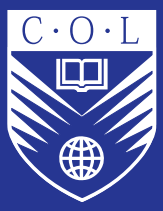

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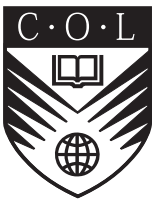
Educational Media in Asia

Usha V. Reddi and Sanjaya Mishra, Editors



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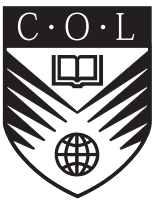

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COMMONWEALTH *of* LEARNING

The Commonwealth of Learning (COL) is an intergovernmental organisation created by Commonwealth Heads of Government to encourage the development and sharing of open learning and distance education knowledge, resources and technologies.

PERSPECTIVES ON DISTANCE EDUCATION: Educational Media in Asia

Usha V. Reddi, Ph.D. and Sanjaya Mishra, Ph.D., Editors

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CONTENTS

PREFACE

Educational media have the potential to transform the process of teaching and learning. We have seen their impact most dramatically through the emergence of large distance-teaching universities (open universities). Asia is home to most of the world's mega-universities (open universities with over 100,000 students). We can learn much, in particular, from the way that these institutions deploy a variety of educational media that include radio, television, teleconferencing, interactive radio, multimedia and the Web. The evidence shows that media have been effective in enhancing the scale and scope of learning, which in turn has made it possible to achieve other social and economic development goals.

The Commonwealth of Learning (COL) seeks to share this Asian experience by documenting the developments that underpin it. Accordingly, COL invited educational media researchers, practitioners and policy-makers to contribute to a volume on educational media in Asia as part of its series: Perspectives on Distance Education. The Commonwealth Educational Media Centre for Asia (CEMCA), a unit of COL based in New Delhi, led and managed the project.

The monograph has three sections: Country Profiles, Research Reviews and Case Studies. The five country profiles describe the use of educational media in Bangladesh, India, Malaysia, Singapore and Sri Lanka. The research reviews document and analyse Asian research in three main areas of media application: audio (including radio and interactive radio), video (television and teleconference) and computer-related technologies (computers, multimedia and e-learning). The final section of the book presents six Asian case studies, of which two are from non-Commonwealth countries.

The collection captures the variety of experience gained and of lessons learned in using educational media in Asia. Singapore, with its well-established policies of educational use of Information and Communication Technology (ICT) is at one end of the spectrum. At the other is Bangladesh, where the use of educational media remains at a nascent stage. The notable success of some of the open and distance learning institutions in the region – such as the distance education initiative of the Indian Institute of Technology Bombay, a premier centre for technology education – stands out. However, in view of the prominent role of open universities in Asia, there is actually remarkably little worthwhile research on educational media in the region. Asian institutions should make research on media applications a higher priority.

The Commonwealth of Learning had the good fortune to enlist 23 authors to contribute to the book's 14 chapters. We were also privileged to have two editors, Dr. Usha Reddi and Dr. Sanjaya Mishra, whose profound knowledge and experience of educational media in the region shaped and enriched the content. I hope that this publication will stimulate

further success and innovation in educational media both in Asia and more widely. Today education faces challenges on such a scale that only the intelligent and appropriate use of media and technology will allow us to satisfy the aspirations of the millions who thirst for learning.

Sir John Daniel

President and CEO
Commonwealth of Learning

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EDUCATIONAL MEDIA IN ASIA: AN INTRODUCTION AND OVERVIEW

Usha V. Reddi

Discussions and debate arise whenever a new communication medium is introduced in society. Early developments in print technology brought about a revolution in education. Similarly, radio and film caught and held the attention of policy-makers and scholars until the end of World War II. At the end of the 20th century, television (when new information and communication technologies shifted attention away from the established media of radio and film) opened up a new debate that lasted for nearly half a century.

Yet, no medium has ever replaced another. Each has found its own niche. Print remains the backbone of both conventional and distance learning efforts worldwide. Educational and instructional television played a pivotal role by "providing a window to the world" for many who were otherwise denied such information and knowledge, and by ushering in societal changes. The collapse of educational television led to a renewed interest in small media. Community radio using low-power FM transmitters has underlined the success that can be achieved when "narrowcasting" blends with locally relevant programming.

Even in the face of contradictory findings from the field, educators have been among the first to use the potential of media for education. This has spawned an entire discipline of educational communications and the new profession of educational technologists and instructional designers. There are protagonists who aggressively promote the role of media in education, citing as their evidence the huge success of farm radio in the U.S., Canada and some developing countries such as India. The example of Mexico's Telesecundaria is widely quoted as a case of successful application of television in education.

Then there are the "disbelievers," those who essentially argue that media are excellent entertainment tools — and therefore ill-suited for delivering education. There does not seem to be much clear-cut evidence providing a direct cause-and-effect relationship between exposure to content through a given medium and learning gains and outcomes. The disbelievers feel strongly that media cannot replace, simulate or even imitate the teacher in the classroom. Implementation problems on the ground have also led many people to question the wisdom of large investments in technology applications in education. For instance, as Ninan (1992) writes:

> "In spite of all good intentions, most of the SIET [State Institute of Educational Technology] programmes are more often than not incompetently made, the teachers who show this to the children are completely clueless even about basic methods

> of teaching, and the discussion materials that are supposed to reach these remote schools before these programmes are aired, never reach at all. Yet the children have benefited academically, possibly because in the wasteland that many rural primary schools still are, any kind of intellectual stimulation makes a deep impression in the children's minds."

We are, then, caught in the continuing debate on the use of communication media in education. While there are different ways of examining the role and effectiveness of media in education, scholars and educators have generally tended to do it from the perspectives of their own parent disciplines: psychologists have probed individual effects, sociologists have studied effects within social contexts, political scientists have shown concern for political effects of mass media, and educators have hoped to perform miracles with mass media in areas where conventional systems have been unable to cater to, and cope with, learners' needs. Each discipline has brought its own special tools to the scholarship, little recognising that educational media is itself a new emerging discipline with its own pedagogy and grammar and therefore requiring a different perspective and, definitely, different tools. For instance, what kind of tool do we use to distinguish between learning from the content of a lesson to learning from its format of delivery? Consider an interactive e-learning lesson on driving safety: how do we distinguish the impact of the content from the way in which the lesson is delivered?

When studying the effectiveness of media to serve educational needs, we often get caught in the trap of looking through the differently coloured lens of the aspects we are studying. Those aspects include: audience characteristics, organisational factors, media environments, audience research, programme-specific factors and infrastructure factors. Alternatively, we can examine media effectiveness from the perspective of Bates's model, ACTIONS — access, costs, teaching function, interactivity, organisation, novelty and speed (Bates 1995).

What should we be concerned about while talking of learning gains and outcomes from the use of media in education? Ideally, as educational technologists, we would like a situation where whatever we produce has the desired effect. We would like to know that the television lesson or e-learning course has served its clearly defined learning objective, that it is possible to distinguish between content and the medium of delivery, and that such information and knowledge come from research findings emerging from end-users/ learners.

The debate continues because more than half a century of research in media development and education has not yielded any conclusive results about the relationship between the two. It has been a mixed record — of stupendous successes and miserable failures. However, research broadly shows that at least three different types of effects require study: medium or displacement effects, content effects, and audience effects.

Medium Effects — "Medium effects" refers to the reorganisation of activities that takes place with the introduction of new media. In simple terms, this means the reallocation of time given to media and other activities. Because media use depends to a large extent on available leisure, time spent with the media may be a reduction in time spent on other work and/or on social activities such as conversations with peer groups, outdoor recreation and other unorganised activities. For distance educators, the use of media to supplant or supplement other educational activities means that the learner has to take time out to engage with the medium of learning. And, as Venkaiah (Chapter 12) reports in his case study on the use of television in B.R. Ambedkar Open University, telecast timing of educational programmes of that institution proved a major disincentive in their use, because learners had to disrupt other activities in order to attend the medium.

Within developing countries, availability of, and access to, media also constitute powerful variables in the media/audience relationship. Variations in media access are likely to be the single most important predictors of media exposure, use and effect, leading to the "knowledge gap" as posited by Tichenor et al. (1970) and Shingi and Mody (1971), which in contemporary language is termed the "digital divide" when applied to new media. The implication here is that learners from more economically advantaged families will have better exposure to the selected media and will be able to absorb more than their less-advantaged peers, and will derive different gratifications from the same media, if exposure is held constant. It is, therefore, all the more necessary to match access and content to audience needs if there is to be greater effectiveness in a desired direction.

Content Effects — Socio-economic factors are the best predictors of media content preference and effect. Print media form the backbone of school experience and audiovisual media are fast being used in classrooms. Many studies in the use of educational media have shown that, under proper learning conditions, learning through media is very successful. And in developing countries, many controlled experiments in educational use of mass media have yielded significant results. Studies by the National Council for Educational Research and Training (NCERT) and the Satellite Instructional Television Experiment (SITE) experiment in India are cases in point described by Agrawal (Chapter 2) and Chaudhary and Panda (Chapter 7).

Audience Effects — The most important and widely accepted belief today is that audiences attend mass media because they want to, and they devote a specific amount of time to this activity — it is a conscious decision taken in the face of competing alternatives. Exposure to media is not a passive activity, with the learner member being no more than a sponge to absorb all messages. As a result of exposure to multiple sources of entertainment and information, audiences become purposeful media users. Just as school textbooks are not the only source of information about the world for children, radio-listening or television-viewing also takes place in a societal context and is not passive. Such findings are emerging from studies in today's interactive media. Purposeful viewing implies a choice between equally attractive alternatives: if the medium or medium content fails to meet the latent need or desire of the viewer or learner, he or she is likely to opt for another media-related (or unrelated) activity. And it is the user or learner, not the producer, who finally determines the effectiveness of any medium or its content in meeting its predetermined objectives.

The purpose of the preceding discussion on the outcomes of research in media and in education is to provide the framework for an introduction to this volume. A wealth of information is available in conventional books and journals about the effects and effectiveness of media on audiences. I remember a time early in my career when, undertaking a survey of literature on media effects on adolescents, I found, to my dismay, that more than 1,500 studies were carried out during an average year — and sifting through those studies was a monumental task. Today, with the explosion of Internet and Web-based technologies, an Internet search would probably yield more than a 100,000 entries. Narrowing down our search to educational media and media applications in education would still leave us with a daunting task.

Much of the existing research in the use of media in education (in all its dimensions and levels) is carried out in developed countries. Such research forms the backdrop of current debates on the use of information and communication technologies (ICT) to meet educational needs, not merely of resource-rich communities but also of the poor and the marginalised in the developing world.

Understanding the broad relationships between education and communication media is also important to help the reader place the two within a broad context of the educational

media scenario in Asia, a continent that presents some of the greatest social, political, economic and developmental diversities. Asia is a region of great disparities. On the one hand, it has economic and information technology (IT) powers such as Singapore, Malaysia and India. On the other hand, it is the region with the largest population of illiterate and poor in the world. It has countries such as Bangladesh, the focus of developmental efforts of donor agencies, and India, one of the fastest-growing economies in the world despite its burden of a population of more than a billion. Maldives is a country that reflects all the strengths and the problems of small states; Sri Lanka reflects the pulls and pressures of ethnic diversity; and the Philippines and Indonesia reflect both the richness and the complexities of large, dynamic, transitional societies.

Yet all these nations of Asia have been test beds for developmental and media initiatives in education. Mega open universities and correspondence course institutions in India, the successful micro-credit experimentation in Bangladesh, community-based development in Sri Lanka — all of these initiatives bear witness to educational and media developments in Asia.

Much current knowledge of initiatives in using media for education, as found in literature, describes projects and activities. However, it does not provide a complete picture of any one country. While first-hand exposure has been gained by individual experts, there is neither a comprehensive profile of a country nor a dispassionate description and evaluation of some of these projects. Recognising that a periodic scan of country profiles, research reviews and case studies was essential in helping us understand the range and kind of educational media activities out there, we undertook to commission several authors from selected Asian countries to contribute to this volume. We hope that by requesting input from Asian scholars and educational media practitioners we will be able to gain the kind of insights that only first-hand experience of work in the region provides.

We divided the discussion we sought into three broad sections, all relating to educational media applications in the countries: country profiles, research reviews and case studies. The contributions of several authors reflect as much the diversity of the region as they do the individual country's priorities and directions in the application of educational media. The contributions also reflect the disparities in the region vis-à-vis availability of information about national policies, activities and initiatives. For instance, little is known about Maldives' efforts in the area of educational media; Pakistan's experience is missing, since at the time of organising this volume, it was difficult to establish communication between India and its neighbour. India, Malaysia and Singapore dominate the contributions, both in terms of numbers and in the sheer diversity of research and case studies.

The contributions also reflect national perspectives. Singapore and Malaysia, for example, have stressed IT-enabled education, both for producing and distributing material and for ensuring access to IT for learners. India's stress, on the other hand, has been in the use of radio and television for formal, non-formal and distance education. This reflects its effort to ensure national access to the widest possible geographic and cultural regions and group, as well as its technological superiority in satellite applications. Sri Lanka's experience is that of a small island-nation, husbanding its resources and trying to ensure that education is delivered with little loss of cultural and linguistic identity. Bangladesh, although a country with limited resources, is trying to optimise use of technology for educational purposes.

In Part I of this volume are five country profiles. These describe, respectively, the education and educational media scenario in Bangladesh, India, Malaysia, Singapore

and Sri Lanka. The applications of educational technologies reflect the dynamics of each country.

In Chapter 1, about Bangladesh, Monira Hossain of Bangladesh Open University begins by providing a broad overview of the country and its people and the place of education as a national priority. She points out that a major initiative of Bangladesh Open University has been addressing inequality in the educational system of Bangladesh, not merely at the tertiary level of education, but more importantly at the school level through open school. Most distance education programmes, whether in the public or private sector, depend heavily on print as the basic mode of delivery, given problems of access to electronic media and low teledensity. However, electronic media support for education has been in existence since 1956, when it was started as a small project. Today, this support is provided by the national radio and television service, with some educational programming coming from the facilities of Bangladesh Open University. Internet and Web-based technologies are yet to make any major headway. It is an irony that Bangladesh, surrounded as it is on three sides by India, has yet to benefit from the advances made by its neighbour in the field of educational media applications.

India's country profile is by Binod C. Agrawal (Chapter 2), an active participant in many of India's pioneering educational media applications. While India's work is very comprehensive, it must be seen alongside the research reviews on radio and television and the case studies by other Indian scholars (Mishra; Chaudhary and Panda; Venkaiah; and Arya, Krithivasan and Iyer). The grand nature of Indian experimentation, from early radio to television, through the SITE experience in the 1970s to today's operational use of television and teleconferencing as critical components of formal and distance education, reflect both the dimensions of the problem and the solutions identified by the polity to address such problems. The research reviews and the case studies underline disturbing findings — of poor attendance and limited effectiveness of such grand operations; of the need for attention to quality and detail; and of the absence of conclusive findings on the relationship between the medium, the content and the learners.

Malaysia's experience with media applications (Chapter 3) shows how a vision can be translated into practice, especially when such a vision is backed by political will. The country profile, by Rozhan M. Idrus, describes Malaysian policies and initiatives and notes that the focus is much more on new media in Western Malaysia, while educational television programming provides some support in Eastern Malaysia.

Singapore (Chapter 4) has a master plan to integrate IT in schools so that, over the plan period, technology can be used to support both teachers and learners. By 2000, the teacher: computer ratio was 2:1 and the student:computer ratio was 5:1. Given such IT penetration, Cher Ping Lim points out that Singapore has moved quickly to provide e-learning opportunities for meeting diverse needs. It envisions a common pool of customised tools and approaches for organisations to use, thereby enabling Singaporeans to assemble, dis-assemble and re-assemble learning resources as per their needs.

The focus of technology-supported education in Sri Lanka (Chapter 5) is largely through its distance learning system, report Shironica Karunanayake and Rupa Wijeratne in their country profile. Both the national radio and television systems do provide some educational programming (locally produced and imported). There is also some production of educational programming in public-funded institutions such as the National Institute of Education and the Open University of Sri Lanka. The country is moving toward greater use of Internet and computer networks for learning; and the Lanka Educational Academic and Research Network, a facility started in 1990, connects all major educational and research and development institutions in the country.

We cover three major media in Part II, the section on research reviews. Audio, radio and interactive radio (Chapter 6), reviewed by Sanjaya Mishra, constitute the first review of research. Sohanvir Chaudhary and Santosh Panda review the use of educational television and teleconferencing in the second review article (Chapter 7). The third review (Chapter 8), by Paul Kawachi, focuses on computers, multimedia and e-learning and explores the available experience and research in the application of computer-based multimedia and e-learning in education.

Part III of this volume describes some new initiatives undertaken in different countries of Asia. How India's Indira Gandhi National Open University has planned its media strategy so that access is ensured to students through multiple channels is explained in Chapter 9 by Ramesh Sharma and Suresh Garg. A similar effort by a state open university — the B.R. Ambedkar Open University — is discussed in Chapter 12) by V. Venkaiah. Kavi Arya, Saraswathi Krithivasan and Shyamala Iyer describe their efforts to use satellite-based conferencing for technical education in Chapter 13, while Hisham Dzakiria and Zuber Hassan describe Malaysian applications of ICT to reach remote teachers for professional development in Eastern Malaysia (Chapter 11). Melinda dela Peña-Bandalaria describes the development of e-learning at the Philippines Open University (Chapter 14), while Tian Belawati, Dewi Padmo and Edward Sinar discuss the efforts of Indonesia's Universitas Terbuka on media usage in Chapter 10.

In planning and preparing this book, we had to confront several realities:

- First, this will be neither the first nor the last exploration of a much-debated theme. Volumes have been written about different aspects of deploying media technologies for educational purposes. Many have described various technology-related experiments.
- Second, we found that many descriptions of technology application in education have been undertaken from the perspective of the implementing agency and rarely from the perspective of research. These descriptions often painted glamorous pictures and spoke of the grand success of the projects. The question that comes to mind is: If the picture is so rosy and if so many projects have succeeded, why are we still lamenting the failure of media to deliver educational services? Why the ongoing debate on the relevance of using media in education? Why are advertising campaigns so successful, when educational campaigns using the same media make no significant difference? In most instances, we found an inadequacy of research findings, both in terms of numbers and the range of themes and countries covered. We chose, deliberately, to address this gap and to undertake not reviews of cases, but reviews of research undertaken by scholars and practitioners in the region. The result, we admit, may be patchy, but it is necessary if we are to learn from our successes and failures.
- Third, we were confronted with the fact that, until the recent convergence of interests between e-business and e-learning, the corporate sector has not been interested in education, except perhaps where some companies have looked to providing in-service training of their own employees. Education and the provision of skilled manpower for the economy have largely been seen as the purview of government. Efforts to use media in education have largely emerged out of public funding and donor support, while governments have engaged with the issue of providing basic, non-formal and formal education to various population segments. The inability of public sector educational systems to deliver "employable" graduates has been responsible for the corporate sector's stepping into the realm of education.

With globalisation, and with educational services entering the ambit of World Trade Organisation negotiations, the corporate sector has awakened to the potential of education as a business. Many global institutions have also recognised the enormous potential of IT-based technologies to reach markets of learners in developing countries. The mosaic of activities in technology-enabled education is very complex and we felt that stocktaking of public sector efforts is an essential first step. We hope to undertake such a review of corporate sector initiatives in a later volume.

This volume of five country profiles, three research reviews, and six case studies is only the beginning of our regular effort to scan, monitor and review the Asian educational media and technology scenario. We are grateful to the large number of individuals and staff at institutions who spared their time and allowed us access to resources so that we could undertake this first exercise.

We look forward to our readers' feedback, which we hope will help us identify the gaps in our effort and address them in future volumes.

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COMMONWEALTH *of* LEARNING

Part I:
Country Profiles

CHAPTER 1

EDUCATIONAL MEDIA IN BANGLADESH

Monira Hossain

INTRODUCTION

The concept of using mass media such as newspapers, radio, TV and films as support services for both formal and non-formal education is not new. Countries in both developed and developing regions have increasingly depended on media as delivery channels to increase access to dispersed and disadvantaged populations. Bangladesh is no exception.

This chapter provides an overview of the use of educational media, both traditional and the new information and communication technologies (ICTs), as part of a broad agenda in both the formal and the non-formal educational sectors in Bangladesh.

The land and people

Bangladesh, a country of rich alluvial plains, has long been a bridge between South and Southeast Asia. Its land mass of about 148,400 sq. km is crisscrossed by a network of several major rivers, their numerous tributaries and canals forming a lace of interconnecting channels. Victim to annual flooding in the plains as a result of monsoons and cyclones in the Bay of Bengal, Bangladesh is a country of high levels of absolute poverty. With the country's high population growth and low adult literacy rate, the conventional system of education is overburdened as it tries to cope with growing requirements, inadequate access to rural areas, and the lack of both formal and informal educational opportunities. Nevertheless, the country is growing steadily, and despite some political instability, there has been a free environment for education and development.

Known as East Pakistan from 1947 to 1971, Bangladesh was separated from the western part of Pakistan by the large land mass of India. It was a distant and neglected partner of the more prosperous West Pakistan, and eventually ethnic, cultural and linguistic differences led to its secession from the west and the formation of an independent Bangladesh in 1971.

Socio-economic indicators

The majority of Bangladesh's population lives below the poverty line, with about 80% of the people inhabiting rural areas. It has the highest rate of malnutrition in South Asia and one of the lowest adult literacy rates in the world. About 57% of the adult population is illiterate. The country's economy is based on agriculture, which accounts for nearly 62% of total domestic employment. Women constitute half the population.

Education system

Education in Bangladesh is not yet fully developed. The literacy rate is low and there is a significant disparity between female and male literacy rates (Table 1.1). However, with the ongoing involvement of government and non-government organisations (NGOs), the literacy rate has been increasing. Bangladesh received the International Literacy Prize in 1998 from UNESCO for its upward trend in literacy. Universal primary education is the focus of the "Education for All" effort in the country, an effort that is seeking to wipe out illiteracy by the targeted year 2015.

Table 1.1: *Population statistics and literacy.*

Cohort	Percentage of Population	Male (no.)	Female (no.)
0–14 years	33.8	23,069,242	21,995,457
15–64 years	62.8	42, 924,778	40,873,077
65 years and above	3.4	2, 444,314	2,069,816
Literacy	56.0	63%	49%

The education system is divided into four levels: Primary, Secondary, Higher Secondary and Tertiary. In line with the national education system, most education is in Bangla, although English is offered as a medium of education in a few metropolitan cities by a number of private enterprises that offer A- and O-Level courses. There is also the Madrasa system which uses Arabic as the medium of instruction and focuses on Islamic teaching.

There are about 52,000 primary schools and 11,000 secondary institutions. The five years of secondary education conclude with a Secondary School Certificate (SSC) examination. Students who pass this examination proceed to two years of Higher Secondary which culminates in a Higher Secondary School (HSC) examination. Led by the Ministry of Education, six education boards deal with education up to HSC level.

