cent of faculty members accept (agree or strongly agree with) the value of traditional, supervised authentication. Other methods such as password access, finger-printing and camera-based authentication are also highly desired (Table 12.5). The importance of the authentication methods was rated on 5-point Likert scales from "strongly agree" (SAgr) to "strongly disagree" (SDis), with a midpoint of "uncertain" (Unc).

Each of these methods now needs to be researched with regard to its technological implementation, ease of use, reliability and the effects of network congestion.

Table 12.5 Student Authentication Methods in E-assessment

<i>Importance of authentication method</i>	<i>SAgr</i>	<i>Agr</i>	<i>Unc</i>	<i>Dis</i>	<i>SDis</i>	<i>No response</i>
Supervised/manual	23	42	3	23	3	6
Password access	65	29	0	3	0	3
Finger printing	71	7	6	10	3	3
Camera/image	45	19	10	13	7	6

Source: Sangi (2008).

DISCUSSION

The literature review and survey of e-assessment practices illustrate a series of issues.

I. Economic Issues

E-assessment can play a valuable role in educational measurement, and especially in DE. Assessment data are often costly to collect when travel is required, and if an analysis can be automated by coding the questions and responses, such costs can be avoided. On the other hand, e-assessment involves the costs of electronic equipment (for example, computers), reliable software, bandwidth, specialised manpower, training and the time involved in developing test questions. Additional costs of maintenance, secrecy, security and trouble-free operations are also involved (Scottish Qualifications Authority, 2004). In the short to medium term, e-assessment tools can be expensive to implement, and traditional assessment methods may be less expensive. Once created, however, e-assessment applications become less expensive, being easy to operate and score, and reuseable from year to year in different combinations (Ridgway et al., 2004). Most of the administrative colleagues surveyed during the current project suggested that e-assessment systems can be more cost-effective than traditional assessment methods, but others felt that the hardware, software, manpower and maintenance costs represent difficult obstacles to e-assessment in developing countries.

2. Technological Problems

E-assessment systems must be stable in order to generate valid and reliable assessments results (Qualifications and Curriculum

Authority, 2007). The system requires reliable hardware, software, network and power systems at all testing centres. Data management and operational security issues can jeopardise the system's reliability. When conducting tests at multiple locations, synchronisation between centres is also important. Depending on the specific e-assessment system in use, dedicated testing centres may be needed with an ongoing requirement for technical support throughout the assessment period. Responses by administrators to the sub-project survey have indicated the importance of alternative network links and increased security measures while online exams are being conducted.

3. Administrative/Operational Issues

The administration of e-assessment requires careful and continual record-keeping within a failure-free/fault-tolerant system. To ensure the system's reliability, a well-trained staff is needed at all testing centres (Scottish Qualifications Authority, 2004). In addition, automated polices and security procedures are essential, with electronic and manual student authentication procedures. Specialised skills are required to produce high quality e-assessments, and many teachers fear that e-assessment will de-skill their profession. Some are threatened by the introduction of e-learning and e-assessment, and suspect the motives involved. Such fears need to be handled by the institution. In the current project survey, students were asked which assessment components (assignments, tests, etc.) they would welcome in an e-assessment context. The majority favoured the electronic submission and grading of assignments, quizzes, class tests and final exams. This indicates an early acceptance of e-assessment systems among this group of stakeholders.

4. Social/Ethical Issues

The electronic manipulation of information in e-learning systems raises major social and ethical issues (Marais et al., 2006). An e-assessment system should above all be fair to students. The student's ability to respond electronically can affect his or her capacity to succeed in the assessment, and the collection of e-assessment data may prejudice the interests of non-computer

literate students. In addition, losses of service in automated systems through power, equipment, software or network failure may cause loss of time and mental composure for the students, as well as actual loss of data. Third, there is the danger that expert computer users could gain access to, manipulate, copy, and misuse the answer scripts. These problems require careful policy decisions and preventive measures.