Universities are under the academic supervision of the University Grants Commission and they offer undergraduate, masters and doctorate degrees. There are 12 public and approximately 48 private universities in Bangladesh. Public universities offer undergraduate, masters and doctoral programmes, ranging from general subjects to specialised areas such as engineering, agriculture, design technology and computer technology. The ever-increasing private universities indicate that Bangladeshis, like people in other developing countries, subscribe to the idea that higher education assures social status.

Distance education

The origin of Bangladesh Open University (BOU) dates back to 1984, when the committee formed by the then Ministry of Education submitted its proposal for the establishment of BOU. The Bangladesh Institute of Distance Education (BIDE) was established on a pilot basis and became the forerunner of the present distance education system. After nearly eight years, the Bangladesh Open University Act 1992 was passed by the National Assembly and BOU started its journey in the field of open and distance education as a project of the Asian Development Bank (ADB) (Hossain 2000). One of the principal aims of the BOU project has been to tackle inequality in the country's educational system. Donor support with international consultants during this period helped to strengthen the capacity of BOU to deliver high-quality education at a distance in a range of areas. Consultants worked in collaboration with local staff towards improving a range of areas, including curriculum, administration and delivery systems.

At present, apart from BOU, the Asian University of Bangladesh, a private university, is offering a number of undergraduate programmes through distance education.

COMMUNICATION MEDIA POLICY IN BANGLADESH

Unlike in neighbouring India, communication media in Bangladesh has always struggled. Print, as a medium, has limited reach in urban areas. The penetration of radio and television is relatively low. UNESCO figures for the country indicate that media penetration is about 50 radio sets per 1,000 population and television penetration is about 6.3 per 1,000.[1]

Electronic media in Bangladesh are government owned, controlled and operated. Radio, as a medium of broadcasting, started functioning in Dhaka from 1939. It continued operating as a major medium of mass communication and played a pivotal role in Bangladesh's struggle for independence from Pakistan. Bangla Betar is today the largest electronic mass medium in Bangladesh.

ELECTRONIC MEDIA AND TELECOMMUNICATION INFRASTRUCTURE

Radio and television

Both radio and television are mandated for use in information, education and entertainment, and to provide support for nation building. Thus, programming is targeted towards these ends in both media. At present, there are two radio stations, one public and one private. The private station has Metro Wave, FM band 1170 KHz (Central Intelligence Agency 2002). The public radio station has national coverage. The estimated number of radio sets in Bangladesh stands at 6.15 million, according to 1997 statistics.

Bangladesh Television (BTV), at the moment the sole government-operated transmission system, has one main transmitter, with 15 relays throughout the country. A government-private joint venture, BTV, broadcasts programmes via satellite to Asia, the Middle East and North Africa. It plans to start digital satellite transmission for overseas viewers.

There are about 15 television broadcast stations in Bangladesh (Bangla Profile 1999). The number of TV sets in Bangladesh was estimated at 770,000 in 1997.

1 www.uis.unesco.org/template/html/CultAndCom/Table_IV-14_Asia.html

Telecommunications

The Bangladesh Telecommunication Regulatory Commission (BTRC) formulated draft rules to govern the country's growing telecom sector. The rules are based on the Telecommunication Act 2001 and are now due to be vetted by the Ministry of Law and Justice (Mandy's 2002). The new law (Telecommunication Laws 2002) will see the Bangladesh Telephone and Telegraph Board (BTTB) work only as a public sector operator, side by side with private operators such as cellular phone companies. There are, at present, about 750,000 fixed-telephone lines with a projected demand for 3.5 million fixed-line services over the next five years.

Relying primarily on the IO-Inmarsat synchronous orbit satellites located above the Indian Ocean, the geo-stationary satellite/terrestrial microwave link network in Bangladesh — used solely for international telecommunication — consists of four ground stations. The first two are Standard A stations located in Betbunia, about 40 km from Chittagong on the Chittagong-Rangamati highway, and in Mohakhali, in Dhaka city. The third one is a Standard B station at Talibabad, about 30 km north of Dhaka on the Dhaka-Mymensingh highway. The fourth one, Standard F, is in Sylhet.

Optical fibre network

Fibre optic links were first established in Bangladesh in 1986, alongside the installation of new digital switches. All intra-city inter-exchange connections are established through short-distance fibre optic links. The inter-city portions between the major cities started with the the STM-16 fibre link between Dhaka and Chittagong, completed in 2001. Bangladesh is finally joining the SEA-ME-WE-4 submarine cable network consortium. The 10-GB bandwidth of this network is expected to serve Bangladesh's needs for the next 10 years (Ahmed 2000).

VSAT users

The government licensed the use of Very Small Aperture Terminal (VSAT) satellites for data-com use about a decade ago. From a state-controlled industry, telecommunications quickly transformed into a private sector-powered industry in the late 1990s, with four mobile phone companies and Internet Service Providers (ISPs) dominating the new development. The Bangladesh Telecom Regulatory Commission is contemplating legalising the use of VoiceOverIP on these lines.

Telephone use

In 1997, there were three telephone main lines per 1,000 people, costing customers about four cents for three minutes. Figures for 2000 show there were over 5 million telephone subscribers. The number of mobile phones estimated in 2000 was 28,300. There are about half a dozen licensed private cellular phone network operators in Bangladesh (*Daily Star* 2003).

Laws governing Internet and computer use

The government of Bangladesh endorsed the draft of an information communication technology policy on October 7, 2002. It has been emphasised that laws will be framed to regulate IT issues such as Intellectual Property Rights (IPR), to protect data, spread IT education and deter cyber crimes. Projects such as Research and Development (R&D)

Capacity Building in major universities and libraries in Bangladesh are helping to build capacity within the educational and R&D organisations, to provide and access Internet-based services. They aim at teaching professors, scholars and research students in major universities and research institutions to become fully conversant in the use of Internet facilities for R&D activities (Sustainable Development Networking Programme 2000).

Educational broadcasting

Reliable information is hard to come by, but the use of technology in mainstream education in Bangladesh dates back to 1956 (at the time the geographical space was politically known as East Pakistan), when the Education Directorate was assigned the responsibility of distributing 200 wet-battery-operated radio receivers gifted by Japan to educational institutions. To handle the operation, a small Audio-Visual Cell was created under the Education Directorate, the main objective being to look after the distribution and maintenance of these sets. Subsequently, in 1962, this group began production of one 8-mm film and a set of silkscreen-printed educational charts. A number of pilot projects, such as the School Broadcast Programme (SBP) of the National Institute of Educational Media and Technology (NIEMT) and Bangladesh Institute of Distance Education, subsequently helped the education sector by providing media-based teaching aids to educational institutions.

It is quite difficult to estimate the number of TV sets in educational institutions as there is no systematic compilation of data. Eleven government teacher-training colleges in 11 districts are officially expected to use television as a teaching aid. BOU has TV sets in all its Regional Resource Centres (RRC) for its target groups.

Radio and TV broadcasts by state-run transmission authorities in support of formal and non-formal education have been a regular feature since 1956. Among educational institutions, BOU is the only one authorised to use national transmission facilities to broadcast its educational programmes. BOU gets national radio time six days a week and TV time five days a week. The present TV broadcast time allocated to BOU doesn't suit the demand of distance learners, and negotiations are underway between the BOU authorities and the Ministry of Information to allocate some more time in the morning and evening.

National TV and radio broadcasts cater to primary and secondary education needs, and non-formal awareness-raising programmes for the general public are aired. Aside from the government-run BTV and Bangladesh Radio, Channel 1 is running a number of educational programmes. Newly installed Independent Television (ITV) is also promise-bound to air a few educational programmes. As well, a few other private TV channels are planning to run educational programmes once they obtain valid licences from the government.

Educational media production facilities

Apart from BOU, which is the main producer of educational video programmes, BTV produces and broadcasts educational television programmes regularly. In the private sector, World View, Proshika, Bangladesh Rural Advancement Committee (BRAC) and a few other NGOs produce need-based video programmes. World View established its office in Dhaka in 1981 and continues to provide media support to a variety of educational and development projects. It also provides training to NGOs and grassroots organisations on the production of participatory video as a communication tool on development and education themes.

Critics of educational broadcasting in Bangladesh often point to the reality that Bangladesh television is far behind in providing quality educational programmes for the people. There is nothing that even approaches the extent of educational television in its neighbour, India, let alone the West. Occasionally there is programming on health, environment or social issues, but such programmes are limited. The efforts of the private channel, Ekushey Television, came to a halt with the cancellation of their broadcast licence in 2002.[2]

ICT POLICIES AND USE IN BANGLADESH

Unlike in traditional broadcasting, the use of ICTs in education, especially with the support of global donor agencies and local NGOs, is growing. Bangladesh has an ICT policy that endorses the need for widespread introduction of ICT use and training in public and private educational institutions as a prerequisite for building skilled ICT manpower. However, use of ICTs in education is directly related to ICT infrastructure and services. At present, ICT penetration is severely limited and largely restricted to the capital, Dhaka. But there are innovative examples of initiatives that are globally acclaimed as best practices.

The Grameen Bank's initiative combining technology with income generation among rural women is one such acclaimed effort. Using mobile telephones, the initiative involves providing revolving loans for a Village Phone (VP) package containing a cellular phone, battery, fast charger, signboard, calculator stopwatch, user guide in Bangla and a price list for calling different locations. After initial training, the women (known as "phone ladies") begin their business enterprise by renting out the mobile phone to anyone in the village who would like to make or receive a phone call.[3]

The Community Development Library (CDL)[4] is trying to develop a knowledge network to assist the exchange of information at local, national, regional and global levels and to provide audio-visual services and training to NGO workers and other beneficiaries. Through 25 Rural Information Resource Centres, CDL has been providing development information services, seminars, workshops, discussion meetings, video shows, and news clipping services.

There are other initiatives, such as the Amader Gram[5] of the Bangladesh Friendship Education Society and the EMIN[6] project, each working within an area of competence: the former with literacy and education and the latter with monitoring and management of water and land resources. The Bangladesh Coastal Radio Network tries to foster amateur radio among the fisher folk of coastal Bangladesh — those most vulnerable to the vagaries of the annual cyclone and monsoon seasons. The Coastal Radio Network is particularly active as an advocacy group working toward the development of a comprehensive media regulatory framework for community radio.

The Ministry of Information and Communication Technology (MICT) took up a project to distribute computers to all secondary and higher secondary educational institutes in the country. All higher education institutes have their own plans for extending computer facilities to their students and teachers. The ICT policy of the government of Bangladesh states: "The capacity of IT-related Departments of all Public Universities and Institutes will be increased, with an intake of 4,000 students in the academic year 2003–2004

2 Based on information collected by Dr. Usha V. Reddi.
3 http://www.telecommons.com/villagephone/gbfamily/html
4 http://www.cdlbangladesh.org
5 http://www.bfes.net/projects/projects.html
6 http://www.ictdevgroup.com

and 6,000 students in the academic year 2004–2005." It also emphasises, "IT-related Distance Education Scheme of the Bangladesh Open University will be expanded through the use of TV and Internet. Private TV channels should be encouraged to start IT Education Programmes" (UNDP 2002).

CONCLUSION

Though there is little yet to show in terms of its actual impact on educational development in Bangladesh, educational communication media have tremendous potential for growth and development. Both government and non-governmental sectors are endeavouring to improve the educational scenario by providing the best possible resources, media and technology to Bangladeshi citizens.

Bangladesh is in critical need of telecommunication infrastructure, and of legal and financial frameworks to create an environment to support the application of both traditional media such as radio and television, as well as new media such as the Internet and the World Wide Web.

Most efforts in the use of educational media are one-off and usually undertaken by individual groups or agencies, either in isolation or in competition with each other. For sustained development, it will be necessary to galvanise partnerships and collaboration between service providers and content developers, and between educational providers and grassroots NGO groups. This would lead to an improvement in both the quantity and the quality of media inputs for education.

To enable such an improvement in reach, access and quality of educational media services to support educational goals, Bangladesh needs to implement critical interventions at policy levels. At the same time, it needs to build capacities, human and organisational. In a scenario where such environments and capacities exist, the potential for use of educational media is enormous and the impact these technologies can have is phenomenal.

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CHAPTER 2

EDUCATIONAL MEDIA IN INDIA

Binod C. Agrawal

INTRODUCTION

Educational broadcast in India appeared as a result of strong recommendations by international agencies and communication experts from North America. From the start, education in its broadcast mode included both "instruction" and "social education." The rationale for introducing educational broadcast, especially in the case of television, was "social education." Prior to the arrival of television in 1959, similar educational broadcasting was also attempted on radio for over 30 years.

The year 1971 marked the beginning of concerted efforts for use of electronic media for improving the quality and reach of education. A great deal of discussion within and outside the country took place among educational planners, administrators and media experts about the role, utility and scope of educational broadcast in formal educational systems. No clear policy emerged, except that educational broadcast was to be used to supplement conventional classroom teaching without undermining the position of the teacher or face-to-face instruction. It is only after the creation of distance teaching and learning systems that educational broadcast has come centre-stage, even though its full potential is yet to be realised.

In India, given the linguistic and cultural diversity, multiple educational approaches were followed. Discussions and debates in academic circles have not resolved whether educational broadcast can be used directly without teacher intervention, though there have been some private initiatives to create stand-alone educational media, both in broadcast and non-broadcast mode, especially for teaching languages and specific disciplines. However, use of educational media has remained sporadic and without any clear direction or policy. A situational analysis of children's television echoed these basic issues in the use of educational broadcast (Agrawal and Aghi 1987; Agrawal et al. 1999).

Another issue in the use of educational broadcast relates to "democratisation of education." Experiences of the last 10 years provide limited evidence to substantiate the extent to which educational broadcasting has helped in increasing either access or quality of education. The present analysis is an attempt to provide a holistic perspective of educational media in India, within this historical framework.

The land and the people

A mega-nation with over a billion people living in a space less than 3% of the total land surface: that is India. Multilingualism and religious multiplicity characterise the country. Political equality bestowed by the democratic constitution remains largely a preserve of an elite minority who dominate the large majority of illiterate poor struggling to survive. Countries surrounding India share a common cultural and religious heritage going back several millennia. Continuous influx of people, ideas and culture into the indigenous ethos has woven a complex mosaic of communities with their own share of rifts and conflicts (Agrawal 2000, pp. 13–43).

The Indian economy is largely agrarian, though over a period of time the industrial sector has made a significant contribution to the national economy. At present, the gross domestic product (GDP) is Rs. 18,958,430 million (approximately US$40,3370 million). Per-capita income is on the rise, increasing from Rs. 9,660 in the year 2000 to Rs. 16,486 (approximately US$350) in the year 2003 (*Manorama Year Book* 2003, pp. 516–517). The health sector has also registered significant improvements. At present, safe drinking water is available to 85% of rural and 95% of urban dwellers. Universal immunisation of children has reduced the incidence of infant deaths. Effective measures are being taken to control the prevalence of HIV/AIDS. Other diseases such as tuberculosis, malaria, leprosy and blindness are being controlled through nationally sponsored health programmes. To counter problems of malnutrition, several measures have been taken by the government to provide diet supplements to children, such as the mid-day meal programmes in government schools and crèches. Life expectancy is 62.3 years. However, due to changes in demographic characteristics and increased life expectancy, new health issues related to old age are emerging in the country.

The constitution of India guarantees, as a fundamental right, free and compulsory education for all children until they complete 14 years of age. Among the world nations, India is the second largest country with over 880,000 educational institutions. Enrolment is about 179 million students, of which 149.4 million are in schools and fall into the age group of 6–14 years. Equally impressive are the 2.9 million teachers. With about 82% young children enrolled in schools, India has made great strides in improving the quality and quantity of education. Less than 1.0% GDP was spent on education in 1951–52. That has risen to 4.11% during 2000/01. Over five decades since gaining its independence, India has registered a remarkable growth in education — from an 18.3% literacy rate in 1947 to 65.4% in 2001.

The medium of instruction for primary education is the "mother tongue," or language spoken by the child at home. Additionally, children in most states of India also learn Hindi, the national language, at school. British colonial legacy, global economic demands and aspirations for international education have been responsible for introducing English as a compulsory language (except in one state, Bihar). Thus, an average school child learns under a "three-language" policy. In higher education, especially in technical and professional fields, English is the medium of instruction in almost all institutions.

The high degree of national commitment for increasing the reach of and access to education throughout the whole country has resulted in a surge in professional, technical and information technology education, especially after economic liberalisation. In order to cope with ever-increasing educational needs and to maintain a high standard of education, the role of educational broadcasting is thought to be extremely important.

Open and distance education

Historically, the University of Delhi initiated the first correspondence course more than 40 years ago in 1962. However, the year 1982 marks the beginning of open and distance education in India. The first open university, then known as Andhra Pradesh Open University, was set up in Hyderabad. Since then there has been remarkable acceptance, expansion and innovation in open and distance education. Besides higher education, the concept of open and distance education has also been firmly incorporated in primary education with the establishment of the National Institute of Open Schooling in 1989.

Open and distance education in its early phases relied heavily on print medium. With the rapid expansion of satellite communication, coupled with increased use of information technology, most of today's open and distance learning programmes are using electronic media. At present, there are 11 open universities, of which Indira Gandhi National Open University (IGNOU) plays a central role. Given the educational requirements of the country, it is expected that almost every state of India will eventually have an open university. Open and distance learning in India is not merely a second chance at education for those who missed the opportunity for conventional education — it is a first chance for those unable to get admission in conventional universities.

Of late, many foreign educational institutions, mostly from English-speaking countries, have started marketing professional and technical education through open and distance mode. A good number of privately run institutions of higher education in India have also taken advantage of this development and have set up several open and distance diploma/degree programmes. On the whole, open and distance education has firmly established its roots, and a fairly large number of students (especially in higher education) are enrolled in open educational institutions. Educational broadcasting continues to be limited, though there is a gradual increase in its use (Gandhe et al. 1996).

EDUCATIONAL MEDIA SCENARIO

Radio

Radio broadcast, both for information and education, is fairly old in India, having its beginnings in 1927, when a privately owned radio transmitter was set up for broadcasting. However, until recently, radio was a government-controlled medium used extensively for information, education and entertainment. Expansion of radio transmission has been rapid, and today there are over 197 radio stations, including 184 full-fledged stations, 10 relay stations and three exclusive commercial radio stations reaching 97.3% of the population and 90% of the geographical area (Government of India 2000, 2003).

After almost seven decades of government control, All India Radio has finally evolved as an autonomous government-supported broadcasting body known as Prasar Bharati. India's first full-fledged educational radio station, Gyan Vani (Voice of Knowledge), was started in 2002. Currently, 10 Gyan Vani stations are being operated in different cities of the country. Gyan Vani radio provides support to the educational needs of various categories of learners, including adult learners.

Music constitutes over 40% of total radio broadcasting in India, drawing heavily on the Indian film industry, the world's largest industry, producing films in over two dozen Indian languages. Besides film music, Indian classical and folk music is also broadcast.

Radio broadcasting falls into two major categories: a general broadcast, covering news, information and some music programmes; and commercial broadcasting, known as Vividh Bharati, which is broadcast on both FM and AM channels. Recently, FM broadcast has also been opened up to private players, mainly limited to a few cities.

While there is no doubt that radio listening has taken a back seat because of the marked preference for television, it still remains an important source of information for a large number of listeners. Based on the available statistics, it would be safe to estimate the availability of 111 million to 125 million radio sets in India (about one radio to eight individuals). Radio listening is higher in rural than in urban areas.

Television

Television arrived late on the Indian scene as compared to many countries of the world. However, its expansion has been phenomenal after the liberalisation of the Indian economy in 1992. National television, known as Doordarshan in India, like radio, was government owned, subsequently coming under the ownership of a public service broadcasting corporation (Prasar Bharati). Doordarshan is the world's largest television network, with 23 channels and 1,314 transmitters dotting the country (Doordarshan 2002, VI). Besides Doordarshan, there are over 150 multilingual private satellite television channels (*Satellite and Cable TV* 2003) in India, owned by Indian and foreign companies. Prominent among them are Zee TV, ETV, Sahara TV, STAR, Sony, Udaya TV and Sun TV. Almost all are 24-hour channels, each group in turn offering a number of specialised channels such as news, general entertainment, movies, music and so on. Besides Hindi and English, the telecast covers 15 other Indian languages. Over 87% of the Indian population is covered by terrestrial television. According to Doordarshan India 2002, 79.3 million homes in the country have television. It is estimated that one out of two terrestrial television homes has cable connection.

India also has a 24-hour educational television channel, known as DD-Gyan Darshan, launched on January 26, 2000. A major milestone in the field of educational broadcasting in India, this is a joint venture between the Ministry of Human Resources Development and Information and Broadcasting, Prasar Bharati and IGNOU. The unique educational feature of DD-Gyan Darshan is its high degree of interactivity. It is estimated that 20 million viewers in 4 million homes with cable watch the channel.

IGNOU and the Indian Institute of Technology (IIT) also jointly launched Gyan Darshan 3 (GD3) on January 26, 2003, as India's technology education channel. The programmes are targeted at the 1.5 million engineering and technology students studying in 1,200 technical institutions across the country. As of now, not much is known about the viewers of the programme or the extent to which engineering colleges have created viewing facilities.

From time to time, both central government and state governments have provided television sets to schools and colleges, but no accurate estimates of the number of television sets or their actual use are available.

Films

Over 100 years old, the film industry has brought India the distinction of being the world's largest film-producing country. Feature films are produced, mainly on 35 mm, in more than 20 Indian languages every year. In 1999, 764 full-length and 975 short films were produced in the country. During the same period, 654 video films were

also made, indicating the change in technology for production of films in India. Video, increasingly, is being used to produce documentaries, limiting the use of 16-mm film, even for documentaries. The film industry remains a private-sector enterprise and has played an important role in Indian politics. Both radio and television draw heavily on the film industry for content. Major centres of film production in the country are Mumbai, Hyderabad, Chennai and Kolkatta.

Telecommunication

Until recently Indian telecommunication was under the direct control of India's Department of Telecommunication. The business of telecommunication services has now been taken over by autonomous corporations, namely Bharat Sanchar Nigam Limited (BSNL), Videsh Sanchar Nigam Limited (VSNL) and Mahanagar Telephone Nigam Limited (MTNL). Furthermore, both basic telephone and cellular phone services have also been opened up to private companies. By the end of 2002, India had 39 million phone networks, including cellular phones, leading to a "silent" communication revolution enabling millions to overcome the literacy barrier in communication. It is not uncommon in small towns and villages to watch illiterate parents regularly communicating by phone with their children who work in other Indian cities or even abroad. It is expected that telecommunication services will further improve in the coming years and also be available at reduced costs.

Satellite services

Satellite services have been used in India for about three decades now. The Satellite Instructional Television Experiment, the world's largest techno-social experiment, was carried out in India during 1975–1976 with the help of ATS 6 Satellite of the USA. Since then, satellite has become an integral part of Indian broadcasting and telecommunication services.

The Indian National Satellite (INSAT) system provides telecommunication and broadcasting services, as do several foreign satellites. The Indian Space Research Organization (ISRO) produces its own geo-stationary satellites and has also started launching them from Indian soil. The large-scale expansion of television has been made possible through the INSAT system, though to a lesser extent All India Radio also uses satellite for digital broadcasting. In the case of telecommunications, satellite-based systems are being used to connect remote areas of the country. Currently, a number of private international companies are providing support for running over 100 satellite television channels in the country. Some Indian companies are also trying to acquire their own satellites for providing broadcasting and telecommunication services.

Computer education and e-learning

Computer education, including e-learning, has shown remarkable expansion and growth at all levels in the Indian education system in less than two decades. For the first time, private entrepreneurs have invested a great deal in computer education, responding to emerging demands of computer education while technical institutions and universities lagged behind. The scope of computer education was broadened to include computer applications in all walks of life, including administration, governance and management, collectively referred to as Information Technology. Such IT institutes have been set up by both government and privately managed educational institutions across the country. However, the sharp rise in demand in computer education also saw an equally quick

reversal as a result of the collapse of the "new economy," and the severe reduction in IT-related job opportunities (both in and outside India) — circumstances that forced the closure and down-sizing of several private computer training "shops."

Nevertheless, the all-pervasive IT has penetrated all sectors: education, research and development, business, industry, entertainment and service sectors such as travel. Today, getting railway reservations or paying electricity bills has become faster and much more efficient as a result of computerisation. The long-term influence of these developments is yet to be assessed and seriously considered. Yet, it is undeniable that the educated youth as well as the elderly have begun to invest time, energy and money to become computer literate and to gain mastery over information technology (Agrawal 2002, p. 313).

However, use of computers in education still remains very limited. According to Goel (2003, p. 2), "Out of about 11,562 colleges in India, 10 per cent have Internet connectivity. Out of 250 universities in India, five per cent have Internet. Rarely are the universities and colleges interconnected."

The first planned effort to introduce computer education in schools was made in 1984 (Agrawal 1996). While initiating the Computer Literacy and School Studies (CLASS) project, educational planners made a strong plea for computer education to narrow the growing gap between "computer literate" and "computer illiterate" nations. On an experimental basis, the CLASS project was introduced at the national level in 250 higher secondary schools. Each school was provided with two BBC computers and software. Teachers from each of the 250 schools were given training. Separate sessions were organised for the students of classes IX, X, XI and XII. CLASS evaluation carried out by Agrawal (1996) indicated low performance — not because of lack of enthusiasm or ability to learn, but because of the lack of infrastructure and other management and administrative hurdles. It was observed that regardless of the type of school, students responded positively to computer learning.

A comparative study of the effect of computers in higher education in India and Canada (Achuthan et al.1993; Chander et al. 1993) found "glaring differences in university computerisation and IT applications and use in India and Canada. The concerns of university administrators and educators in both countries were qualitatively different, since the degree of computer and Internet use in these countries was of quantitatively different order. However, the responses of university teachers in both countries were somewhat similar. Both expressed the need for higher degree of Internet use for communication, teaching and research. The university being a teaching and research centre, it represented a very special domain of social life, both in India and Canada and was comparable in many ways" (quoted in Agrawal 2003).

Internet and other computer networks

Enormous changes have been observed in government policies and infrastructure development for Internet and related services. Government has made serious efforts to introduce computers in administration for providing information as well as improving public services. Information and Communication Technology (ICT) has been freed from exclusive government control, and an era of partnership has been initiated in which the government has started playing the role of referee between public and private entrepreneurs. Now airwaves and electronic signals connect people within and outside the country. ICT has certainly influenced the lifestyle of the visible minority in India. Internet use has also increased remarkably, with an estimated 10 million to 12 million users. Earlier, the major users of Internet were working in offices, but that is no longer the

case today. Almost 25% of users surf the net sitting at home and about 43% go to cyber cafés (National Readership Studies Council 2002, p. 3). There has been a continuous fall in the price of Internet user charges, as well as the number of telephones used for dial-up net connectivity. Cable network companies have introduced Internet service. Over the last few years, many laws have been formulated for controlling software piracy and socially objectionable uses of the Internet.

Video libraries

Agrawal (1989) reported phenomenal growth during the 1980s of video in India for home viewing. Video libraries mushroomed across the country. Within a matter of five years, video reached more than 400 district headquarters and adjoining rural areas of the country. The collapse also came equally fast, in the 1990s, with the rapid growth of satellite and cable television and changes in communication technology. While video libraries are still functioning in a limited way in urban areas, they are not as significant as they were before. Also, they are not posing any serious threat to cinema, as was believed would happen in the mid-'80s. During this period, the government passed a number of laws on video piracy and the illegal showing of videos, especially pornography (Government of India 2000).

Educational broadcasting

Educational broadcasting in India is more than 40 years old. UNESCO played an important role in promoting use of electronic media for education. In 1961, the Delhi School Television Project was initiated for about 20,000 students in 150 higher secondary schools of Delhi (Neurath [nd]). Since then, both radio and television have been used for educational broadcasting. In the recent past, information technology has been an additional dimension to learning. While a great deal of effort and money has been spent on television broadcasting, comparatively little has been done for radio. Educational broadcasting has suffered from a built-in contradiction: whether it should be used to enhance classroom education or be used to enrich the knowledge of the learners.

Arrival of open and distance education, however, has lent further impetus to educational broadcasting. "It recognised the potential of electronic media because of the distance neutrality and simultaneous reach in covering large areas. Furthermore, it was thought that electronic media could break structural impediments to equality of opportunity in education. At the every least, open education was seen to act as an equaliser. To what extent the pronouncements have achieved any measurable and meaningful targets is yet to be demonstrated as shown by the number of projects carried out in the last four decades. Even the policy pronouncement has not helped resolve the contradictions" (Agrawal and Sinha 1999, p. 148).

The National Policy on Education (1986) gave due emphasis to educational broadcasting. But little quantitative or qualitative data are available to help us understand how radio and television in broadcasting and non-broadcasting modes are being utilised in education. Chandiram et al. (1993) reported the use of radio in eight educational projects, ranging from school to university and adult education. Use of radio in these educational projects was mostly on an experimental basis. The authors, however, did not document how the findings of these projects have been utilised in improving radio educational broadcasting.

The largest ongoing educational broadcast relates to radio broadcast of 15–30 minutes duration on weekdays. It has been reported that 46 radio stations and another 22 relay stations broadcast them for primary and secondary schools. Similar coverage is reported

for science education also. Educational technology institutions set up by the central government and All India Radio have produced most of these programmes.

The Central Institute of Educational Technology and National Council for Educational Research and Training also produce weekly radio programmes for children in the age group of 6–14 years. Prominent productions include a 12-part series on India's freedom struggle, available both in broadcast and non-broadcast modes.

The National Literacy Mission also used radio broadcasting to supplement textbooks and provide language drills for female adult learners in four states — Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh. Though the project continued for a while, the current status is not known. It was reported that because of major managerial and infrastructure problems, there was no way to test the utility of radio in adult education (Agrawal and Sinha 1999). Educational radio broadcasting has so far not been given a fair chance to demonstrate its appropriate utility for enhancing the quality of education. As a result, it continues to be neglected in spite of being cheaper and more accessible to a large number of listeners.

Compared to radio, educational television has had higher visibility in all sectors of education. There has been educational television broadcasting for school children and college students for over two decades. As indicated earlier, there are currently two exclusive satellite television channels for broadcasting educational programmes in the country. There is a proposal to produce curriculum-based television programmes to help students of Class X in the science stream.

In over 40 years, starting from 1961, educational school television broadcasting, countrywide classroom educational television broadcasting (1984), and several other educational television broadcasts have been evaluated by a number of educational technology and communication and social scientists. These evaluative studies, carried out by external agencies as well as by the broadcasting agencies, made a very guarded and somewhat cautious generalisation. About the impact of Delhi Educational School Television Broadcast, Neurath (nd, p. 62) concluded, "…by and large the television schools did somewhat better in the tests than did the non-television schools." While discussing the impact of SITE (Satellite Instructional Television Experiment) on the primary school children, Shukla and Kumar (1977) concluded that, as a result of television viewing in school, the general understanding and information-seeking behaviour of children did change and so did their cognitive development. Agrawal (1978, V) observed that school television viewing influenced children's personal behaviour. They learned to bathe regularly and keep their surroundings clean. Aghi (1977, p. 19) also reported a positive change in the performance of television-viewing school children and gains in language development.

The University Grants Commission (UGC) and various educational media research centres (EMRC) and audiovisual research centres (AVRC) have also evaluated the effects of countrywide classroom television viewing by college students from time to time. Specific evaluation studies have shown positive gains as a result of educational broadcasting among college students, including engineering students (Reddi 1997; Chaudhari 1997). Furthermore, a number of two-way interactive television programmes in teleconferencing mode have also shown positive impact of television viewing (Agrawal 2000).

Another recent initiative by the government is to use television broadcast — employing Doordarshan's low-power transmitters, over 1,300 of them, for area-specific development telecast — to promote better health care, family planning and agriculture. This may bring about path-breaking changes in the way television is used for development.

Regular television programmes are being produced both for primary and college education by educational production units set up by the UGC (see Appendix 1). Open universities have also created their own production facilities, as have agricultural universities, language teaching and research institutions, premier technical institutions of higher education such as IITs, and several other training centres. DD-Gyan Darshan is broadcasting these productions.

Zee TV was the first private television channel to start educational television (in 1995), called Zee Education (ZED). It later evolved into a full-fledged channel. Initiatives from local cable networks, including tutorials for home viewing in several parts of the country, were also reported, though no reliable data are available to estimate the extent to which private entrepreneurs have produced and supplied educational audio-video courseware.

USING IT FOR EDUCATION

India's policy-makers have chosen to explore the use of newer computer- and Internet-based ICTs for education, alongside educational broadcasting. Thus, the planned launch of a dedicated broadcast education satellite, EDUSAT, is scheduled for 2004. EDUSAT has the capacity to provide separate channels for agriculture and technology, among other sectors, as well as to open up 5,000 FM community broadcasting stations for use by educational institutions.

At the same time, the national Task Force on Human Resource Development in Information Technology (IT) 2000 made a large number of recommendations designed to promote the use of Internet and IT-based technologies for educational purposes (Government of India 2000).

There has been a dramatic shift from the 1980s to present day in terms of access to technology by the population in general. Deregulation of the airwaves and the telecommunication industry has spurred the revolution in basic telephony and Internet services. Technologies such as Wireless in Local Loop (WLL) and VSAT are also being used for Internet and Intranet purposes. India's telephone network, including mobile phones, is the fifth largest in the world and the second largest after China among emerging economies. Telecom experts predict that this sector is poised to witness one of the fastest growth rates globally, with a compounded annual growth rate (CAGR) of 19% up to 2006 for basic services and a CAGR of 46% for cellular services. This will take the current estimated 8 million cellular and mobile subscriber base to 44 million by 2006. By 2010, the total number of access lines (fixed and cellular) is expected to increase multifold, from 35.8 million in 2001 to between 170 million and 190 million by 2010. Radio has a penetration of 100% in the country, while satellite and terrestrial television cover nearly 80% of the country.

Post economic liberalisation and large-scale privatisation of Indian education, there has been an increased effort to use educational broadcasting. The commercial companies involved in the marketing of education are investing a large sum of money in educational broadcasting, especially in convergence technology, incorporating technology-driven training to overcome scarce human resources. Hospitality education, post-secondary training refresher courses, short-term knowledge upgrading and updating of professional knowledge and skills are some of the areas where educational broadcasting has gained a great deal of ground. On the face of it, these are impressive gains, indicating a high acceptance of educational broadcasting.

CONCLUSION

Undoubtedly, the country has seen a very rapid and impressive expansion in ICT reach and in open and distance learning achievements. Theoretically, availability of ICTs is widespread in large parts of the country, with pockets of saturation and areas where such availability is lower because of terrain or extreme deprivation. Having said that, one must also bear in mind that availability does not guarantee access, which itself is limited by a number of factors including: *physical* infrastructure constraints, such as lack of electricity, poor maintenance of telephone lines, and inconvenient location of the kiosk or cyber café; *economic* constraints, such as extreme poverty; *educational* limitations, such as illiteracy and the non-availability of relevant content in the local language; and *social* constraints, such as those imposed by gender, class, community and caste. Data are not readily available to indicate the extent to which social constraints limit access to technology.

Despite 40 years of educational broadcasting, it is difficult to determine its role and scope in the context of Indian education. Likewise, widespread expansion of technology has yet to make a far-reaching or distinctive mark on educational delivery methods or processes. Software concerns such as relevant and appropriate content, limited production and reception facilities and, above all, integration of these broadcasts within the educational system remain major limiting factors in appropriate utilisation. Because development of convergence technology takes educational broadcasting away from terrestrial models to dedicated systems, the very technology that set out to create wider access and bridge the gap often ends up achieving the opposite — widening the gap — for only a niche audience can afford access, both socially and economically. Hence, in all likelihood, educational broadcasting, instead of being an educational equaliser, may increase levels of inequality. This problem may further grow with advances in the convergence of information and communication technology, unless appropriate measures are taken in terms of equitable policies and distribution.

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APPENDIX 1

Educational Production Facilities in India

1. Indira Gandhi National Open University (IGNOU)
   IGNOU Complex
   Maidan Garhi, New Delhi 110 068
   Home page: www.ignou.edu/
2. Jamia Millia Islamia
   Jamia Nagar, New Delhi 110 025
3. The Babasaheb Bhimrao Ambedkar University, Lucknow
4. Indian Institute of Technology (IIT)
   Hauz Khas, New Delhi 110 016
   Home page: www.iitd.ernet.in/
5 National Council for Educational Research and Training (NCERT)
   Sri Aurobindo Marg
   New Delhi 110 016
   Home page: www.ncert.nic.in/
6. National Open School
   B–31 B, Kailash Colony,
   New Delhi 110 048
   Home page: www.nos.org
7. Consortium of Education Communications (CEC/UGC)
   NSC Campus
   Aruna Asaf Ali Marg, New Delhi 110 067
8. State Institute of Education Technology
   SCERT Campus, Mahendru, Patna 800 016
   Bihar
   Home page: www.sietpatna.nic.in/
9. State Institute of Education Technology
   Agarkar Marg, Pune 411 004
   Maharashtra
   Home page: www.sietpune.nic.in/
10. State Institute of Education Technology
    TC No. 15/160 Padmabai Road
    Vellayambalam, Thiruvananthapuram 695 010
    Kerala
    Home page: www.sietkerala.nic.in/
11. State Institute of Education Technology
    Nishat Ganj, Lucknow 226 007
    Uttar Pradesh
    Home page: www.diksha.nic.in/
12. State Institute of Education Technology
    Ramanthapur, Hyderabad 500 013
    Andhra Pradesh
    Home page: www.siethyd.nic.in/
13. State Institute of Education Technology
    PO Sainik School, Bhubaneswar 751 005
    Orissa
    Home page: www.sietorissa.nic.in/
14. Central Institute of English and Foreign Languages
    Hyderabad 500 007
    Home page: www.ciefl.org/
15. Central Institute of Indian Languages
    Manasagangotri, Mysore 570 006
    Home page: www.ciil.org/
16. National Institute of Adult Education (NIAE)
    10-B I.P Estate
    New Delhi 110 002
17. National Literacy Mission
    New Delhi
    Home page: www.nlm.nic.in/
18. Directorate of Adult Education
    10 Jamnagar House Shahjehan Road,
    New Delhi 110 011
19. National Institute of Educational Planning and Administration (NIEPA)
    17-B Sri Aurobindo Marg
    NIE Camp, New Delhi 110 016
    Home page: www.niepaonline.org/

CONSORTIUM FOR EDUCATIONAL COMMUNICATION AND MEDIA CENTRES

1. Consortium for Educational Communication
   NSC Campus
   Aruna Asaf Ali Marg
   New Delhi 110 067

2. Educational Media Research Centre
   Gujarat University
   Guru Nanak Bhavan
   Ahmedabad 380 009

3. Educational Media Research Centre
   St. Xavier's College
   50 Circus Avenue
   Calcutta 700 017

4. Educational Media Research Centre
   Central Institute of English
   Foreign Languages
   Hyderabad 500 007

5. Audio Visual Research Centre
   Opp. Centre for Distance Education
   Osmania University
   Hyderabad 500 007

6. Audio Visual Research Centre
   Devi Ahilya Vishwavidyalay
   A.B. Road, Bhanwar Kuan
   Indore 452 001

7. Educational Media Research Centre
   Jai Narain Vyas University
   Faculty of Engineering Campus
   Jodhpur 342 011

8. Audio Visual Research Centre
   Anna University
   Guindy
   Chennai 600 025

9. Educational Media Research Centre
   Madurai Kamaraj University
   Palkalai Nagar
   Madurai 625021

10. Audio Visual Research Centre
    Manipur University
    Canchipur
    Imphal 795 003

11. Mass Communication Centre
    Jamia Millia Islamia
    Jamia Nagar
    New Delhi 110 025

12. Educational Media Research Centre
    University of Pune
    Ganeshkind
    Pune 411 007

13. Audio Visual Research Centre
    University of Roorkee
    Roorkee 247 667 (UP)

14. Audio Visual Research Centre
    Kashmir University
    Hazratbal
    Srinagar 190 006

15. Audio Visual Research Centre
    University of Calicut
    Calicut 673 635

16. Audio Visual Research Centre
    University of Mysore
    Manasagangotri
    Mysore 570 006

17. Audio Visual Research Centre
    Dr. Harisingh Gour University
    Sagar 470 003

18. Audio Visual Research Centre
    Punjabi University
    Patiala 147 002

CHAPTER 3

EDUCATIONAL MEDIA IN MALAYSIA

Rozhan M. Idrus

INTRODUCTION

The Malaysian government's commitment to Information and Communication Technology was formalised in 1994 when the National Information Technology Council (NITC) was established. The National IT Agenda (NITA), launched in December 1996 by NITC, provides the foundation and framework for the utilisation of information and communication technology to transform Malaysia into a developed nation with a distinct identity consistent with Vision 2020.

The NITA vision is to utilise ICT to transform all of Malaysian society into an information society, then a knowledge society and finally a values-based knowledge society. With the theme "Turning Ripples into Tidal Waves," NITA focuses on the development of people, info-structure and applications to create value, to provide equity and access to all Malaysians, and to qualitatively transform our society into a values-based knowledge society by the year 2020. The "ripples" are focused initiatives by the government to create the necessary environment and empower the people so that they will bring about the tidal wave of change required to achieve the NITA vision (MAIT 2002).

If NITA is to work and succeed, it is imperative that the entire nation be mobilised in using ICT as a strategic tool. For this reason, the role of ICT in education has received due attention, funds and execution by the responsible bodies and agencies in Malaysia. To cite a case in point, there exists a project called the Mobile Internet Unit (MIU), which is a development project on computer-mediated education for teachers and students in schools of Malaysia. It is a self-contained, mobile library-cum-computing centre in the form of a bus, driven by a "smart" driver and co-driver. They go around to the non-mainstream schools in the country to conduct basic ICT literacy programmes.

In the following discussion, other perspectives on ICT in Malaysia are presented.

The land and the people

In 1957, Malaysia obtained independence from British colonial rule. The population of Malaysia in the first quarter of 2003 was 24.92 million (Keystat 2003). Malaysia is a multi-racial, multi-religious and multi-lingual country with a surface area of 329,758 sq.

km. Its climate is tropical, and its terrain is coastal plain that gives way to hills and then jungle-covered mountains. According to the country's Constitution, Islam is the religion of the Malaysian Federation. The Constitution, however, also asserts that every person has the right to profess and practise her or his own religion. Other religions are Buddhism (19.2%), Christianity (9.1%), Hinduism (6.3%) and Confucianism/Taoism/other traditional Chinese religion (2.6%) (Information Malaysia 2002).

Malaysia is made up of West Malaysia, or Peninsular Malaysia, and East Malaysia, which comprises Sabah and Sarawak on the island of Borneo. According to the country's 2000 census, about 21,890,000 people (or 94.1%) were Malaysian citizens and 1,385,000 (or 5.9%) were non-Malaysian citizens. Of the total Malaysian citizens, 65.1% were *Bumiputera*, 26.0% Chinese and 7.7% Indians. In Sarawak, the predominant ethnic group was the Ibans, accounting for 30.1% of the state's total Malaysian citizens, followed by the Chinese (26.7%) and Malays (23.0%). Similar data for Sabah showed the predominant ethnic group to be the Kadazan Dusun (18.4%), followed by Bajau (17.3%) and Malays (15.3%) (Information Malaysia 2002).

Bahasa Melayu is the official language, but English, Chinese dialects (Cantonese, Mandarin, Hokkien, Hakka, Hainan, Foochow) and Tamil are widely spoken, as are Telugu, Malayalam, Punjabi and Thai. In East Malaysia, several indigenous languages are spoken, the predominant being Iban and Kadazan.

Government

Malaysia is a constitutional monarchy. Its head of state is the King, or *Yang di-Pertuan Agung*, one of the Malay Rulers, elected for a term of five years by his brother rulers. He must act in accordance with government advice. Malaysia has a bicameral parliament consisting of a Senate (*Dewan Negara*) made up of 69 members and a House of Representatives (*Dewan Rakyat*). The Cabinet, headed by a Prime Minister, consists only of members of the legislature and is collectively responsible to Parliament (Information Malaysia 2002).

Socio-economic indicators

The Malaysian economy grew by 4.2% in 2002. Growth was broad-based, driven by strong domestic demand and reinforced by improved export performance. Malaysia's real GDP in 2002 (preliminary) was 219.3 RM billion, and its per capita income was RM 13,716 (US$3,610) (Central Bank of Malaysia 2003). The labour force in Malaysia numbers 10.2 million, with 3.5% of that group being unemployed.

Among the finest in Asia, Malaysia's road system covers about 63,445 km. There is a main highway that reaches the Thai border from Singapore, a distance of over 800 km. However, although Peninsular Malaysia's road system is good, Sabah and Sarawak have less developed roadways. Within the city, the Light Rail Transit (LRT) is available for use to help meet Malaysia's need for mobility that is safe, predictable, reliable and comfortable.

Malaysia has six international airports, with the sixth being the newest (as of 1998), located south of Kuala Lumpur in Sepang. The main airline in Malaysia, Malaysia Airlines, was started in 1971 and provides international and domestic air service. There is a railway system that is state run, but it generally covers only West Malaysia, with a brief jog into Sabah. It has a total of 1,798 km of track.

Education system

The Minister of Education is assisted by two Deputy Ministers. The Ministry comprises professionals and administrative sections headed by a Secretary-General of Education and a Director-General of Education, respectively. The Ministry uses a committee system in its decision-making procedures. The Educational Planning Committee, chaired by the Minister of Education, is the highest decision-making body. At state level, the State Education Departments are responsible for the implementation of all educational programmes, projects and activities.

Malaysia provides its citizens 11 years of free schooling, and approximately 18% of the annual budget is allocated for education. At 93%, Malaysia's literacy rate is one of the highest in the world. Although schooling is not compulsory, over 95% of all seven-year-olds are enrolled in public schools. Most children between four and six years of age begin their education at pre-school in kindergartens set up throughout the country by the government, non-government agencies and the private sector. A comprehensive pre-school policy is currently being formulated to improve the coordination and the quality of pre-school education in the public and private sectors.