5. E-assessment in Pakistan

The results of the project's survey confirm that uses of e-assessment in Pakistan are currently limited, located in individual sections of the institution and used experimentally without full acceptance by the institutional management. The Virtual University of Pakistan is using a relatively comprehensive e-assessment system. The National Testing Services in Pakistan, Allama Iqbal Open University (AIOU) and a few other institutions are using e-assessment as an occasional, alternative option. The wider use of e-assessment systems clearly depends on the identification of solutions to the technical and procedural hurdles that threaten their stability. In order to develop better and robust e-assessments, a checklist of e-assessment procedures is required to anticipate these problems, and to advise institutional policy, assessment, security and authentication procedures. Such a checklist might not initially cover all constraints and questions, but it could focus attention on the common issues and suggest the best approaches for specific institutions and types of faculty member. In the next section, an e-assessment procedures checklist is proposed, and the work being undertaken in the current project to implement the procedures via a software prototype is discussed.

AN E-ASSESSMENT PROCEDURES CHECKLIST

An e-assessment system has three active stakeholders: the student, faculty and institution. The students and faculty members are regarded as end-users in the system while the institution is represented as its administrator/manager. Faculty may support the development of assessment objects and generate assessments

on the institution's behalf. The survey and discussion has indicated that all aspects of the system involve challenges. An e-assessment procedures checklist (EPC), based on the current project's priorities, is provided to anticipate many of these issues and challenges (Sangi and Ahmed, 2007). The checklist is divided into three main stages: pre-assessment, assessment and post-assessment (Figure 12.1).

Figure 12.1 The E-assessment Procedures Checklist

<u>Pre-assessment</u>	<u>Assessment</u>	<u>Post-assessment</u>
Policies, rules and procedures	Assessment generation	Marking and grading
Institutional interfaces	Assessment administration	Results certification
Assessment objects	Assessment capturing	Post-assessment audit
Assessment software	Storage and transmission	Assessment analysis
Security measures	Student authentication	Assessment feedback

Assessment Support System

Registration	Authentication
Plagiarism Check	
Access Controls	Record Keeping
Support and Maintenance	

Source: Sangi (2008).

I. Pre-assessment

The major tasks in the pre-assessment stage are the creation of policies, rules and procedures. Three main policy decisions relate to e-assessment setup, institutional setup, and rules for conducting the assessments. In the software currently being designed to implement the EPC, an Assessment Policy Configuration module enables the administrator to set up necessary policies and to make decisions regarding number of tests, quizzes, and assignments in a given period. With the help of the Personalisation/Configuration module, the administrator can personalise the system's look-and-feel and make other adjustments according to institutional needs. The Conduction Policy Configuration module is an important component of the system, handling assessment generation,

centralised and distributed testing, prevention of cheating and control of backup mechanisms. A security maintenance module handles decisions relating to encryption, network access control, firewall settings, and user security checks. Measures to prevent cheating include randomisation of assessment questions and generation of multiple exam papers.

2. Assessment

The assessment stage handles the generation of the actual tests. Assessment generation procedures control the selection and assembly of objects and test items, and their archival storage. Objects/items include assignments, quizzes/tests, mid-term papers and final term papers. Assessment objects can be defined at varying levels of difficulty, and assembled in random formats. Continual storage, record-keeping mechanisms and backup support facilities need to be provided. Encryption rules, editing privileges, and transmission between servers in distributed assessment environments need to be carefully controlled. Assessment storage deals with the real-time compilation, capturing and archiving of assessment items with respect to individual students and topics. This function aids the examinations department in the administration, transmission and storage of assessments. Secure transmission is an essential and ethical responsibility of the system. Student authentication procedures ensure that the right student is present for the test at the specified place and time. Automated and/or manual authentication should be available according to the institution's preferences. The general procedure of authenticating the students by login names and password is a minimal requirement.

3. Post-assessment

The first major component of post-assessment is grading. Automated or teacher-assisted scoring mechanisms may be required, followed by results compilation and certification processes. Institutional templates for printing certificates and result cards can be defined. A particularly important component is the post-auditing of the processes and controls used by the system

during an assessment. Post-assessment audits involve the collection of system performance data. They provide information about the assessment objects used, student scoring, and issues relating to the adjustment of grading levels, certification and test validity and integrity. They also provide data on student performance and on whether course objectives have been achieved. Post-assessment feedback to students, teachers and administrators assists in the system's subsequent improvement.