The structure of formal school education in Malaysia is a 6-3-2-2 pattern. This structure represents the primary (six years), lower secondary (three years), upper secondary (two years) and pre-university (two years) levels, respectively. Primary schools in Malaysia adhere to a common curriculum that emphasises the acquisition of basic skills — reading, writing and arithmetic — as well as encouraging overall development of talents and fostering moral, aesthetic and social values.

Secondary education consists of three years of lower secondary education, followed by two years of upper secondary education. After the Lower Secondary Examination (LSE) in Form Three (at age 15), pupils are channelled into academic streams or religious, technical or vocational schools. The Malaysian Certificate of Education (MCE at age 17) or the Malaysia Vocational Certificate of Education marks the end of the upper secondary education. After the completion of Form Five, pupils can choose to further their studies in pre-university programmes in public or private institutions, enrol in training institutions or enter the job market. Educationally challenged children have a special place in Malaysia as Special Education provides educational opportunities for pupils with special needs (such as those who are handicapped, visually impaired or hearing impaired or those with learning disabilities). The national primary and secondary school curricula are used in special education schools and in inclusive education programmes (Government of Malaysia 2001).

There are 11 public universities, nine private universities and six college universities in Malaysia, as well as 12 polytechnics, 27 teacher colleges and 12 community colleges. The enrolment in government-assisted educational institutions in 2001 was: 26,613 in pre-school; 2,917,214 in primary school; 1, 264,793 in lower secondary; 707,154 in upper secondary; 173,980 in Form Six, matriculation, polytechnics, teacher colleges, community colleges and Tunku Abdul Rahman College; and 245,989 in universities and college universities (Government of Malaysia 2002b).

Educational development

The last decade of the 20th century and the beginning of the 21st century witnessed in Malaysia unprecedented and accelerated change at a pace that has never been experienced before. Advances in ICT hastened the pace of nation-states to develop a

world-class quality education system. Education legislation — including the Education Act 1996, Private Higher Education Institution Act 1996, Universities and University Colleges (Amendment) Act 1996, National Accreditation Act 1996, National Council on Higher Education Act 1996, National Higher Education Fund Board Act 1997 and the National Higher Education Fund (Amendment) Act 2000 — has been promulgated for development purposes (Gan 2001).

Increased access to tertiary education is taking centre-stage in Malaysia, with the setting up of several public and private universities, university colleges, matriculation colleges, community colleges, private colleges and foreign university branches. Support services, educational facilities and special projects were introduced in tandem to facilitate this development. Among these are the scholarship programme, education loans, textbook loan scheme, nutrition and health programme, counselling and guidance service, school boarding facilities, education resource centres, educational radio (East Malaysia only) and television, "Smart Schools" project, sports schools, "Vision Schools," "Computers in Education" (CIE), e-learning projects, environmental education projects, tech-prep programme, student exchange programmes, the Educational Management Information System (EMIS) and an Intranet facility for the Ministry of Education.

Distance education in Malaysia took shape during the formulation of the Constitution of the University of Penang (now known as Universiti Sains Malaysia) in 1969, referred to in the Cabinet Committee's Report. Distance Education made its first appearance in the Malaysian education system when the Universiti Sains Malaysia (USM) established the Centre for Off-Campus Studies in 1971. The university's Academic Planning Board, which launched the first distance education programme in Malaysia in 1970, had its first intake of 72 students in 1971. The centre subsequently became the present School of Distance Education in 1998, headed by a Dean. Courses are delivered via printed text, the annual residential intensive course, and full video conferencing (Rozhan and Ahmad 2002).

The mushrooming of distance education programmes by local institutions of higher learning escalated around 1995 when the Ministry of Education, Malaysia, directed each university to provide distance education. The institutions of higher learning in Malaysia that provide distance education programmes are Universiti Teknologi MARA (1990), Universiti Kebangsaan Malaysia (1993), Universiti Malaya (1994), Universiti Putra Malaysia (1995), Universiti Utara Malaysia (1997), Universiti Telekom Malaysia (1997), Universiti Tun Abdul Razak (1998), and International Islamic University Malaysia (2000). Universiti Tun Abdul Razak is the first virtual university in the country (Rozhan and Ahmad 2002).

The year 2000 also saw the establishment of the first open university in Malaysia, Open University Malaysia (OUM), that was established on August 10, 2000. It is now the seventh private university in the country. Although incorporated as a private university and established under the Private Higher Education Institution Act 1996, OUM leverages the quality, prestige and capabilities of its owners — a consortium of the 11 Malaysian public universities (Gan 2001).

ELECTRONIC MEDIA AND TELECOMMUNICATION INFRASTRUCTURE

Radio and Television Malaysia (RTM) is responsible to the Ministry of Information, which coordinates all government mass media institutions — information, film, press

liaison and broadcasting. A 1999 estimate reports 10.9 million radios and 10.8 million television sets in Malaysia. Radio Malaysia has 31 stations, which are equipped with advanced electronic equipment. There are 12 radio stations in all states of Peninsular Malaysia, four in Sabah and five in Sarawak, serving the needs of her local listeners in the respective regions.

Television Malaysia was launched in 1963, broadcasting programmes through TV1 and TV2, and also telecasting programmes produced by private companies to comply with the privatisation concept of the Broadcasting Department.

MEASAT Broadcast Network Systems Sdn. Bhd. (MBNS) is a Malaysian integrated electronic media organisation offering wide-ranging multimedia broadcast and interactive services to Malaysia and the region. Equipped with the latest in digital broadcast technology and systems, it has been licensed by the Malaysian government to provide satellite broadcast services. It operates the country's first Direct-to-Home (DTH) service, which is marketed under the name ASTRO.

ASTRO services are broadcast via MEASAT by employing the high-powered Ku-band payload of the satellite system. This enables the transmission of digital television and radio broadcast direct to users. Using a revolutionary satellite dish as small as 60 cm in diameter, users can receive the signal, a technology once considered impractical in heavy rainfall regions such as Malaysia. Subscribers access ASTRO services using a Digital Multimedia System (DMS), which comprises a satellite dish, Digital Multimedia Terminal (MDT), security-enhanced Smart Card and ergonomic remote control. For educational purposes, an educational institution or school can easily access ASTRO by installing the necessary hardware.

For the development of IT, Malaysia laid the foundation with the launching of the National Information Technology Agenda and the Multimedia Super Corridor (MSC). The MSC is an integrated global multimedia environment being developed in a 15 km wide and 50 km long corridor in the region of Kuala Lumpur. One of the flagship applications of the Multimedia Super Corridor is the Smart School Project, which is seen as a learning environment that has been systematically reinvented in terms of teaching and learning practices and school management, to prepare children for the Information Age.

As it stands now, the statistics regarding IT penetration and usage are at an encouraging level. In 2000, there were 4.6 million main telephone lines, 5 million mobile cellular phones, 2.2 million units of installed personal computers, 7 ISP providers, 1.2 million Internet subscribers and 4 million Internet users (Government of Malaysia 2000).

EDUCATIONAL MEDIA RESOURCES

The Educational Technology Division (ETD) of the Ministry of Education was established in 1972, and in 1996 its organisation and function were expanded to include the State Educational Resource Centres in West Malaysia, the Educational Technology Division of Sabah and Sarawak, and the Teachers' Activities Centre. This was followed by the inclusion of the Smart School Pilot Project under its wing in the year 2000. The teaching and learning materials produced by ETD are disseminated to the schools in many ways, including educational radio, educational TV, interactive multimedia courseware, books and cassettes (both audio and video) (Government of Malaysia 2002a).

Educational broadcasting

Educational radio programmes are broadcast only in East Malaysia (Sabah and Sarawak), and not in West Malaysia anymore. In 2001, the state ETDs of Sabah and Sarawak produced a total of 187 radio programmes, 140 of which were for primary school. They were curriculum-based, covering Malay Language, English Language, Iban Language, Kadazan-Dusun Language, Islam and Science. Forty-seven of those programmes were for public education. The radio programmes were transmitted in an off-air fashion in Sabah, being sent to the schools in the form of audio cassettes. The programmes in Sarawak were transmitted via RTM Kuching for two-and-a-half hours daily, from Monday to Friday, for 30 weeks in a year (Government of Malaysia 2002a).

Educational TV (ETV) programmes are of two types: curriculum based and for general public education. The philosophy of this two-pronged approach is to fulfill the needs of, respectively, the captive in-school audience and the non-captive out-of-school audience. In 2001, the ETD produced 184 teaching and learning TV programmes, 134 of which were produced by the educational technology division and 50 in collaboration with the private sector. Of the 184 programmes, 45 are based on 10 subjects at varying levels: Malay Language (primary and secondary), English Language (primary and secondary), Science (primary and secondary), Mathematics (primary), History (secondary), Geography (secondary), Technical & Vocational (secondary), Islamic Education (primary and secondary), Moral Education (primary and secondary) and Local Studies (primary). All 45 of these programmes are accompanied by a teacher's manual (Government of Malaysia 2002a).

Since 2001, ETV has been aired via ASTRO (Channel 28). Also in 2001, the Digital Multimedia System was installed in 2,396 schools, bringing the total number of schools having the ability to receive ETV programmes to 8,479. The ability to receive transmission via ASTRO is another boon to schools as it enables them to access other channels for education such as Discovery, National Geographic, Animal Planet, TV1, TV2 and TV3 (a private television programme also aired via ASTRO). A survey conducted in 2002 revealed that ETV was viewed by 73.5% of schools in rural areas as opposed to only 25.5% in urban areas. ETV programmes are aired from 9.00 am till 12 noon and are repeated from 1.00 pm to 5.00 pm. The costs for DMS and installation and subscription to ASTRO in schools are fully borne by the Ministry of Education (Government of Malaysia 2002a).

Some Educational Media Organisations in Malaysia

Educational Technology Division
Ministry of Education
Persiaran Bukit Kiara
50604 Kuala Lumpur, Malaysia

Centre for Instructional Technology & Multimedia
Universiti Sains Malaysia
11800 USM, Penang, Malaysia

Centre for Multimedia Education Development (CMED)
(Software Development Unit)
Multimedia University
Jalan Multimedia, 63100 Cyberjaya,
Selangor Darul Ehsan, Malaysia

The Malaysian Smart School Project was launched in July 1997 by the Prime Minister. As one of the flagship applications of the Multimedia Super Corridor (MSC), it was meant to capitalise on the MSC's infrastructure, using it to jumpstart the deployment of enabling technology to schools. This was done by creating a group of 90 pilot schools in 1999 intended to serve as the nucleus for the eventual nationwide rollout of Smart School concepts, materials, skills and technologies (Chan 2002). By 2001, the courseware had been installed at all the Smart Schools for subjects like Malay Language, English Language and Mathematics, produced for Year One till Form Five (primary and secondary) in stages called Edition 1, Edition 2 and Edition 3.

Educational multimedia and e-learning

The concept of ICT in education has been realised in tandem with the computerisation programme of the Ministry of Education, which was conducted in three phases. The first stage involved a pilot project, from March to June 2002, involving 18 schools in six selected states. A computer laboratory was built for each of these schools. All the laboratories were handed over to the ministry in November 2000, and these are being fully utilised by the schools concerned. The second stage, referred to as Phase I, started in November 2000. In February 2002, about 43% of the buildings had been completed. The third stage, Phase II, began in November 2001(Chan 2002).

The Web site, known as MySchoolNet, was set up by the Ministry of Education to help increase the use of ICT in education, providing links to help teachers and students access educational information readily and henceforth encourage interactive communication between Malaysian school children and students from other countries. An example of such a project is the Ministry of Education – British School Link Project that enables students from four schools in the Klang Valley to e-mail and videoconference with their peers in four Coventry schools in the United Kingdom (Chan 2002).

In institutions of higher education, e-learning emerges in diverse ways. The Universiti Tun Abdul Razak is the region's first MSC-status virtual university, where education is delivered through the pervasive use of e-learning technology like the Internet, Web-based or CD-based courseware, and facilitator-based tutorials or academic meetings. UNITAR started operations on December 18, 1997. The Ministry of Education approved its registration on January 28, 2000 (UNITAR 2003). Many of the teaching-learning practices at UNITAR are based on trial and error, and improvement of practices is based on the limited experiences of instructors involved in teaching online courses (Silong and Ibrahim 2003).

The Multimedia University (MMU), via the MMU e-Learning Campus, offers affordable university credit academic programmes and professional courses. It delivers these using an innovative Learning Management System and delivery engine called the Multimedia Learning System. Students registered in e-learning campus courses are expected to use the state-of-the-art facilities offered by the engine (Multimedia University 2003).

The Universiti Technology MARA launched its distance education programme in 1990. It includes, among other features, online additional and supplementary learning materials, support services such as online counselling (via fax, telephone and e-mail), online learning facilitators, online discussion and an online library. Meanwhile, the Universiti Putra Malaysia initiated the Online Programme Delivery System in November 1999, in collaboration with the Institute for Distance Education and Learning (UPM), the Department of Communication (UPM) and an IT company. The learning platform used is

Lotus-LearningSpace. It includes four main features: learning materials, online discussion and forum, course information, and information of instructors and students (Silong et al. 2001)

The Open University Malaysia (OUM) combines printed modules and face-to-face teaching with Internet-based support systems, including a digital library, for e-learning that provides continuous interaction between the learners and the faculty. OUM has adopted the Multimedia Learning System developed by MMU and is in the process of developing its own learning management system (Latifah and Ramli 2003).

CONCLUSION

The evolutionary nature of technological infusion into the education system in Malaysia is very much a planned approach. Through sequential five-year-term Malaysia Plans, the past is reviewed, the present consolidated and the future planned for. From educational radio to television and current satellite and wireless technology, all have helped in affording the gamut of educational technology at all stages of the educational lifeline. Those in the infancy of technology, especially in remote areas, can benefit from past successes. The future, too, is being planned through the Multimedia Super Corridor and Smart School concept. The "new" generation now has the world in their homes and the power of e-learning to help them gain knowledge and skills at their own pace and in their own time.

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CHAPTER 4

EDUCATIONAL MEDIA IN SINGAPORE

Cher Ping Lim

INTRODUCTION

The primary motivation for integrating media in education is the belief that it supports learners in their own constructive thinking, allows them to transcend their cognitive limitations, and engages them in cognitive operations that they may not have been capable of otherwise. Most Asian countries have channelled many resources into the development of educational media to ensure that their workforce is competitive regionally and globally. Singapore is no exception. In the face of intense competition from other emerging Asian economies, Singapore has redefined herself to remain competitive, and this involves moving towards more value-added industries. One of the economic strategies is to have a workforce that is able to generate new knowledge and make Singapore the knowledge hub in the region and beyond.

This chapter profiles the educational media infrastructure, resources and organisations in Singapore.

The land and the people

Singapore is a small island, measuring just 42 km from east to west and 23 km from north to south, situated at the southern tip of the Malay Peninsula. In 2000, its total population was 4,017,700 of which 3,263,200 were citizens and permanent residents. This is an increase of 2.8% over the decade. There are three main racial groups in the country: the Chinese, numbering 2,505,400 (77% of resident population), Malays 453,600 (14%) and Indians 257,800 (8%). The median age of the resident population was 34.2 years in 2000, as compared to 29.8 years in 1990. Residents below 15 years of age formed 21.5% of the population in 2000, and the proportion of residents aged 65 years and above was 7.3% (Government of Singapore 2003a).

Government

Singapore is a republic with a parliamentary system of government based on the Westminster model. The main organs of state are the head of state and the Cabinet. The head of state is the President, who is elected for a fixed term of six years. The Cabinet

is led by the Prime Minister. The Parliament is elected by general election every five years. The first general election for Parliament was held on April 13, 1968. There are 24 registered political parties. The present Parliament, elected on November 3, 2001, has 82 People's Action Party (PAP) Members of Parliament (MPs), two Opposition MPs and one non-constituency MP. In addition, there are nine nominated MPs.

The government has a deserved reputation for being strong, able and corruption-free. The main political party, PAP, has been in power since 1959 and has sustained its vision of remaining nationally cohesive, independent and economically competitive. Over the years, it has made the senior civil service a prestigious profession, one that is demanding and authoritative. This civil service plans and implements well-resourced projects to improve the socio-economic conditions of the country and her residents. The ideas for some of these projects were adopted from other countries and customised for Singapore. In fact, many of these projects are so successful that they are closely studied in other parts of the developing world (Gopinathan 2001).

Socio-economic indicators

The gross national product (GNP) of Singapore at current market prices has been growing steadily from S$3 billion in 1965 to about S$161 billion in 2000. The real GNP has been growing steadily at about 9% for the last two decades. Per capita GNP has increased from $1,618 in 1965 to $40,051 in 2000, and includes one of the highest savings rates in the world (Government of Singapore 2002).

The employed labour force in Singapore grew from 644,200 in 1965 to about 2 million in 2000. The overall labour force participation rate in 2001 was 65.4%. As fertility decreased and the post-war baby boomers came of working age, the child dependency ratio fell to 30 per 100 working-age residents in 2001, down from a high of 82.8 when Singapore gained independence in 1965. With the increasing number of elderly persons, old age dependency rose from 6.8 to 10.4 per 100 over the same period (Government of Singapore 2003a).

The infant mortality rate was 2.2 per thousand resident live births in 2001, compared to 6.3 in 1989. Life expectancy at birth for resident males and females has increased from 73 years and 77 years in 1989 to 76 years and 80 years in 2001, respectively. In 2001, there were 27 hospitals and speciality centres with 11,897 beds and an average of one doctor to every 698 persons (Government of Singapore 2003a).

Singapore has an elaborate and reliable public transport system that serves all parts of the island. There is the Mass Rapid Transport service, with 51 stations and 106 trains serving 1.073 million average passenger-trips daily in 2002. In the residential area, there is the Light Rapid Transport, with 14 stations and 19 trains serving 40,810 average passenger-trips daily. There are two bus companies: Singapore Bus Service and Trans-Island Bus Service. Together they operate along routes with a fleet of 3,564 buses. Five groups of operators ran a fleet of 18, 922 taxis in 2002 (Government of Singapore 2003a).

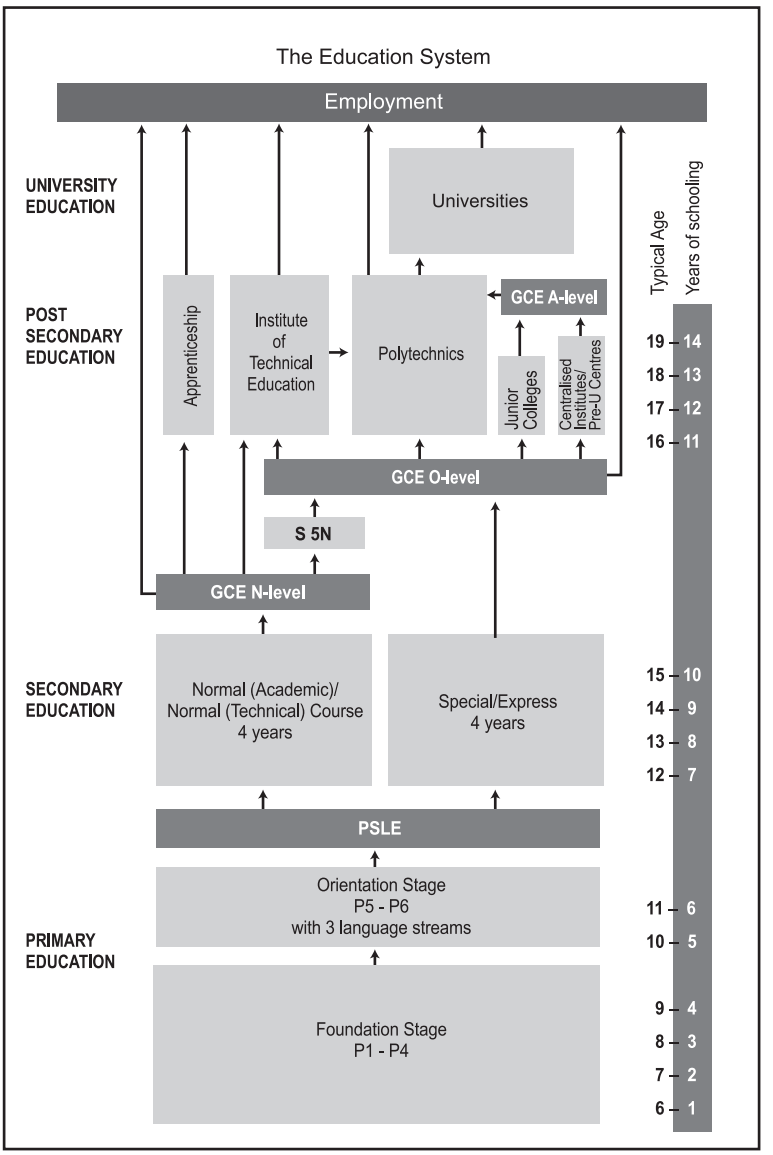
Literacy has improved slowly and steadily in the last four decades, in tandem with the upgrading of the educational level of Singapore residents. The general literacy rate among the resident population aged 15 years and over increased from 60.2% in 1965 to 93.2% in 2001. Such improvement is attributed to the pragmatic and well-planned approach adopted by the government to improve the education system and ensure the success of her economy (Gopinathan 2001).

Education system

Today, only a small percentage of children in Singapore are not enrolled in national schools. Although compulsory education was not implemented until 2003, Singapore has achieved almost universal education at the primary and secondary levels through years of effort. Education is compulsory until Primary Six, as this is considered the minimum level of education for all Singaporean children. The Ministry of Education is the main organisation that oversees the curriculum, educational structures, examinations, teacher qualifications and fitness to teach, and conditions of service.

Figure 4.1 shows a flow chart of the education system in Singapore. At the primary level, students go through a four-year foundation stage, from Primary One to Four, and a two-year orientation stage from Primary Five to Six. The foundation stage includes a common curriculum that provides students with a firm foundation in English Language,

Figure 4.1: *Singapore education system (Government of Singapore 2003b).*



their mother tongue, Mathematics and Science. Music, Art and Crafts, Civics and Moral Education, Health Education, Social Studies and Physical Education are also included in the curriculum. To maximise their potential, students are formally streamed according to their learning ability at the end of Primary Four. They then sit for the national examinations, the Primary School Leaving Examination (PSLE), that assesses their abilities for placement in a secondary school course that is most suited for their learning pace and aptitude — Special, Express or Normal stream (Government of Singapore 2003b).

The courses in secondary schools are four years for the Special/Express stream and five years for the Normal stream. The curriculum includes English Language, mother tongue, Mathematics, Science, History, Geography, English Literature, Visual Arts, Design and Technology, Home Economics, Civics and Moral Education, Physical Education and Music. Students can also learn a third language, such as French, German, Japanese or Malay (Special Programme). At the end of four or five years, depending on the stream they are from, students sit for the GCE O-Level that will enable them to gain entry into junior colleges, polytechnics or technical institutes. Besides the formal curriculum, students participate in co-curricular activities that provide opportunities for healthy recreation, teamwork and the opportunity to develop self-discipline and confidence.