4. Assessment Support Systems

An important consideration for software based on an EPC is its interface with existing university systems and processes. These include the traditional registration procedures, access controls, record-keeping databases, methods of communication, and software uses. Specialised routines include student authentication and plagiarism checking.

CONCLUSIONS

This project has conducted a detail review and survey of e-assessment practices in Pakistan. It has identified a general need for e-assessment methods, particularly in institutions with high student enrolments, and in DE. The survey has highlighted various assessment practices currently followed by Pakistani educational institutions. In most institutions, a semester system is followed, with variations, and many assessment components are employed: assignments, quizzes, class tests and/or presentations are the most commonly used, together with other assessment activities (for example, lab and project work, and oral examination). Essay-type questions are common and regarded as an integral part of assessment schemes. Electronic systems need to cater to these requirements, and to be flexible in defining and considering each e-assessment component.

At present, electronic support for assessment in Pakistan is usually limited to the examinations section of institutions. Other uses of e-assessment are located in individual institutional units and used experimentally without full acceptance by the

institutional management. This is changing, however, as many institutions are beginning to recognise the value of e-assessment methods. The preferences for e-assessment systems vary between electronic applications for operational purposes: implementation, secrecy and authentication of students, and maintenance of students' results and records. Faculty members would like the scope of e-assessment methods to be expanded to include new assessment forms other than simple quizzes and tests.

The survey has highlighted, however, major problems in the adoption of e-assessment methods. Their current usage is very limited in Asian education, even in distance education and at institutions which feature online learning. The survey conducted during this project has revealed poor conditions for e-assessment in many Pakistani institutions: lack of Internet access, software and power failures, overloaded servers and networks, etc. These are major problems for effective e-assessment, which are likely to increase as the volume of students and frequency of tests place increasing pressure on institutional servers and networks, for example, security of data, electronic plagiarism, authentication of students at multiple and distant locations and operational reliability. The technical and procedural problems highlighted by other PANdora projects suggest that these conditions are common in Asian institutions generally. Cost-effective, secure, efficient and reliable ICT infrastructure with nationwide coverage will be crucial for all electronic access, learning and assessment processes. Their development will need clear plagiarism/authentication control policies, training for faculty members, students and administrators, and vigilance by faculty members and technical staff. As a segment of Asian educators is totally opposed to e-assessment, and can negatively influence and manipulate the political will to overcome these barriers, support for pilot studies must be obtained and the viability of e-assessment and the growing need for it publicised.

E-assessment security, secrecy and operational issues can be addressed immediately with the development of open source e-assessment software. The current project has developed an e-assessment procedures checklist and software prototype of this type. The checklist covers a range of assessment practices, levels and policies, and aims to provide a flexible basis for the reliable e-assessment practices demanded by Asian institutions. It focuses

attention on the common issues and best approaches for specific institutions and types of faculty member. To implement the checklist, the project has generated an open-source, configurable e-assessment software at AIOU, enabling institutions to adopt the specific components of the system that they require. The software contains varied test formats supporting different sorts of formative and summative assessment, and adding time-saving automation to the assessment process in the hope that acceptance of e-assessment among faculty members and students will be increased. Both the e-assessment checklist and software will be capable of expansion and refinement as more institutions begin to use them; and it is hoped that they will mature into a generalised e-assessment model for use across the Asian region. (Access to this freely shareable e-assessment software may be sought from the author.)

The need for e-learning and assessment in Asia is clear. The drive for a higher quality of education at a relatively low cost, and the availability of better computing and technical facilities, especially in remote regions, are major driving forces. As Asian DE institutions provide education in multiple local languages, a generalised e-assessment model will be needed to address these and other cultural factors. The institutions which prepare themselves for this challenge at an early stage will benefit more from e-learning in future, as their student enrolments increase and issues of quality are imposed upon them by society.

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