Students who opt and qualify for junior colleges after their GCE O-Level examination will sit for the GCE A-Level examination after two years. Their admission is based on a point system computed from the aggregate of their GCE O-Level result. Those who do not qualify but want to sit for the A-Level examination, have to enrol in a three-year pre-university course in a centralised institute. The students' eligibility for tertiary education is determined by their A-Level results. Students who opt not to take the A-Level or fail to qualify for admission into junior colleges or centralised institutes may apply for admission to polytechnics and institutes of technical education. The polytechnics are set up to train middle-level professionals to support technological and economic development, while institutes of technical education ensure that their graduates have the technical knowledge and skills relevant to industries (Government of Singapore 2003b).

Over the last three decades, there have been increasing proportions of successive Primary One (P1) cohorts pursuing post-secondary education. For example, in 1965, only 11% of the P1 cohort progressed to post-secondary, but by 2001 the proportion rose to 79%. Similarly, there was an increase in the proportion of a P1 cohort admitted to local universities, from a mere 3% in 1965 to 21% in 2001. There are three universities in Singapore: National University of Singapore, Nanyang Technological University and Singapore Management University. In 2001, the universities produced 9,859 first-degree graduates, while the polytechnics produced 15,874 graduates from part-time and full-time diploma courses (Government of Singapore 2003a).

Educational development

There have been many major educational policy initiatives in Singapore since the 1970s. They include the introduction of ability streaming at primary school, proposed in 1979, the establishment of the first ethnic self-help (education) group Mendaki in 1981, the establishment of independent schools in 1988, the provision of 10 years of general education as recommended in 1991, and the Masterplan for Information Technologies in Education launched in 1997 (Gopinathan 2001). As the focus of this chapter is educational media, only the IT Masterplan is discussed here.

In Singapore, the Masterplan for IT in Education (MP1) was launched in April 1997. It has clearly spelt out how IT is to be used and integrated in education as a strategy to

meet the challenges of the future. As part of this plan, all Singapore schools are expected to acquire and integrate IT in their curriculum so as to develop a culture of thinking, lifelong learning and social responsibility. MP1 was implemented in three phases: Phase I in 1997, Phase II in 1998 and Phase III in 1999. Schools that had a good history in the use of IT in their curriculum were chosen to be the demonstration schools. These demonstration schools, known as Phase I schools, were intended to provide the rest of the schools in Singapore with concrete, local models of innovation in teaching and learning strategies and in school administration using IT. Altogether there were 22 Phase I schools: 10 primary schools, 10 secondary schools and two junior colleges/centralised institutes.

Phase II and III schools started their IT Masterplan implementation in 1998 and 1999, respectively. The identification of Phase II schools was based on the school principals' own evaluation of their staff's readiness to embrace the new initiative. There are 106 Phase II schools, while the remaining 268 schools are in Phase III. Schools within each phase are given the flexibility to decide on the pace of implementation.

As the priority of the Masterplan is to integrate IT into the curriculum, IT coaches from the Educational Technology Division in the Ministry of Education were sent out to schools to train teachers on the pedagogical principles for using IT effectively for teaching and learning purposes. Teachers were equipped with the knowledge and skills to integrate IT with their school curriculum through lesson demonstrations, modelling and hands-on activities in the context of their own schools. Teachers were also trained in incorporating thinking skills and co-operative strategies in IT-based lessons so that they could provide pupils with opportunities to actively engage in higher-order thinking. Apart from becoming acquainted with the pedagogies and methodologies of IT integration, teachers were trained in basic office application software, such as word processing and presentation tools, in an one-off major training exercise from 1996 to 1997 (Lim et al. 2003).

To sustain the momentum gained from MP1 and to optimise the potential of educational media for facilitating thinking, lifelong learning and social responsibility, the second Masterplan (MP2) was announced in July 2002 and officially launched in 2003. With MP1 and MP2 as the backdrop, the rest of this chapter outlines the educational media infrastructure, resources and organisations in Singapore. (Note that it is not within the scope of this chapter to discuss in detail how these educational media are used in the context of schools, education institutions and organisations.)

ELECTRONIC MEDIA AND TELECOMMUNICATION INFRASTRUCTURE

Radio

Singapore has six radio broadcasters with 18 domestic channels. They are MediaCorp Radio, UnionWorks, SAFRA Radio, National Arts Council, Rediffusion and BBC World Service. BBC World Service is the only foreign free-to-air radio station in Singapore. It operates one FM channel and uses Singapore as the base for its short-wave relays to the region. MediaCorp Radio is Singapore's largest radio network that operates 11 local and three international stations. The stations broadcast in Singapore's four official languages and cover various programming genres: entertainment, news/current affairs and classical music. SAFRA Radio, two stations under the Singapore Armed Forces Reservists' Association (SAFRA), targets National Servicemen and regulars. The stations are entertainment based, featuring contemporary, popular music and the latest entertainment news (Media Development Authority 2003).

In March 2001, National Trades Union Congress (NTUC) Media and Singapore Press Holding (SPH) MediaWorks formed a 50–50 joint venture company named UnionWorks to operate a radio business that was previously run by NTUC Media. This repositioning seeks to obtain maximum synergies between the radio stations and MediaWorks' two TV channels, Channel i and Channel U. The National Arts Council (NAC) manages an art station that is devoted to promoting an awareness and appreciation of the arts and to providing a platform for the arts community. The station features arts news, programmes on arts and culture, literary readings and a host of musical genres such as Asian, World, jazz and classical. Radio Singapore International (RSI) reaches listeners around the region via shortwave and features music and lifestyle programmes, regional news, current affairs and analyses from a Singapore perspective in English, Mandarin, Malay and Bahasa Indonesia (Media Development Authority 2003).

Digital Audio Broadcasting (DAB) has been identified as a key technology that will propel the local radio industry into the digital age. DAB means specifically the Eureka-147 Digital Audio Broadcasting System, the digital radio standard recommended by the International Telecommunication Union for worldwide adoption. Singapore launched her first commercial digital radio service, SMART Radio, operated by MediaCorp Radio, at the end of 1999. She is the first country to provide commercial digital radio service in South East Asia. Currently, SMART Radio carries seven audio services and transmits textual information on lifestyle, traffic and stock market.

To ensure the quality of the programmes broadcast on radio, the Media Development Authority (MDA) issues programme and advertising guidelines for radio broadcasters. MDA is the statutory board that regulates and promotes media in Singapore. All radio broadcasters operating in Singapore are subject to MDA's Radio Programme and Radio Advertising Codes. General principles of the radio programme codes stipulate that programmes must take into account national objectives, racial and religious sensitivities and the public's moral and social standards, tastes and decency. A fundamental principle of the radio advertising code requires all claims and comparisons made in advertisements to be presented truthfully and lawfully. The claims and comparisons must be capable of substantiation and should not in any way deceive or mislead listeners. MDA also practises co-regulation with the public by encouraging them to provide feedback to the authority or broadcasters when they have problems with objectionable programme or advertisement content (Media Development Authority 2003).

Television

Since May 2001, there have been two free-to-air broadcasters in Singapore, MediaCorp TV and SPH MediaWorks, operating seven channels. The former owns and manages five channels that include mass entertainment channels in the four official languages and Channel NewsAsia (CNA) with its regional reach. CNA operates its services 20 hours a day and targets countries such as Indonesia, India, Australia, Korea, China, Hong Kong, the Philippines and the Middle East, with correspondents in most of these countries. SPH MediaWorks is a subsidiary of Singapore Press Holdings and has two television channels in English and Chinese. Its English channel, Channel i, is a general entertainment channel with sitcoms, movies, sports and news programmes. Channel U is a Mandarin channel that offers dramas, infotainment, and variety and news programmes.

To improve the standard of broadcasting in Singapore, MDA has adopted the European DVB—T (Digital Video Broadcasting—Terrestrial) standard, which is the standard adopted among many countries around the world. Digital TV refers to the complete digitisation of the TV signal from transmission to reception. MediaCorp has already

started pilot services of Mdigital, which simulcasts Channel 5, 8 and Channel NewsAsia (CNA). In addition, TVMobile became the first broadcaster in the world to deliver commercial digital TV programmes on public transport to commuters in February 2001.

Currently, there is only one TV cable operator, StarHub Cable Vision (SCV). It offers multichannel cable television and fast Internet via a cable modem service. It was granted exclusivity in the provision of pay television services until June 2002, in recognition of its nationwide cabling effort. However, MDA may be issuing a second pay-TV licence soon. The cable TV subscribership was 327,185 persons, or 30.7% of all cabled homes, in May 2002.

Similar to radio programming and advertising, MDA has in place TV Programme, Advertising and Sponsorship Codes to set standards for programmes and advertisements on free-to-air television and Cable TV. These guidelines are congruent with national objectives, uphold racial and religious harmony, observe societal and moral standards, and promote positive family values. This safeguards the viewing interests of the general public and protects children from undesirable programming material (Media Development Authority 2003).

Films

MDA works closely with the Singapore Film Commission in developing and promoting the film industry. All films that are distributed and exhibited in Singapore must be submitted for classification and certification. Films are presently classified into four ratings: G for General; PG for Parental Guidance; NC16 for No Children below 16 years old; and R (A) for Restricted (Artistic) for persons above 21 years old. Classification gives adult audiences more choices with minimal or no cuts, preserves the artistic integrity of the film, and protects the young from unsuitable films (Media Development Authority 2003).

Telecommunications

In 2002, there were more than 3 million mobile phone users in Singapore (73% of the population). There are three service providers: StarHub, Mobile One (Asia) and SingTel. The SingTel Group provides a wide range of communications services in Singapore and Australia that include: national telephone services, mobile communications services, public data and private network services, and international telephone services. The Group's fully digitalised local access networks extend to 1.5 million homes and businesses in Singapore. MobileOne Ltd (M1) was formed in August 1994 to enter the rapidly expanding mobile telecommunications market in Singapore. It gained 10% of market share within the first month of launch. It specialises in mobile communication services and is the first provider in Singapore to provide Multimedia Messaging Service (MMS). Launched in April 2001, StarHub provides a full range of information, communications and entertainment services over fixed, mobile and Internet platforms. It operates its own nationwide broadband network that delivers multichannel Cable TV services, data services, voice services, and Internet access services. It won the "Best Asian Competitive Carrier" at Telecom Asia Readers' Choice Awards in 2001 and 2002.

There are about 2 million residential telephone lines in Singapore, with both StarHub and SingTel providing for such services. The former only started operating at the end of 2002. The charges for residential lines for SingTel are S$31.20 for a one-time turn on and a subscription of S$26 per quarter. The outgoing call charges are 0.73 cents per 30 seconds for peak hours and 0.73 cents per 60 seconds for non-peak hours. For StarHub, the charge

is S$10.20 per month for 300 minutes of free local outgoing calls. It charges a flat rate of 0.70 cents per minute all day.

Satellite services

Satellite broadcasters can use any of the four available uplink facilities: ST (Singapore Technologies) Teleport, SingTel Telecast, MediaCorp T & T (Transmission & Technology) and Ascent Media Group. These uplink facilities provide a comprehensive range of end-to-end satellite communication services that combine network design and integration, equipment provisioning and service activation with flexible service options, and value-added services. Alternatively, a satellite broadcaster can operate its own satellite uplink facility, but a separate licence, issued by the Infocomm Development Authority (IDA), is required (Media Development Authority 2003).

Internet and other computer networks

The Internet dial-up penetration rate was about 47.2% in April 2002 (about 2 million subscribers). According to a survey of broadband usage in 2001, there were about 950,000 users in Singapore (about 34% of the population) (MICA 2003). The major Internet service providers (ISP) in Singapore are 1-Net Singapore, Singnet, StarHub, Pacific Internet and SingTel Magix. 1-Net operates Singapore ONE and is one of the pioneers of broadband development in Singapore. The Singapore ONE network connects ISPs, broadband service providers, hosting service providers, government agencies, educational and research institutions, financial institutions, commercial organisations and other IT and telecom service providers. Pacific Internet Limited is Asia's largest ISP by geographic reach, with a regional presence in Singapore, Australia, Hong Kong, India, the Philippines and Thailand. It began providing commercial Internet access services in September 1995. In February 1999, Pacific Internet became the first Asian Internet company to successfully list on the NASDAQ stock exchange.

The framework for the Internet by MDA emphasises public education, industry self-regulation, and minimum regulation through a transparent licensing framework. One of MDA's main concerns is the ease of access to pornography on the Internet, especially by children and minors. Its regulatory focus is on mass impact Web sites that distribute pornography. The Internet Code of Practice seeks to identify what the community regards as offensive — namely, pornography, as well as violence and materials that might undermine Singapore's racial and religious harmony. It also spells out the obligations of ISPs and Content Providers (Media Development Authority 2003).

Besides the regulations set by MDA, there are organisations that support parents and children in dealing with Internet issues such as pornography, misinformation, chat room dangers and privacy. Two such organisations are the Parents' Advisory Group for the Internet (PAGi) and TOUCH Community Services. PAGi is a volunteer organisation set up as a support network for parents and guardians concerned about the online safety environment that children surf in. As a volunteer group, they depend on volunteers to assist them in undertaking various activities such as exhibitions, workshops, talks and production of useful references (e.g., handbooks and VCDs on online safety).

TOUCH Community Services is a non-profit, voluntary, welfare organisation and is a member of the National Council of Social Service. In 2001, TOUCH Youth Services launched Project CRuSH ("Cyberspace Risks and where u Seek Help") — a public education effort commissioned by the Inter-Ministry Committee on Youth Crime (IMYC) to inculcate safe surfing values in youths. Project CRuSH is committed to informing

youths about the benefits, risks and dangers of the Internet, to mentor youths to adopt positive values and safe behaviour in the cyberworld, and help youths become positive influences on peers and juniors in cyberspace. It organises road shows, the Cyber Wellness Exposure programme, parenting talk, online discussions and peer-mentoring programme.

EDUCATIONAL MEDIA RESOURCES

At the end of 2000, the teacher:computer ratio was 2:1 for all schools in Singapore and the student:computer ratio was about 5:1. The schools were also given funds to purchase educational software and other peripherals annually. Schools have the autonomy to identify and purchase ICT resources that best meet the needs of their students and teachers. One of the goals of the Masterplan was to ensure that by the end of 2002, all 368 schools in Singapore would be equipped with the necessary hardware, software and infrastructure that would support an ICT integrated learning environment (Government of Singapore 2003b). The Ministry has a compilation of recommended software evaluated by the Ministry of Education clearinghouse for IT Resources (www.moe.gov.sg/edumall/edu_library/rsl_englishl.html). There is also a database of Internet educational resources for use in the local curriculum (www3.moe.edu.sg/ier/).

Besides software and Internet resources, video resources are also used extensively in Singapore schools. The Educational Technology Division in the Ministry of Education has a comprehensive e-video collection that is anchored to the primary and secondary school curriculum (www1.moe.edu.sg/etv/). The video repository, with its own search and browse facilities, provides a synopsis of the video title, suggested lesson plans and activities, related curriculum topics and textbooks, and relevant Web links. The ETD locally produces most of the video clips. Periodically, MediaCorp TV screens some of these videos under its KidCentral timeslots. For audio and radio resources, there has been no centralised coordination on the national level to date. However, many teachers use such resources, especially in language and music classes.

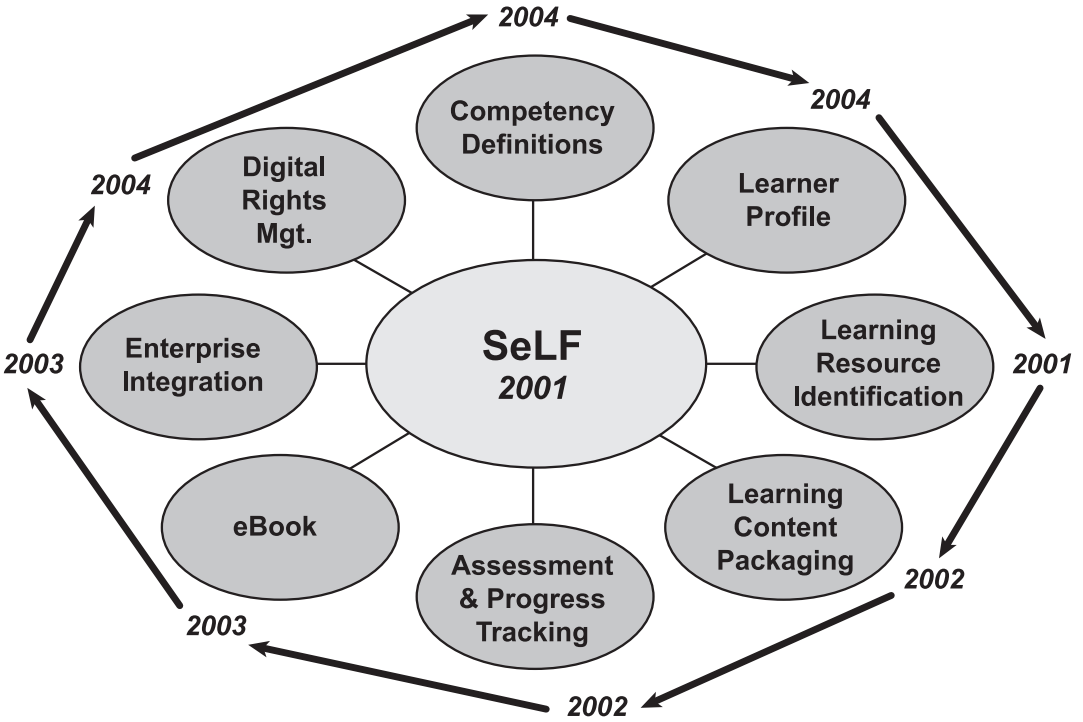
According to a 2002 study by the Singapore Information Technology Federation (SITF) (e-Learning Chapter) and Infocomm Development Authority of Singapore, the total e-learning market in Singapore is expected to be worth US$106.4 million by 2005, growing at a compounded annual growth rate of 45% from US$24.3 million in 2001 (E-Learning Competency Centre 2003). The largest market opportunity lies in the content sector, which will account for 57% of the total market by 2005, as compared to 26% for the services sector and 17% for the technology sector. The academic e-learning market, with an expected growth rate of 58% from 2001 to 2005, will account for 27% of the total market by 2005, while the combined corporate and government e-learning market will account for 62% of the total market, and the individual market 11% by 2005 (E-Learning Competency Centre 2003).

To promote e-learning and assist in the development of Singapore into an e-learning hub and Asia Pacific market leader, the SITF eLearning Chapter was launched in May 2001. The main objectives of the Chapter include acting as the e-learning industry voice and champion, providing information on industry trends and forecasts, developing benchmarking, upgrading the competence and standards compliance of industry players, and creating branding by developing a distinct identity for the Singapore e-learning industry.

Besides the launch of the eLearning Chapter, the Singapore e-Learning Framework (SeLF) was set up in 2001. It provides a basis for the e-learning industry in Singapore,

developing content and systems that conform to international e-learning specifications. Figure 4.2 shows the eight components of the Singapore e-Learning Framework. The components are based on various leading e-learning specification bodies, such as the IMS Global Learning Consortium (IMS), Aviation Industry CBT Committee (AICC), IEEE Learning Technology Standards Committee, Open eBook Forum, XrML (eXtensible Rights Markup Language) and Advanced Distributed Learning Initiative (ADL). With this framework, any organisation may pick and choose the particular component that it needs. The framework also provides a common pool of customised tools and approaches for organisations to use. For example, when an e-learning developer wants to assemble and disassemble learning resources, he or she can refer to the part of the framework that provides information on learning objects (Lim 2002).

Figure 4.2: *Singapore e-Learning Framework (Lim 2002).*



Since the late 1990s, a number of organisations in Singapore have started to offer e-learning courses to their staff, business partners and external customers. Although each e-learning project undertaken by the organisations is different in purpose and scale, they share very similar views on the benefits and challenges of e-learning. The common benefits include the reduction of training time, flexibility for learners, and efficient delivery of information and knowledge. The common challenges include committing the time needed to build an e-learning culture, overcoming learner isolation and instilling learner discipline, and gaining active support from the management (E-Learning Competency Centre 2002).

Many organisations are exploring innovative strategies to ensure the success of e-learning. For example, NTUC Income, with 800 staff and 3,600 insurance advisors, engages line managers as coordinators and mentors for e-learning. It adopts off-the-shelf content on IT and soft skills, and custom-builds content on operating procedures and product knowledge. NTUC Income allows staff to e-learn in the office and encourages

them to e-learn at home. It puts in place e-learning champions to provide mentoring for e-learning courses and has co-ordinators to monitor the use of e-learning. The monthly e-learning reports are then sent to staff and supervisors. There is strong support from the top management in the organisation.

Another example is the Accountant-General's Department, which provides financial and promotion incentives to encourage e-learning. It custom-builds content for external staff in the various ministries, delivered mostly via the Intranet. The content development and learning management system are outsourced in this organisation. It centralises the e-learning administration and provides help-desk services for e-learners and information on how to take e-learning courses.

In the academic market, many schools and tertiary institutions have also integrated e-learning into their curriculum and programme. For example, in the National Institute of Education (NIE), Blackboard, a learning management system, is adopted to design a fully dynamic online learning environment to complement onsite activities. In many of the modules, the learning activities include anywhere/anytime online lectures, onsite tutorials, onsite independent work, and online asynchronous and synchronous discussions. Besides the introduction of the online activities, there is also a shift in the mode of assessment from summative to more formative, and a shift in the methods of delivery from cognitivist-oriented to social-constructivist-oriented (Lim 2001). Together with other learning and teaching tools, students and tutors, Blackboard has afforded a learning environment that supports learner autonomy, creative and critical thinking, and initiatives to meet with the challenges of the changing education landscape.

CONCLUSION

This chapter has explored and described the critical aspects of educational media infrastructure and resources in Singapore. Given her size and lack of natural resources, Singapore has made a huge investment in developing comprehensive and state-of-the-art educational media infrastructure and resources. Among those in all Asian countries, Singapore schools are probably the best networked (with broadband connections in all classrooms) and have one of the lowest teacher:computer (2:1) and student:computer ratios (5:1). There are also nationwide initiatives to co-ordinate and facilitate educational media development, such as the Masterplan for IT in Education and the eLearning Chapter to construct the Singapore e-Learning Framework. These strategies ensure that Singapore will remain competitive globally by having a workforce that is constantly upgrading its skills and generating new knowledge — that is, lifelong learners who know how to seek out new information, think critically and show initiative to meet with the challenges of a fast-changing world.

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Media Development Authority (2003). Creative Media, Connected Society. Available: www.mda.gov.sg [Accessed March 21, 2003].

DIRECTORY OF EDUCATIONAL MEDIA ORGANISATIONS

PRINCIPAL CONTACT	TYPE OF MEDIA MATERIALS PRODUCED (audio, video, film, computer and other A/V aids)
Name: Aculearn Pte Ltd Address: 2 International Business Park, #03-28 Tower 2 The Strategy, Singapore 609930 Tel: 6896 9818 Fax: 6233 9138 E-mail: Info@aculearn.com	Designs and develops next-generation intelligent distribution networks that manage and accelerate delivery of static and media-rich streaming content.
Name: Asiabiz Solutions Pte Ltd Address: No. 10 Genting Road, #04-01 The Blue Building, Singapore 349473 Tel: 6747 2224 Fax: 6746 2224 E-mail: contact@asiabiz.com	Develops Web applications, multimedia, e-learning, wireless applications and Bluetooth applications.
Name: Asia Learning Hub Pte Ltd Address: 159, Kampong Ampat, #06-02, KA Place, Singapore 368328 Tel: 6488 1685 Fax: 6488 1699 E-mail: info@asialearninghub.com	Develops rich and interactive learning content for schools, hospitals and commercial organisations.
Name: ASKnLearn.com Pte Ltd Address: 20 Ayer Rajah Crescent, #09-02 Technopreneur Centre, Singapore 139964 Tel: 6776 2013 / 6872 2835 Fax: 6773 1610	Develops interactive broadband multimedia content for schools, the Civil Service College, Singapore Police Force, MINDEF, and corporations. The company specialises in advanced multimedia development (using software such as Macromedia Director, Flash and Authorware), video production, and video streaming.
Name: A-Star interactive Address: 37 Farleigh Ave, Singapore 557812 Tel: 6383 8587 E-mail: patrick@a-star.com.sg	Produces a wide range of CD-ROM and Web-based English and Mandarin titles for children. Many of its titles are used widely in Singapore schools and kindergartens.

Name: Bee Interactiv Pte Ltd Address: 46A & 48A Bukit Pasoh Road, Singapore 089858 Tel: 6323 0373 Fax: 6323 2178 E-mail: serene@beeinteractiv.com	Produces interactive simulations and offers conversion of classroom, print and CD-ROM courses to Web-based courseware.
Name: Blue Orange Pte Ltd Address: 20 Ayer Rajah Crescent, #09-27 Technopreneur Centre, Singapore 139964 Tel: 6872 3060 / 6872 3061 Fax: 6872 3062 E-mail: contact@blueorange.com.sg	Provides media-rich, Internet-based learning solutions that enhance the classroom-based and instructor-led learning environment across borders.
Name: COMAT Training Services Pte Ltd Address: 12 Prince Edward Road, #02-08 Podium B Bestway Building, Singapore 079212 Tel: 6323 7911 Fax: 6323 7922 E-mail: david@comat.com.sg	Offers e-learning content covering both Professional and Personal Development Skills and IT Skills through its strategic partners SkillSoft and NETg. At the Technology level, provides a proprietary Learner Content Management System, and partners with reputable delivery partners to offer the "best-of-breed" application technologies. At the Professional Services level, produces a sustainable e-learning strategy using solid implementation methodology.
Name: Data Unlimited (S) Pte Ltd. Address: 221 Henderson Road, #05-16 Henderson Building, S(159557) Tel: 62733456 Fax: 62784567 E-mail: europressasia@postl.com Contact person: Ms Shelley Tenh	Developer of Dr Genius, and distributor for games, education, business, graphics and home CD-ROM titles.
Name: Dnium Pte Ltd Address: 20 Ayer Rajah Crescent, #04-03A, Ayer Rajah Industrial Park, Singapore 139964 Tel: 6773 9263 Fax: 6873 7721 E-mail: info@dnium.com	Through its LearningEdge system, provides a platform to enable all e-learning activities and processes.

Name: Ednovation Pte Ltd Address: 16A Science Park Drive #01-04 The Pascal Singapore 118228 Tel: 6774 0188 Fax: 6776 0389 E-mail: joolian@ednovation.com.sg Contact person: Ms Tan Joo Lian	Produces e-learning materials, educational software and multimedia products for school and home uses.
Name: GetIT Multimedia Pte Ltd Address: 30 Orange Grove Road, RELC Building #07-03, Singapore 258352 Tel: 6738 6929 Fax: 6738 7839 E-mail: Info@getit-multimedia.com	Provides courseware development, streaming media and multimedia production, interactive applications, Web site development and maintenance, and rich-media CD-ROM production.
Name: Global Knowledge Network (S) Pte Ltd Address: 268 Orchard Road, #20-00, Singapore 238856 Tel: 6332 2330 Fax: 6338 6149 E-mail: enquiries@globalknowledge.com.sg	Enterprise Services: developing custom integrated solutions to managing proficiencies for an information technology workforce. Knowledge Products: providing training and e-learning solutions. Self-paced e-Learning: delivering training content on CD or over the Web and study-at-your-own-pace. Virtual Classroom e-Learning: delivering classes to students no matter how geographically dispersed.
Name: Hewlett-Packard Education Services Address: 396 Alexandra Road, #09-00 BP Tower, Singapore 119954 Tel: 6275 3888 Fax: 6275 6554 E-mail: chor-ter_tay@hp.com	Produces Web-based courses, e-instructional design programme, e-content conversion and development, education consulting, education strategy study, change management for e-learning, learning management system, employee support performance system, virtual classroom, smart classroom, learning portal, and knowledge management.
Name: ICUS Pte Ltd Address: 1 International Business Park, #01-13B The Synergy, Singapore 609917 Tel: 6566 1411 Fax: 6563 1411 E-mail: education@ibridge.com.sg	Provides integrated, end-to-end solutions that leverage its capabilities in project management, instructional design, pedagogy, coaching, information technology and change management. The comprehensive suite of e-learning services includes: Consultancy, Development and Design, Process Management and Post-implementation.

Name: INK Studio Pte Ltd Address: 29 Mayo Street #02-01, Singapore 208315 Tel: 6292 9329 Fax: 6292 2289 E-mail: enquiry@inkstudio.com	Offers digital multimedia, Web design.
Name: I Productions Pte Ltd Address: 1 Jalan Kilang Timor #10-02 Pacific Tech Centre, Singapore 159303 Tel: 62703025 Fax: 62703023 E-mail: iprod@pacific.net.sg	A multimedia software house.
Name: iT21TM(Singapore) Pte Ltd Address: Blk 219 Henderson Industrial Park, #05-01 Singapore 159556 Tel: 6270 0021 Fax: 6272 6263 E-mail: It21@post1.com	Produces CD-ROM titles for schools (e.g., IT21 P4, P5 and P6 Fun Learning Programmes for the learning/teaching of Mathematics, Science, English, Chinese and Malay Languages; plus IT21-CHS secondary school titles for English, Chinese, Geography, History, Chemistry and Literature).
Name: i-tutor.net Pte Ltd Address: Blk 4010 Ang Mo Kio Ave 10, #03-11 Techplace 1, Singapore 569626 Tel: 6556 0833 Fax: 6552 0985 E-mail: sales@i-tutor.net	Develops www.i-tutor.net, the Web site for e-learning that is designed to reinforce and complement primary school curriculum in a creative and fun-filled learning and tutoring approach. The Web site contains a huge amount of content that is presented through lively animation and multimedia intensive applications that entail graphics, sounds, colours and interactions for children from Primary One to Six. In addition, the company provides customised software application systems for the corporate training market.
Name: KnowledgeAlive, STTS Address: 24 Ang Mo Kio St 65, Block D, Level 4, Singapore 569061 Tel: 6413 1353 Fax: 6481 6116 E-mail: Marketing@knowledgealive.com	Provides complete end-to-end e-learning, communications and collaboration solutions for organisations.

Name: Knowledge Director Pte Ltd Address: 88 Joo Chiat Road, #03-01, Singapore 427382 Tel: 6344 4765 Fax: 6344 4719 E-mail: info@knowledge-director.com	Provides content development, custom courseware development, technical consulting and learning consulting services.
Name: Litespeed Education Pte Ltd Address: 420, North Bridge Road, #03-39/40, North Bridge Centre, Singapore 188727 Tel: 6837 0024 Fax: 6837 0377	Produces on-line interactive lessons, activities and diagnostic questions.
Name: Microsoft (S) Pte Ltd Address: 5 Temasek Boulevard #09-03 Suntec City Tower, Singapore 038985 Tel: 63376088 Fax: 63376788 E-mail: help@microsoftcare.com Contact person: Ms Michele Chiang (Director, Marketing Services)	Provides a wide range of games and educational software.
Name: MoreAtOnce Pte Ltd Address: 21 Kim Keat Road, #04-01, Singapore 328805 Tel: 6849 8666 Fax: 6256 5922 E-mail: sales@moreatonce.com	Provides multimedia content for pre-school, primary and secondary schools.
Name: Pericon.com Private Limited Address: 37 Kallang Pudding Road, Block B Tong Lee Building #06-03, Singapore 349315 Tel: 6841 7233 Fax: 6841 7211 E-mail: Biz@pericon.com.sg	Designs and develops interactive custom courseware for large corporations. Multimedia production for corporate presentation and training video.
Name: Rich Concept (S) Pte Ltd Address: 61 Lorong 17 Geylang #05-01 Lam Leong Building, Singapore 388514 Tel: 67437473 Fax: 67433343 E-mail: richcon@pacific.net.sg Contact person: Mr David Man	Developer of Singapore — Mads educational multimedia software and manufacturer, distributor, importer and exporter of full range of computer accessories.

Name: SCALAIT (S) Pte Ltd Address: 3016, Bedok North Ave 4, EASTech, #08-16, Singapore 489947 Tel: 6245 8195 Fax: 6245 8197 E-mail: sales@scalait.com.sg	Specialises in Click2Learn's authoring ToolBook II software and other e-learning related products. It also distributes a complete Learning Content Management System — Kaleidosckop, which is an enterprise solution that comprises content production work flow, delivery work flow and a resource management tool within the system. Also provides training and consultancy in implementing e-learning, be it for an organisation or a university.
Name: SDC Learning Pte Ltd Address: 50 Market Street #10-02, Golden Shoe Carpark, Singapore 048940 Tel: 6325 4982 Fax: 6325 4983 E-mail: info@sdcasia.com	Produces courseware solutions for O-Level and A-Level students.
Name: Singapore Computer Systems Limited Address: 7 Bedok South Road, Singapore 469272 Tel: 6827 3161 Fax: 6827 3199 E-mail: mls@scs.com.sg	Conceptual design of enterprise-wide learning portals, instructional design and content writing, interactive Web-based training, electronic lessons and publications, and design and production of interactive contents for e-media.
Name: Solvolution Labs Private Limited Address: 35 Kallang Pudding Road Blk A, Tong Lee Building #04-04, Singapore 349314 Tel: 6848 1311 Fax: 6848 1322 E-mail: rogerkhoo@solvolution.com	Produces e-commerce solutions, multimedia Web design and development.
Name: Startech Interactive Pte Ltd Address: 200A Telok Ayer Street, Singapore 068638 Tel: 6324 7196 Fax: 6324 7197 E-mail: sales@startechmm.com	Develops innovative digital media and e-business solutions that allow companies to utilise practical and effective technologies to fulfil business objectives.

Name: Times Information Systems Pte Ltd Address: Times Centre, 1 New Industrial Road, Singapore 536196 Tel: 6213 9106 Fax: 6213 9445 E-mail: info@sparklepals.com	Provides multimedia design, online learning services.
Name: TTS Asia Learning Solutions Pte Ltd Address: 10 Ann Siang Hill, Singapore 069789 Tel: 6325 5280 Fax: 6222 1955 E-mail: info@ttsasia.com	Develops e-learning ecosystems; this includes LMS vendor selection, instructional design, custom content development, change management and implementation, and integration.
Name: United Training Online Address: Bukit Batok Central PO Box 102, Singapore 916504 Tel: 6425 6801 Fax: 6425 6505 E-mail: info@utonline.com.sg	Produces e-learning solutions on Business Mandarin.
Name: Zenith Infotech (S) Pte. Ltd Address: 30 Robinson Road, #04-01B, Robinson Towers, Singapore 048546 Tel: 6224 9404 Fax: 6224 9387 E-mail: Bagga@zenithinfotech.com.sg	Produces e-learning platforms/ courseware/solutions for organisations.

CHAPTER 5

EDUCATIONAL MEDIA IN SRI LANKA

Shironica Karunanayaka and Rupa Wijeratne

INTRODUCTION

The Democratic Socialist Republic of Sri Lanka is a small island situated in the Indian Ocean, off the southeastern coast of India. It is an independent member of the Commonwealth of Nations. Colombo is the largest city and the commercial capital of Sri Lanka, while the administrative capital is Sri Jayawardenapura-Kotte. This chapter summarizes the developments and current status of educational media in Sri Lanka

The land and the people

Sri Lanka has a total area of 65,610 sq. km. About 80% of the island is flat land, while the south-central part of the country is mountainous. The highest point is the peak of Pidurutalagala, which rises to 2,524 m. Being situated near the equator, Sri Lanka has a hot and humid climate. It has an average annual temperature of about 32^0 C in the lowlands and about 21^0 C in the mountainous regions. The country's estimated population was 19,576,783 in 2002. About 74% are Sinhalese (Theravada Buddhists). Minority ethnic groups consist of Tamils (18%), Moors (7%) and others (1%). Sinhala and Tamil are the official languages of Sri Lanka, while English is also widely used (The World Fact Book 2002).

Government

Sri Lanka is governed under the constitution of 1978. The President, who is both the Chief of the State and the Head of the Government, is elected by popular vote for a period of six years. The President appoints the Prime Minister and the members of the Cabinet. The members of the unicameral parliament are elected by popular vote. The country is divided into eight administrative provinces and 25 administrative districts, each presided over by an appointed district minister.

Socio-economic indicators

Sri Lanka's economy is primarily based on agriculture, with emphasis on plantation-grown export crops such as tea, rubber and coconut. However, with changes in the

government's policies in 1977 to help the country be more market oriented, textiles and garments have become Sri Lanka's largest exports since the mid-1980s, accounting for 63% of total exports. Gross Domestic Product (GDP) grew at an average annual rate of 5.5% throughout the 1990s. Yet, in 2001, due to various reasons such as civil war, power shortage, budgetary problems and global slowdown, the economy declined to a 1% growth rate.

About 25% of the population live below the national poverty line. The Human Development Index is 0.741 (2000) and the Gender Development Index is 0.737 (2000). The unemployment rate is around 7.7% (2001), and this is found to be highest among educated people. Sri Lanka has a high adult literacy rate of 91.6% (2000), highest in the South Asian Region (Human Development Reports 2002).

Education system

In Sri Lanka, education is free at all levels — from the primary grades through first-degree at the university level. Free textbooks are provided to all school students. Attending school is compulsory for children from 5 to 14 years of age. Five years of primary education is followed by three years at the junior secondary level, another three years at senior secondary level and finally two years at college level. There are around 10,548 schools (government schools, private schools and *pirivenas*) in Sri Lanka, as well as are 13 universities, 14 National Colleges of Education, and about 30 technical institutions (Government of Sri Lanka 2001).

Sri Lanka's education system is predominantly a national system. It is centrally organised under the Ministries of Tertiary Education and Education, with human resource development and culture also falling under the same ministerial umbrella. Apart from the ministries of the central government, the provincial governments also have their own ministries, which are administratively linked to the line management of the central government. The National Education Commission is the central body that looks after the national policy of education and national aims and objectives of education. Aspects such as school curriculum, teacher education and national examinations (at the GCE A-Level and O-Level, and Grade Five scholarship examinations) are held at the national level. Within provinces, the administration and management are further structured into zones and divisions, each of which is administered by a Director.

The school system consists of two major categories: public/state schools and private schools. The latter include two types: schools that are not funded by the government, but in all other respects (for instance, curriculum, examinations) follow the procedures of state schools; and the International Schools, where the medium of instruction is English and both curricula and assessments are internally determined. Most international schools prepare students for foreign examinations such as London O-Levels and A-Levels. Sinhala or Tamil is the language of instruction in state schools and non-international schools. A recent development in state schools is the introduction of English as the language of instruction in one of the classes at each level. Those students who opt for English instruction are allowed to join these classes.

Teacher education at the pre-service and in-service levels is totally under the Ministry of Education. Pre-service teacher education is conducted via National Colleges of Education (NCOE) and student-teachers are selected from among those students who have obtained marks above the minimum pass level to qualify for entry to university, but failed to enter due to lack of places in the universities. The teacher education system in the country is ordered under an umbrella organisation called the National Authority of

Teacher Education (NATE). This step was taken in keeping with a recommendation of the World Bank. Apart from the NCOEs, there are a number of teacher-training colleges still functioning as in-service teacher-training institutions.

The National Institute of Education also shares in the preparation of teachers. A Bachelor of Education degree programme is conducted by NIE. In this programme, teachers are given course material for training, and practical experience is supervised and evaluated by external staff.

Universities, technical colleges and technical institutions come under the Ministry of Tertiary Education. There are 13 universities spread over different parts of the country, each province having at least one. Entry to the universities is highly competitive, except in the case of the open university. The latter has a total student enrolment — over 20,000 — that is a little more than the total number of students of all the universities. Although this is not a large number when compared with that in other countries, it should be considered with respect to the total population in the country.

The Open University of Sri Lanka (OUSL), established in 1980–81, reaches its students through the distance mode, operating via a network of four regional centres and 21 study centres and teaching centres. A wide variety of study programmes, ranging from certificate courses to higher degrees, is being conducted by OUSL.

RECENT DEVELOPMENTS IN EDUCATION

There are noteworthy developments in education since the recent reforms were introduced and gradually implemented with funding from the World Bank and Asian Development Bank. Significant changes were introduced in primary education, based on recommendations made by the National Education Commission (NEC). These were focused in the areas of curriculum, teaching methodology and overall philosophy of primary education. A competency-based curriculum was introduced and efforts were made to make primary education more child-centred and activity-based (The Presidential Task Force on General Education 2000).

Major changes in the curriculum at the GCE O-Level and A-Level were introduced in order to release the students from a heavy syllabi-centred and examination-oriented education. School-based assessment (SBA) schemes were introduced and teachers were given in-service training in implementing the new system. The need to make educational qualifications fit into the world of work is fully recognised. The skills development project of the Asian Development Bank has begun work in the area of improving the technical training system, making it move towards a competency-based system so that trained youth will receive recognition in the world of work, both within the country and outside (National Education Commission 1997). Introduction of computer knowledge into the school system, as well as in tertiary and higher education institutions, is a major step in moving towards new technologies. This is a significant move, though the process is slow due to resource constraints.

The open university in its small way has now turned its attention towards building international links. The Youth Development programme initiated by the Commonwealth Secretariat is one such attempt, where OUSL has played a major role in preparing course material and conducting the courses. Initiatives are already being taken to internationalise the existing Master of Arts programme in Teacher Education conducted by the Faculty of Education. This programme is scheduled to reach students in some of the member countries in the South Asian Association for Regional Cooperation region.

DISTANCE EDUCATION

The concept and practice of distance education was introduced in the Sri Lankan education system during the latter half of the 1970s. The Sri Lanka Institute of Distance Education (SLIDE) was established in 1976. There were two sections in this institute: one for Mathematics, Science and Technology, and the other for Humanities and Social Sciences. The Ministry of Education had a unit in distance education established mainly to provide training to graduate teachers serving in the school system. They had not received initial training and, to address this, lesson material in print was prepared and given to them. Weekend face-to-face sessions and seminars were conducted at different centres. Practical teaching was conducted at schools. Thus, a distance teaching system for teacher education came into practice. This system of graduate teacher training continues in the open university.

With the establishment of OUSL in 1980, the work of SLIDE was transferred to the institution. The Ministry of Education continued to work in collaboration with the open university until 1985, when all the activities of the distance education unit were finally handed over to the open university. At its inception, OUSL had more or less ready-made programmes handed over by SLIDE, the Ministry of Education, and the External Services Agency of the University of Colombo, which conducted a certificate course in professional English and a certificate course in Pre-School Education for teachers. These events marked the beginnings of distance education. During the last 20 years, the open university expanded with four faculties: Education, Engineering Technology, Humanities and Social Sciences, and Natural Sciences (OUSL 2003).

As noted above, total student enrolment in OUSL numbers around 20,000, and the outreach covers almost every part of the country. The courses vary from certificate level to higher degrees. In terms of content, distance education courses at OUSL have moved away from traditional university disciplines and opened new avenues, providing pre-school education for teachers and higher education for nurses and teacher-educators. These programmes have become very useful for professional training and career development of the respective categories of professionals.

The Ministry of Education, through the National Institute of Education, organised distance education programmes especially in the area of teacher training and education. A group of non-graduate teachers who are in schools across the island teaching Science and Mathematics receive training and updating on an ongoing basis. In addition, parallel to the open university programme, the National Institute of Education has also been running a programme for graduate teacher training since the 1980s. The distance education system in Sri Lanka has contributed greatly in the area of teacher education and training by clearing a large backlog of untrained graduate teachers who have been serving in the school system without initial training for long years.

Distance education as a delivery mode for education and training while in service is now becoming more popular. Even conventional systems are now developing courses in the distance mode for selected groups of employees. For example, the Medical Faculty of the University of Colombo has already started preliminary work in this area. A non-formal organisation, Distance Education for Public Servants, is conducting a programme for public servants on a national level, aiming at capacity building and career development of civil servants.

The Asian Development Bank is stepping in to launch a programme to modernise the secondary education system in Sri Lanka. It is hoped that this project will boost the distance education approach considerably, playing a significant role in expanding

opportunities for meaningful human resource development and preparing youth to transition smoothly into the world of work.

In 2001, the World Bank assisted the establishment of a Centre of the Global Development Learning Network (GDLN) at the Sri Lanka Institute of Development Administration to address the training needs of managers. The centre is owned by the government and operates in collaboration with the public and private sectors to provide real-time video conference based distance learning programmes.

ELECTRONIC MEDIA AND TELECOMMUNICATION INFRASTRUCTURE

Radio

Radio broadcasting started in Sri Lanka in 1924, during British rule. It was a very popular medium. Radio Ceylon was the first radio transmission channel. With the expansion of services, there are now about 16 radio transmission channels, including Sri Lanka Broadcasting Cooperation (SLBC), which is the main national channel. In 1998, the number of radio broadcast stations stood at 26 AM, 45 FM and one short wave. There were 567,000 radios licensed up to 1999 (The World Fact Book 2002).

Television

Television broadcasting started in Colombo in 1979, and since then it has expanded with an increased number of TV broadcast stations, channels and users. In 1997, there were 21 TV broadcast stations, and 1.53 million people used television sets. At present two national channels — Rupavahini (Sri Lanka Rupavahini Corporation [SLRC]) and the Independent Television Network (ITN) — are operating with island-wide coverage. In addition, Channel Eye mainly covers Tamil programmes. There are six other major private transmissions. About 95% of Sri Lanka's land area is reached by national television.

Telecommunications

In 1991, the telecommunications wing of the erstwhile Department of Posts and Telecommunications was transferred to a government-owned corporation called Sri Lanka Telecom Corporation (SLT). Nippon Telegraph and Telephone Corp (NTT), the Japanese telecommunications giant, bought 35% of SLT shares in 1997 and took over all of SLT's management (Gunawardene and Wattegama 2003). Today, SLT operates Sri Lanka's domestic and international telecommunication services. Over the years, with the advances in the telecommunications field, SLT has taken steps to upgrade and strengthen the telecommunications infrastructure in the country. Strategies such as expanding the optical fibre network and applying new digital technologies have contributed to greater reliability and efficiency. According to 2001 data, there were 704,095 telephones in Sri Lanka. In Colombo and other major cities, waiting time has been completely eliminated, but in rural areas some inadequacies remain. Despite that, public phone facilities have been provided in all parts of the country. International dialling facilities are provided by SLT to 219 countries, with direct connections to 51 countries. Web-based services such as e-mail and access to the Internet are also provided through SLT Net. It had 33,208 Internet customers by 2001. The services provided include PSTN dial-up at 56 kbps, ISDN dial-up at 64 kbps and 128 kbps, Internet Leased Line services at 64 kbps, 128

kbps, 256 kbps, 512 kbps and 2Mbps, client mail server installations and Web hosting (Sri Lanka Telecom 2001).

Other than SLT, there are a number of private telecommunications service providers, cellular mobile telephones, pay phones, trunk telecommunications network, radio paging service and trunk radio network. Mobile cellular phone services, which started in 1989 (a first amongst South Asian countries), continue to grow very rapidly. The number of cellular connections, which stood at 1,800 in 1991, increased to 667,662 in 2001. Phone charges per minute are comparatively high. Domestic phone rates continually increase, and vary from zone to zone, while IDD rates have decreased slightly in recent years. Cellular phone rates are also high, but have declined gradually due to intense competition. Restructuring of telecom services started in 1995, and since then steps have been taken to privatise SLT in stages, opening for foreign investment and with the intention of making the services more efficient.

Internet and computer networks

Internet usage has grown steadily in Sri Lanka in the recent past. In 2001, there were 121,500 Internet users in Sri Lanka. Since 1995, when the Lanka Internet Services initiated commercial operations, the industry of Internet Service Providing has grown exponentially. SLT started its Internet service facility in 1996. At present there are over 20 Internet Service Providers (ISPs), including SLT and private companies. The services of ISPs cover a wide geographical area, and Internet connectivity and e-mail software are readily available. Despite this fact, the high costs involved (and especially the huge increases in local call charges) limit use of the facility by a majority of the population. Currently, most of the Internet usage is in the commercial sector. Although government initiatives have attempted to provide Internet facility and access in schools and other educational institutions such as the National Colleges of Education, its use is minimal due to prohibitive cost.

According to the Telecommunications Regulatory Commission of Sri Lanka (TRCSL), the total number of Internet accounts was 61,532 in 2001. Gunawardene and Wattegama (2003) estimate approximately 300,000 Internet users in Sri Lanka. Industry data show that subscribers to Internet and e-mail services grew by 52% during 2001 (Central Bank 2002).

The Lanka Educational Academic and Research Network (LEARN) is a facility that interconnects educational and research and development institutions throughout the country. Initiated in 1990 as a project by the Department of Computer Science and Engineering (CSE) at the University of Moratuwa, it provided LEARNmail, the first e-mail service in Sri Lanka. Now administered by the Institute of Computer Technology at the University of Colombo, with technical operations being carried out by the CSE at the University of Moratuwa, it provides e-mail, dial-up and dedicated Internet connections to member institutions (Government of Sri Lanka 2001).

EDUCATIONAL MEDIA RESOURCES

Radio broadcast

Radio broadcasting began in Sri Lanka in 1924 and, as early as 1927, need for an educational service was felt. In 1931, a Schools Radio Committee was formed. This committee included senior officers in the education department and leading educationists.

One assistant director of education was appointed as the chairman of the committee. Broadcasting of radio talks started in 1931. In this effort, Radio Ceylon provided the airtime for broadcasting the talks.

An advisory committee was appointed in 1934. There is documentary evidence to the effect that radio talks were broadcast in all three languages. The talks touched on a variety of topics ranging from kindergarten to the stage of finding employment. At a conference held in 1941, with members from a number of ministries, a decision was taken to give more publicity to educational programmes. Since 1951, several new features have been added, such as new subjects, greater variety in programme formats, distribution of supplementary print material and handbooks, and increased broadcast hours for educational programmes. Also since 1951, educational broadcast times have been extended to cover three-and-a-half hours a day from Monday to Friday and one hour on Saturdays. In 1952, broadcast time was further extended to four-and-a-half hours a day.

A listener survey, based on a questionnaire, was conducted in 1952 for the first time. This was sent to schools to collect responses from school listeners. In order to get the best out of educational programmes, a series of lectures and revision courses was conducted for teachers by the broadcasting top circles. All three languages — English, Sinhala and Tamil — were used for these programmes. Music, drama, songs and a variety of other features suited to radio medium were broadcast.

In 1952, an important event took place when an UNESCO foreign consultant was appointed to start training in scripting, editing and presentation. As well, in order to organise work more systematically, a coordinating officer from the Ministry of Education was appointed. A commission appointed in 1956 to look into matters pertaining to broadcasting identified a number of shortcomings in the existing system that needed revision and correction. The commission also pointed out the need to build closer rapport between the listener and the producer. Proposals were made to introduce programmes to activate the language policy of the government.

Currently, educational radio programmes are available in all three languages, English, Sinhala and Tamil. These are not restricted to formal school education and are not totally curriculum-based. These changes came in 2002. Programmes now take the form of non-formal education and one of the major objectives is skills/competency development and value education. The broadcast programme named "3–5," for example, presents a wealth of information, with a mix of entertainment as well. This programme is popular among children in the age group 13–18. However, no proper survey data is available.

In its organisational set-up, the Sri Lanka Broadcasting Corporation (SLBC) has accorded an important place to educational service. SLBC falls under a directorate headed by a Deputy Director General. In its role in educational broadcasting, SLBC has been working in close collaboration with the Curriculum Development Centre of the Ministry of Education. With the establishment of the National Institute of Education (NIE) in the early 1980s, the Curriculum Development Centre came under it. In its key role of developing school education, NIE maintains its own media unit and AV production centre. Since the 1980s, NIE has looked after the production and delivery of AV material to schools and students.

NIE produces curriculum-based audio and video materials required for students in the national school system. These are made available for narrowcast as well as broadcast. Non-formal educational organisations also purchase these materials at a nominal cost. Broadcast arrangements are made with national television, both Rupavahini and the

SCBC. As both are government institutions, production and broadcast activities are carried out, more or less, on a collaborative basis.

NIE has its own audio and video production unit, but is not sufficiently staffed to attend to all its needs. However, the unit produces a variety of programmes mainly for the school system. These are curriculum-based supplementary materials for children at all three levels — primary, junior and senior secondary — as well as materials for teacher training and parent awareness. Teachers are trained for some skills in the production of AV material, such as script writing, and also for presentation of lessons over the radio and TV. Parent awareness programmes are mainly for broadcast over radio. AV materials are also produced for children with special needs, for instance the hearing impaired.

Telecast of educational programmes

Dedicated educational programmes are telecast through national (public) TV channels. As mentioned before, till recently, national TV had a dedicated time slot for the telecast of educational programmes. These are curriculum-based educational programmes telecast through national TV channels and produced by NIE. Of late, there appear to be certain changes in TV programmes. Rather than curriculum based programmes, non-formal programmes have taken precedence to benefit a larger audience, including school children who have the opportunity to move away from classroom teaching programmes to a broader spectrum of knowledge and information.

Both Rupavahini and Eye Channel broadcast the Discovery programme, which has become very popular among viewers since the late 1990s. Sinhala-speaking viewers watch Rupavahini predominantly, whereas Tamil-speaking people watch Eye Channel.

Non-broadcast use of audio and video programmes

Non-broadcast AV materials are prepared and used for educational purposes by educational institutions such as NIE and universities. NIE, as mentioned earlier, produces material both for broadcast and narrowcast, mainly in the form of audio tapes. This is being done for both formal and non-formal education.

Universities also produce these, for their students mainly, not so much for broadcast. At OUSL, the AV materials produced are given to students as supplementary material to print course material, or else they are made available at the regional and local centres for student use.

EDUCATIONAL MEDIA PRODUCTION FACILITIES

The importance of production of AV material has been given full recognition by universities and other educational institutions such as NIE. Because of resource constraints and other factors, each of these institutions finds it difficult to establish its own production centre. In this respect, OUSL is the leading institution, with its own production centre. Donated by the Government of Japan, a fully equipped audio-video production centre called Media House has the capability of producing broadcast-quality material. The complex has studios for audio and video recording (Betacam), a post-production section, dubbing rooms, editing rooms, a copying facility, viewing rooms and other extra facilities such as a make-up room and graphic and illustrations units. OUSL, which offers its production services to other universities and institutions as necessary, is planning to move from analogue to digital systems to keep pace with new technologies

and move towards quality and facility in work while reducing production costs. Even with the available limited facilities, OUSL has trained its staff as well as staff from other universities in the production of computer-based, multimedia material. The work is now in progress.

Other institutions with production centres are NIE and the National Youth Services Council (NYSC). They are relatively smaller in size, but are sufficient to their needs. These materials are also for broadcast as well as narrowcast. VHS copies and cassette tapes are available for sale at their sales counters. Most other universities have established smaller AV units, which produce and store AV material. NIE is also responsible for producing educational AV material for schools. This institution works in collaboration with national TV and radio broadcasting organisations for broadcasting/telecasting educational material.

Educational multimedia and e-learning

Use of Information and Communication Technologies (ICTs) in education has become popular in Sri Lanka over the last two decades. Having identified the need and the importance of integrating ICT into education, the Government of Sri Lanka has taken several initiatives to advance utilisation of IT in the education system. The first-ever Computer Policy for Sri Lanka (COMPOL) was formulated in 1983 by a committee appointed by the Natural Resources, Energy and Science Authority (NARESA, currently the National Science Foundation), and it identified key areas of development in the use of computers. Based on its recommendations, the Computer and Information Technology Council of Sri Lanka (CINTEC, which was later renamed the Council for Information Technology) was established in 1984 in the Ministry of Higher Education and Information Technology Development. This body was entrusted with making policy recommendations regarding information technologies (IT) use in the country and monitoring developments and achievements. CINTEC prepared a National Policy on IT in 1998 (Council for Information Technology 1998). Among other areas, priority has been given in this document to IT use in schools and in universities, and for the training of trainers. High literacy standards in the country, including the highest literacy rate in South Asia, and a large English-speaking population are two main strengths that support widespread use of IT in education.

IT in school education

Since 1983, the Ministry of Education and Higher Education has taken steps to familiarise and encourage school children in the use of IT. Initially, computers were provided to some schools in 1984. Later, in 1994, Computer Resource Centres (CRCs) were set up in a number of schools with the assistance of the Asian Development Bank. The main objective of setting up CRCs was to provide basic computer literacy to students — during their vacations once they had taken the GCE O-Level and A-Level examinations, and after they had left school.

In 1999 and 2002, a small number of computers were supplied to selected schools in all provinces. This was done with the intention of implementing the "activity room" concept, where students of junior secondary level (Grades 6–9) were to be familiarised with computer use.

Despite all these attempts, a significant impact was not observed as expected. IT was not integrated into the formal school curriculum. The major emphasis seemed to be on hardware supply for schools rather than on IT education. Realising this shortcoming, and

with the intention of obtaining optimum advantage from funding and other resources, a National Policy on Information Technology in School Education (NAPITSE) was prepared by the IT unit of the Ministry of Education and Higher Education, and was approved in 2002. This policy includes a six-year strategic plan from 2002 to 2007, which is divided into three stages. Focusing on two main aspects — use of IT in education (learning and teaching) and use of IT in management of the education system — the strategic plan is being implemented under four major themes: curriculum development, human resource development, physical/infrastructure development and support initiatives development. As a result of NAPITSE, a subject called General Information Technology was introduced to GCE A-Level classes (Grade 12) after June 2002, and it is expected IT will be introduced as an optional subject for GCE O-Level classes after 2003. It was also decided that IT should be used as a tool in the teaching and learning of various subjects, from primary to advanced level classes (Government of Sri Lanka 2002).

In implementing government policy, the National Institute of Education plays a major role in curriculum development and human resource development. Syllabi on General Information Technology (GIT) and Computer Assisted Learning (CAL) courses for GCE A-Level and GCE O-Level classes have been developed, and GIT for GCE A-Level is already being implemented. Teacher training is taking place, with about 700 A-Level teachers trained up to now and more than 5,000 teachers to be trained. In addition, the IT unit of NIE has also been involved in software development since 1988.

Under various foreign-funded projects, the Ministry of Education is currently taking several measures to enhance IT facilities in schools. For instance, under the World Bank funded General Education Project II, planning is underway to provide 400 schools island-wide with ICT centres, equipped with 10 computers each and other accessories, as well as Internet facilities. The pilot project, in which ICT centres were established in 80 schools, was implemented in 2001 and was evaluated in 2003. The initiative was found to be providing the opportunity for students and teachers to develop basic competencies in the use of IT in education; and, despite various constraints, all schools are attempting to make the best possible use of the centres (Karunanayaka et al. 2003).

The Secondary Education Modernisation Project currently being implemented with the support of the Asian Development Bank intends to develop computer literacy and narrow the digital divide. During 2001–2006, about 2,300 schools will receive 10–20 computers; and the project envisages improving access for an additional 5,000 poor students annually, by upgrading 1,000 existing schools (Reddi and Sinha 2003).

IT in university and higher education

The National Policy on IT made several recommendations to enhance IT in university education. These included providing IT awareness to all undergraduates, establishing campus-wide networks in all universities, providing Internet access to all, and introducing computer science courses. These are being implemented in all universities of the country, at various levels. For instance, OUSL offers many programmes of study including IT courses, ranging from certificate level to master's degrees. Of special note is the Master of Arts in Teacher Education programme where IT courses are offered to teacher-educators. Steps are also being taken to offer such courses to teachers who follow a Post-Graduate Diploma in Education. All registered students at OUSL are provided with the opportunity to undergo a basic computer awareness course, and to use the computer facilities available at the elementary computer laboratories at the Colombo Regional Centre and other regional centres. Internet facility is also provided to students free of charge at these labs and in the main library. The campus-wide computer network

integrates resources such as the library and IT division. Initiatives to integrate e-learning with the existing courses are currently being implemented. The staff development centre of OUSL conducts multimedia training sessions for its staff, as well as staff from other universities. The IT division also conducts IT training sessions for staff.

The Institute of Computer Technology, an independent institution established within the University of Colombo, is a well-recognised institution with modern facilities. Providing IT training for students on a large scale, it is also involved in software development and research in IT (ICT 2001).

The Sri Lanka Institute of Information Technology (SLIIT) was also recently established by the Government of Sri Lanka to train IT professionals. At this institution, courses are offered in IT, development of software, and research and development in IT. The SLIIT conducts a programme of study leading to a Bachelor of Science degree in Information Technology (SLIIT 2001).

CONCLUSION

The Sri Lankan educational environment is undergoing a phase of rapid transformation with adoption of information technology at various levels. With increased need for access to quality education, as in other parts of the Asian Commonwealth, the use of electronic media and distance education have emerged as areas of prime importance. Teacher training on various educational media has been identified as one of the key approaches to integrating ICT in the classroom. At the same time, efforts to develop learning materials indigenously are ongoing at various educational institutions. It shows that educational practices and policy in Sri Lanka recognise the role of ICTs in providing access to quality education.

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Note

In addition to the above references, the authors collected information for this paper by means of interviews held with the managerial officers in charge of the respective services and institutions, such as SLBC, SLRC, Media Centre, NIE, IT Unit of NIE, IT Unit of Ministry of Education, and IT Division of OUSL.

COMMONWEALTH *of* LEARNING

Part II: Research Reviews

CHAPTER 6

AUDIO, RADIO AND INTERACTIVE RADIO

Sanjaya Mishra

INTRODUCTION

Audio-based technologies may be known as "little media" (Schramm 1977), but in terms of their usefulness they are also known to be the most accessible, affordable and appropriate for a wide range of teaching and learning situations (Thomas 2001). They provide a personalised tone and play a persuasive role, if used in an integrated manner with print and other activities.

Bates (1995) categorises audio technologies into two groups: *one-way* (e.g., radio, audio cassettes) and *two-way* technologies (e.g., telephone, audio conferencing, audiographics). However, according to Bates "audio is becoming less and less a separate medium, but is both being combined more and more with data, print and video, and is becoming increasingly digitized, to the point where it will soon be difficult to discuss audio separately from other media as a teaching medium" (p. 138). The emergence of interactive radio instruction, radio-text, audio-vision and radio-vision are some of the other examples of audio media used in education.

According to Rowntree (1994) the purposes of audio use in open and distance education are to:

- provide "aural source materials" for learners to analyse and react;
- breathe life into ideas presented elsewhere in a course;
- make teaching more human and personal;
- say things that are not so easily expressed in print;
- influence learners' "feelings and attitudes";
- let learners hear the voice of experts, and other students; and
- present ideas to learners who are unable to read.

Though audio is considered basic and rudimentary in the age of the Internet and World Wide Web, it is slowly becoming popular again with the resurrection of FM radio in many parts of Asia. Using the "Day-After Recall Method," a study conducted by A.C. Nielson's Radio Audience Measurement (RAM) reported that 72% of the population in Mumbai (India) is tuned in to FM radio. In June 2002, there were only 42% FM listeners (Times News Network 2003).

This chapter provides a review of research related to audio media in India and neighbouring countries. The review presents a mixed picture about the usefulness and effectiveness of audio media in education. At the one end are studies that conclusively report significant gains due to use of audio-based media. At the other end, at least one study clearly supports the "no significant difference."

RESEARCH ON RADIO BROADCASTS

Research has concentrated more on radio broadcast than on other audio media. Radio also has a wide reach because it is available at relatively low cost. It has been used in education for the following five purposes (Thomas 2001):

- news and information (keeping students up-to-date);
- motivation and mobilisation (provides personalised words of encouragement and breaks anxiety for study and examination);
- tutorial support (remedial/supplementary support, explains key concepts, provides multiple viewpoints);
- resource material (brings in others' experiences, transports students to real as well as imaginary worlds); and
- Direct teaching (can be a substitute for print or face-to-face contact).

Neurath (1956), in an evaluative study of the Farm Radio Forums conducted by the Tata Institute of Social Science, reported that "(i) Radio Farm Forum as a transmission agent for dissemination of knowledge has proven itself a success beyond expectation; (ii) Group Discussion as a means of transmitting knowledge was a complete success; (iii) The Forum developed rapidly as a new institution in village life" (Kumar 1967: p. 61). Results of this study put radio on the educational map of India.

Biswal (1980) studied school broadcast programmes in terms of instructional objectives and their utilisation. His study revealed that students sustained their interest in listening to radio lessons daily. He also reported that amongst the broadcast programmes covered, students' achievement was found to be above 56% in two programmes, above 60% in 10 programmes, and above 70% in four programmes. In another study, however, the experimental group reportedly gained 7–17% only after listening to radio broadcasts. Further item analysis revealed that while students gained very little on word knowledge and concept formation, the gain was high on acquisition of factual information (Singh and Shukla 1980).

Harjal (1992) reported that radio listening is decreasing because of TV watching increasing. However, 50% of those who listened to radio broadcasts said that radio has increased their knowledge. Similarly, in a study carried out in the Management Programme of Bangladesh Open University, Karim et al. (2001) found that 50% of the respondents considered radio programmes useful. Mohanty and Giri (1984) in a study conducted by the State Council for Educational Research and Training, Orissa (India), found through a questionnaire that the school broadcast programmes of All India Radio contributed to students' growth with respect to their vocabulary, language, pronunciation and appreciation. They also found a relationship between attention to and interest in the school broadcast programme. However, although the All India Radio broadcast programmes were syllabus oriented, they could not be integrated in the classroom. Most of the schools had neither seating arrangements nor revised timetables to accommodate school broadcasts (Nagarajan and Usha Ram Kumar 1983).

Wad (1984), in a doctoral study, reported that radio programmes, though considered useful, interesting and rich in content, were used rarely in the teaching-learning process in urban areas, and less than 50% of the total programmes were used in rural areas. The study also reported that senior secondary students preferred radio over TV in rural areas. A comparative effectiveness study of television and radio in two rural community settings revealed that media programmes were only moderately comprehended, but retained well, and that duration of exposure had no remarkable benefit on the target audience (Samant 1983). Another study revealed significant differences in knowledge gain between rural and urban groups after listening to radio programmes (Mohanty 1990).

Mishra (1989) reported that children liked radio programmes based on a story format, but not radio talks and quiz programmes. Mishra recommended using child performers and developing programmes in story format using mythology and folk culture. Another study amongst Grade 4 and 5 students reported a high level of comprehension for drama- and story-based programmes, but a low level for talks and poetry recitation (Mohanty 1990).

Some studies have examined radio-plus-visual elements either in print or multimedia format. These applications are called "radio-vision." Oberoi (1981), through an experimental research design of a study of Grade 8 and 9 students, reported that the radio-vision groups obtained significantly higher mean scores on the recognition test than the group receiving instruction through the traditional teaching method. Use of colour workbooks in the radio-vision group significantly improved the mean scores of the learners. The attention profile of students using radio-vision also increased, and students' attention was sustained from start to finish of the presentation. In another study, students attained their highest knowledge achievement scores when geography was taught through radio-vision. Similarly, their retention of knowledge of geography was high when radio-vision was the medium of instruction (Dhamija 1985). These results show that radio-vision is best suited for specific subjects such as geography, where illustrations and map reading are essential. Interestingly, the study also revealed that the involvement of students in the classroom was high when they were taught through the radio-vision approach.

With the support of UNESCO, Indira Gandhi National Open University conducted an experiment on radio-vision using digital satellite audio broadcasts of WorldSpace. Sreedhar (2002) reported that this multi-site study with different learning media mostly showed the "no significant difference phenomenon." Although comprehension of content was almost equal across all groups, it was found that groups exposed to audio plus visuals fared better. Chaudhari (1997) in another radio-plus-technology use reported the field-testing of radio-text at Yashwantrao Chavan Open University. Using FM radio supplemented with a computer-based text and graphical interface, the radio-text system delivers multimedia content to remote centres. The content in the field-testing was designed in family drama format based on folk forms. This created a lot of interest among the audience, who discussed the topics in groups after the delivery of the programme. The evaluation of the programme showed that radio-text could create a very effective learning environment at a distance.

Research has also shown that school teachers appreciate the importance of radio programmes in staff development activities or in-service training programmes (Mohanty et al. 1976). School teachers are also critical of the pace of the radio programmes, thus, emphasising the need for careful planning and scheduling of radio programmes.

By contrast with some of this work, Parhar (1993), in her doctoral research, found no significant learning gain due to exposure to school broadcast and school television programmes.

RESEARCH ON INTERACTIVE RADIO

Interactive radio is like a radio broadcast programme where the listeners can phone in to interact with experts and teachers. Interactive programmes have recently gained popularity and, according to Chaudhary and Bansal (2000), they are based on the following assumptions, regarding the strengths and limitations of radio:

Radio can cater to region-specific needs of learner groups.

- A decentralised approach to radio broadcasting can develop a healthy academic relationship between resource person and students.
- Disadvantaged groups, such as the physically and visually challenged and women, can benefit from interactive radio.
- Use of local language for interaction may motivate students to pursue their course of studies.

Indira Gandhi National Open University (IGNOU) has been using interactive radio successfully since 1998. A few evaluation studies have been done on the use of this medium. In one study of the pilot project of interactive radio instruction at IGNOU, Bansal and Chaudhary (1999) reported that students' participation exceeded that of face-to-face personal contact and teleconference sessions. Students demanded more interactive sessions on assignments and to help them prepare for term-end examination. A continuation of this research, a multi-phase study (involving a survey, interviews and focus group discussion) by Chaudhary and Bansal (2000), found that those who participated and/or interacted in the interactive radio counselling sessions appreciated the advantages of interactive radio counselling. They received substantial benefits and considered it one of the cheapest modes of learning. The majority of the respondents also had no problem in comprehending the concepts discussed. The study emphasised the need to encourage interactivity amongst learners.

Sukumar (2001) reported on the media habits of IGNOU students and the usefulness of interactive radio counselling. Respondents considered interactive radio counselling an excellent opportunity to interact with faculty and experts and to clarify doubts on study materials. The study also revealed a "spill-over effect," as the interactive radio counselling programmes were being received by the general public. However, the frequency of interaction was limited, resulting in questionable learning impacts. Sharma (2002), through participatory observation and follow-up telephone interviews, reported that 60% of non-students make use of interactive radio counselling, confirming the spill-over effect. The study also emphasised the use of local language as the popular medium of interaction.

Recently, Gyan Vani radio programmes have been started by IGNOU. Usha Chander and Sharma (2003) gathered the feedback from the audience of a Gyan Vani station, which revealed that learners prefer discussion-based programmes (43%) followed by quiz shows (40%). Most of the respondents (62%) highlighted the need for interactivity in Gyan Vani programmes.

RESEARCH ON AUDIO CASSETTES

Audio cassettes, though they may not be useful for relaying news and up-to-date information, can perform all the other four roles outlined earlier for radio. However, they offer more control to the learners in terms of where, when and how to listen. Learners can stop, start, pause, rewind and fast-forward a cassette, thus personalising learning.

Kaur (1981), in her doctoral study, reported that self-instructional audio cassettes were effective for developing different teaching skills for student teachers. Golani (1982), through an empirical survey, reported that students learned better when audio-visual aids were used, and that their interest was also more greatly sustained in the learning activity with audio-visual aids than without them. In an evaluative study of an audio intervention programme aiming to sensitise grassroots-level workers in women's development, Chowdhry (1990) reported that the experimental group receiving the audio intervention performed better than the control group in comprehension, sequential thinking, recall and vocabulary, concept of colour and shape, awareness of immediate environment and awareness of cultural heritage.

In an attempt to study the utilisation and effectiveness of specially prepared audio cassettes in village primary schools for language (Hindi) development and listening comprehension, Sumitra (1991) conducted a major survey covering 450 primary schools, 900 teachers and 34,345 students. The results showed that children liked best the programmes that had segments of songs and stories, question-and-answer, and an activity-oriented design. In these programmes the learning points were repeated in different segments of a programme.

DISCUSSION

This review of research in itself cannot be called comprehensive, as research findings from other Asian countries are not covered here. However, the Indian research evaluations covered in the review provide us some insights, direction and gaps in research on audio in this part of the world. Though most of the studies are evaluative in nature, experimental research on effectiveness of audio media establishes their potential in education and training.

Some of the research reported still shows "no significant difference," yet the majority of the studies report that the achievement of the target groups increased as a result of radio programmes. Radio programmes are useful for transmitting factual information and learners are interested enough in radio-based programmes to tune in if the broadcast timings are suitable. Radio-vision could be gainfully employed in teaching subjects where illustrations, examples and steps (processes) are important. Radio programmes presented in story and drama formats are received well, though talks and quiz-based programmes are also useful. In order to make radio useful for distance learning, the programmes should:

- form an integrated part of the curriculum;
- be broadcast at a time suitable for the target audience;
- use a drama or a story format;
- use radio more for factual information than for explaining concepts; and
- use radio-vision, if the subject requires illustration.

While very little research on interactive radio has been undertaken, those studies that have been done underline the significance of interactivity in learning. Thus, the live radio session should be planned in advance and the agenda should be widely publicised to elicit interaction and discussion. Studies have also revealed that interactive radio instructions are used by a significant non-student population, suggesting that this medium encourages lifelong learners in society. With the emergence and popularity of FM radio growing, the use of interactive radio shows great potential for more interactivity in open and distance learning programmes.

Research on audio cassette use in education has proved to be effective in language learning. But studies also highlight issues such as the format of the programmes and repetition of the main learning points. It is important to note here that developing better audio-based programmes requires good audio scripts, planning and preparation.

As this review points out, research studies on educational audio media have so far tended to focus more on the achievement of learners at the school level. However, audio media plays a significant role in education of adults too, and thus in open and distance learning. More research is needed on the usefulness of audio in the adult learning context. As FM radio is poised to provide a new boost to the role of radio and audio media, it is time for research to focus more and more on how adult learners make use of audio, their likes and dislikes, and their overall gain in learning through audio compared to other media.

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CHAPTER 7

EDUCATIONAL TELEVISION AND TELECONFERENCE

Sohanvir Chaudhary and Santosh Panda

INTRODUCTION

Instructional design and educational media are two major developments in the teaching-learning process of the recent past. While instructional design refers to pedagogy and the methodologies of the teaching-learning process, educational media, as a generic term, includes information and communication media and technologies that are used to facilitate the process of education and training. Educational media have brought about new learning possibilities in the conventional classroom, distance education and self-learning. Application of new media has made it possible to demonstrate, experiment with, analyse and stimulate individual and group learning. Furthermore, use of educational media enhances the quality of education and training and can make educational resources accessible to all those who need them, regardless of time and distance. A large number of research studies have been conducted around the globe (including a sizeable number of studies in the Asian region) to assess the effectiveness of various media used in stand-alone, supplementary, complementary, and/or integrated modes. Efforts are being made to find alternative delivery mechanisms and assess their potential in different contexts.

This chapter reviews research studies conducted on educational television (ETV), including teleconferencing. The section on ETV research is divided into three sub-sections: impact on children and young people, impact on teachers, and utilisation. No such categorisation has been attempted in the case of teleconferencing because of fewer studies conducted in this area. *Although an overall increased use of teleconferencing as a technology, especially by government administrative mechanisms and business houses, has been noted, few references are available of studies conducted recently, particularly in the last five years, in the context of education.*

Before proceeding to a sectional analysis, the reader should bear in mind that with the advent and explosion of the new information and communication technologies (ICTs), research into educational television has declined. Thus, it is difficult to find studies and analyses of this medium beyond vintage studies of the 1960s and 1970s, or within the broader studies of media impact in recent decades.

OVERVIEW OF EDUCATIONAL TELEVISION

More and more educational institutions are increasingly incorporating electronic media in the teaching-learning process in an effort to enhance both the reach and quality of education provided to large numbers of learners. Educational television is one of the favoured media being used by many countries in the world. Nevertheless, some developing countries have found it difficult to create appropriate technological and managerial infrastructure and are not able to optimally use this resource for educational purposes. High upfront costs of investments, rapid obsolescence of technology, confusion resulting from an abundance of carriers with varied capability, convergence of technologies — all of this has made technology choices difficult for countries with limited economic resources and small populations.

Globally, television has been used successfully in the teaching-learning process both in formal and non-formal settings. The Mexican Telesecundaria and the Brazil soap opera experiments are cases in point. Within the Asian region, television has been successfully deployed in agricultural extension, bringing to farmers knowledge about improved varieties of seeds, planting and cropping practices. In Bangladesh, a small experiment in the 1950s funded by UNESCO provided audiovisual support through pre-recorded programmes (see Chapter 1 in this volume).

In India, television had its origins in education, when it was started as a pilot project in 1959 and was used for school education in some selected secondary schools of Delhi (the capital of India). India's first attempt to use TV on a mass scale for improving the quality of primary education in rural areas came with the availability of the American satellite, ATS-6, during the Satellite Instructional Television Experiment (SITE) in 1975–76. After SITE, the push was on and, with the operationalisation of the Indian National Satellite System in 1983, educational television received its largest boost as the country introduced national school television and the Countrywide Classroom for higher education programming in 1984 and for distance education soon after that.

Educational programming was also produced and telecast on the Indonesian satellite PALAPA during the mid-1970s in an innovative education-commercial television model mix. Although not calling them so, Sri Lanka's Rupavahini Television has also produced and telecast interactive educational programmes. Since 2000, the morning chunk is directed at home-based workers, retired persons and unemployed youth for the purpose of educating them. A similar educational programme has been in operation since 2002, targeting youth and school children in the afternoon hours. Internal audience reports record the continuing success of this effort.

The UNICEF-enabled cross-cultural series "Meena" has been broadcast throughout South Asia, spreading gender-sensitive information and knowledge about protection against violence and exploitation, minimum age for marriage, access to information, child care facilities and social security, community/family responsibility, nationality, standard of living, and health care concerns. In Bangladesh, television has been recognised as a tool to make education accessible to the masses, both in urban and rural areas (Sultana 1998). South Asia is also home to a dedicated television channel for education, Gyan Darshan, and India has launched a dedicated educational satellite, EDUSAT.

Effective use of television, essentially a one-way synchronous medium, depends on a large number of factors. Our concern here in reviewing the research studies has been with overall effectiveness, impact and utilisation of ETV. This review does not include research on the content variables influencing the quality of individual programme production, because such information is not yet available.

IMPACT ON CHILDREN

Various studies conducted all over the world, both in the developed and the developing countries, have established that students learn as much from TV as from any other medium. Under favourable conditions, TV can bring desirable change in the knowledge and attitude of students. The studies conducted in India also establish that ETV programmes favourably affected the knowledge, understanding and behaviour of the students exposed to those programmes.

Neurath (1966) conducted a seminal study on the impact of television in improving science education (the Delhi School Television Project). Using an experimental design and dividing his achievements tests into factual knowledge, visual gains and understanding, Neurath conducted four rounds of tests to gain a longitudinal insight into the effect of television. He found that students exposed to television did better overall and on all types of questions. The result that surprised the researcher was that television students did distinctly better on questions that require understanding (problem-solving questions).

Quite a few studies on the effects of ETV were undertaken during SITE. The study by Shukla and Kumar (1977) deserves special mention. It was aimed at finding out changes in the behaviour and cognitive development of primary school children as a result of their exposure to television lessons.

The results showed significant improvement in language development of the exposed group. The picture, however, was neither very clear nor persistent on achievements in other school subjects. The researchers concluded that rural children, who were normally deprived of extensive interaction with parents, teachers and books — which was essential for language development — benefited from interacting with the television.

Kumar (1978) concluded that children of the TV schools remembered quite a few things from the programmes and also learned from them. Such learning included paper and mud toy construction, some games, poems and stories. They also learned about personal cleanliness and social and moral values.

Aghi (1977) found, during the same period of SITE, that TV exposure to science education programmes stimulated an interest among the experimental school children of Grades 3 and 5. Significant information gain as a result of TV viewing was observed on topics such as fuel, plant root systems, milk, transportation and nation-building. In a study, sponsored by the Space Applications Centre in Ahmedabad, a series of science programmes on nutrition, hygiene, environmental science, nature and the universe was transmitted in the Kheda district for children between 6 and 12 years. The results showed that those children exposed to television were better informed on the broad principles of the topics than their counterparts in the control villages.

Rehman (1977), however, found that comprehension of the ETV programmes telecast during SITE was generally partial. Agarwal (1978) evaluated SITE at a micro-level for in-depth, qualitative understanding of the process of socio-cultural changes that might have been triggered by the introduction of TV. In terms of the impact of ETV on children, he found that the children's comprehension of the programmes was rather poor. It often depended upon the content as well as the age and educational standard of the student. The students of Grade 1 did not show much interest in learning through TV, except for enjoying recreational programmes. Students of Grades 2 and 3 did not understand the science programmes or the underlying themes of the songs, but they were happy to watch nature on TV, especially plants, birds and animals which they saw in their daily lives.

Programmes showing cities, tourist places and industrial areas captured the children's attention and produced great awe. The children recalled several of those programmes in the post-viewing interviews. Stories, dances and dramas received the most positive response, though recalling the themes of these programmes varied from grade to grade.

However, from the programmes on health and nutrition, the children only really learned that they should bathe daily and keep their surroundings clean. What bacteria were and how they affected health was difficult for them to understand. The study concluded that: (i) for comprehension, language should be simple; (ii) the programme plan should allow for repetition in a variety of ways to help reinforce new ideas and allow the children to learn the steps in doing activities; and (iii) TV curriculum should promote teacher-student interaction for broadening the child's mental horizon.

Ensuring that ETV programmes are syllabus based seems to ensure they will be better used. For example, a needs assessment study on the children of Orissa (CIET 1984a) reported that ETV modules should comprise two types of programmes: those drawn from the contents prescribed in the primary school syllabus, and those related to general knowledge which broadens the horizon of children, develops scientific temper, instills moral values and develops hygienic habits among children.

Kanade (1982), working with a sample of 216 rural elementary school children drawn from television and non-television schools, found that TV children's language fluency was improved, though language refinement remained unaffected. Mohanty (1991) and Chaudhary (1991) observed that rural children were enthusiastic about TV viewing. Most of them looked forward to the ETV period and children of all age groups watched ETV programmes attentively if the opportunity was given to them. However, the children faced some difficulties in comprehending the content because of heavy content load, difficult language, speed of content delivery, pronunciation by the tele-teachers (presenters), style of presentation and other factors.

Karim et al. (2001) conducted a survey on the role of radio and television programmes in distance and open learning systems in Bangladesh on the students of the Graduate Diploma in Management (GDM) programme of the Bangladesh Open University. The objectives of the study were to assess the effectiveness of BOU's radio and television programmes and to suggest remedial measures to make the programmes more effective for the students. The researchers found that the programmes were appreciated by 85% of GDM students. The responding viewers identified some problems in making use of the television programmes, which were, by and large, unsuitable viewing times and frequent power cuts during viewing.

Das and Das (2001), in their study on the viewing of Doordarshan (Indian Television) programmes by high school students, examined the students' viewing preferences, particularly of Grade 9, in relation to various television programmes. The findings of the study revealed that the students expressed interest in learning (in a classroom situation) through television and video programmes.

The foregoing studies do not consistently and conclusively sum up any significant impact of ETV on the immediate academic achievement of students. However, they suggest that such programmes do generate curiosity and sharpen the thinking process of children. It therefore seems that educational programmes have the potential to enhance learning.

According to Aghi (1996) there was a dearth of TV programmes for school children. Around 75% of her sample of children mentioned programmes made for adults as the ones they liked. Crime, thrillers, comedies and family serials formed the core of the programmes liked by her respondents. Recognising the need to study the

impact of television on the life of children in Asia, the Asian Media Information and Communication Centre (AMIC) launched an empirical study on children and the media in Asia. The first phase of the study examined the nature and types of children's television programmes available to them in Asia. It examined the level of awareness among children's television programme producers and TV policy-makers about the rights of the child as enunciated in the United Nations Charter on Children's Rights. The study looked at the nature of the world created for children by these television programmes. The study also looked into the resources available for the production of children's television programmes in Asia.

In 1999, AMIC launched another study on the portrayal of children in television and the press in 13 countries in Asia. The survey shows clearly the need to develop children's television in many countries in Asia. At the Asian Summit of Child Rights and the Media held in Manila in 1996, AMIC proposed the creation of Asian children's programmes for television, radio and press. This proposal was made again at the Second World Summit of Television for Children held in London in March 1998.

IMPACT ON TEACHERS

The impact of ETV on teachers has been studied both with respect to the programmes designed and telecast for children and those designed for teacher training and capacity building.

Neurath (1966) observed that in the beginning there was widespread apprehension and scepticism among teachers about the utility of ETV in teaching science to senior secondary school children. However, with time, the situation changed and criticism became less common. The teachers who experienced TV found it good and useful, not only for the students, but also for themselves. Neurath (1966) wrote:

> "Teachers had found television to be a very useful aid in improving learning among students since they were able to see on the television screen more and better experiments in greater detail than what teachers could provide in most of the schools. It was found that the interest in science among students also increased. Moreover, television was already proving to be a useful aid teaching students more and better experiments."

Concerning the impact of school TV on the teachers, Neurath (1966) made several interesting observations:

> "Whole learning process, though not necessarily the teaching performance, of every single teacher is slowly improving."
>
> "Science teachers are becoming aware (from seeing the television teacher) not only of the necessity, but also of the possibility, to mobilise their own, even though in most cases rather meagre, laboratory resources."
>
> "[Teachers] are now more vociferous in their clamour for more laboratory space and equipments."

In a feedback study of the ETV programmes for primary school children in the INSAT districts, Singh and Singh (1983) found that teachers liked the programmes meant for the children. During SITE, the morning slot otherwise meant for the school children was used twice for the in-service training of primary teachers (for teaching science) during the summer and autumn vacations. A multimedia approach was taken, made up

of TV lessons, radio broadcasts, reading materials and hands-on experience conducting experiments and activities with inexpensive, locally available materials taking the help of self-instructional materials and guidance from the TV custodian. The programme was repeated after SITE for a group of teachers in an experimental situation, using control groups, with a pre- and post-test design. Shukla et al. (1978) evaluated these programmes and concluded that the multimedia package was successful in significantly increasing the knowledge of content and pedagogy of teaching science among the primary school teachers.

Another important outcome was that teachers were convinced that experimentation was an important element in the teaching of science, and that it was possible for the primary teacher to arrange it without laboratory facilities using locally available materials and simple equipment. The message of "importance of learning by doing" was well received.

In another study, Behera (1991) reported that ETV had a positive impact on three dimensions of competency in the TV teachers: knowledge, understanding and application. Their ability to apply their knowledge and understanding in real classroom situations was enhanced and reflected in their adoption of innovative approaches to teaching primary subjects.

In summary, these studies show the positive effects of ETV in general on enhancing the competency of teachers and encouraging in them a favourable attitude towards the use of ETV for children, particularly at the lower grade level.

Such benefits, however, are tempered by other findings that show that teacher resistance to the use of television as a teaching tool is based on a lack of awareness of what is available and where it can be obtained, an ignorance of how to integrate media effectively, and the lack of institutional readiness on the part of schools and colleges. This results in reluctance and resistance to using electronic media to improve the quality of learning. Such teacher resistance is global and can be addressed only by teacher training.

USE OF ETV PROGRAMMES

Studies conducted in India during SITE indicated that utilisation of the ETV service was satisfactory. Several factors contributed to this, such as:

- the novelty effect of the medium;
- the high motivation among the teachers;
- the support of the headmasters of the school;
- the existence of an infrastructure for proper security, maintenance and operation of the TV sets; and
- the effective supervision and monitoring of the ETV service.

Studies conducted later in the post-SITE and INSAT period, however, did not present a bright picture about the utilisation of the medium. Several field studies revealed that the ETV programmes actually remained under-utilised (CIET 1983a, 1992; Behra 1991; Chaudhary 1991).

In a study conducted by the CIET (1983a), it was reported that on physical verification, out of 50 schools listed by the State Education Department as operating the TV set regularly, only seven schools were actually making use of the ETV programmes. Another study in the INSAT districts conducted by the CIET (1992a) showed that only 23% of the TV schools reported using TV sets. The studies conducted in the schools of Delhi also pointed toward rather poor utilisation of the ETV programmes (CIET 1986; Joshi 1988).

The main reasons for under-utilisation, as revealed by the various studies were infrastructural, such as:

- sets out of order
- poor maintenance of TV sets
- erratic power supply
- disconnection of power supply due to non-payment of electricity bills

In some cases there were institutional problems, such as:

- non-co-operation of the headmasters in accommodating TV period in the class timetable;
- lack of supervision by the officials of the user education department;
- indifferent attitude of the custodian teachers (responsible for the operation of the TV set);
- inadequate remuneration and incentive for the custodian teachers;
- lack of training of custodian teachers;
- lack of support materials to the teachers; and
- poor quality of the programmes.

A study of the INSAT TV project conducted by CIET (1993) showed that only 45% of the teachers were aware of the existence of the ETV programmes telecast for the teachers. And only 36% teachers could say specifically that the weekly programmes for the teachers were telecast on Saturdays.

There was a time in 1995, when India's Countrywide Classroom was at its height of public acceptance. The independently commissioned report by ADMAR (a marketing research agency) in 1996 found that viewership of educational programmes peaked at around 20 million in the afternoon session. Quite a few were casual viewers. Nevertheless, frequent or dedicated viewers (watching on four or more days in a week) numbered over 2 million. Subsequently, the national broadcaster withdrew the programme slot for higher education, replacing it with soap operas. Viewership declined significantly as timings for educational programmes changed to the early morning hours, which were not suitable for many potential viewers.

Reddi (1996) identified some other common reasons for poor utilization, noted by both teachers and learners. She reported that at the user end (i.e., the teacher or student), greater ignorance and confusion existed, resulting in reluctance and resistance to using electronic media to improve the quality of learning. Among the complaints often heard from students and teachers alike were the following:

- Constructing a lesson plan which integrates electronic media is too time-consuming.
- There is too much responsibility involved.
- I teach well enough without instructional aids.
- No programmes are available in my subject.
- I do not know how to operate the machines.
- There are no technicians to operate the machines.
- Programmes are aired at the wrong times.
- I never know when programmes on my subject are aired.
- There is no video library/The video library is disorganised.

- There is no electric power in the college.
- The syllabus has to be covered and I do not have the time to use electronic media.

Pre- and post-telecast activities

Success of any ETV programme in the classroom depends on the teacher's preparation and follow-up after the programmes. The act of sharing experiences with children adds a new dimension to the teacher's relations with the children. However, the arrangement of pre- and post-telecast activities by TV custodian teachers was almost missing (Chaudhary 1991). Shah (1972) also reported that hardly any teachers conducted pre- and post-telecast activities. In the absence of such activities, there could not be effective utilisation of the TV programmes.

The impact of viewing conditions on teleconference effectiveness

Appropriate viewing conditions enhance learning from the medium (Swami 1967). In a study conducted in rural and urban schools in and around Delhi, Sharma (1982) found that only 50% of the students could watch programmes because of limited space for viewing. This applied to urban schools also.

These and other similar reasons are familiar to proponents of educational television throughout the Asian region. The studies show that good programming is no guarantee that the target audience will view the programmes. A different set of conditions and factors govern the utilisation of the medium.

TELECONFERENCING

The use of television with the element of interaction between the learner and the teacher in real-time bridges the physical gap between the teacher and the learner and enhances learning. Although in vogue in the U.S. and other parts of the developed world for business purposes, Asia discovered teleconferencing as a way of including the element of interactivity in educational television programming. Technological advances, especially in India, made this option increasingly available for use by educators, and early experimentation with this format (one-way video, two-way audio) showed that interactivity in real-time enhanced learning from television.

There are sound financial, as well as pedagogical, reasons to use the teleconferencing system to reach large, dispersed audiences with the same quality of education. Teleconferencing is becoming popular among adult learners who are motivated enough to acquire knowledge through interaction with experts. Besides, it is effective in managing and monitoring the teaching-learning processes and operations.

Since the 1970s, telephone technology has been a pre-eminent interactive mode of delivery in the developed world. However, because of poor teledensity, a lack of enabling policies and the dearth of adequate funds available with educational institutions in developing countries (particularly in South Asia), interactive technologies have been difficult to use for educational and developmental purposes on a large scale. The situation, fortunately, is changing fast.

Several forms of teleconferencing exist, including audio, audio-graphics, video and computer conferencing. And different types of teleconferences differ in complexity and

costs. Two-way audio teleconferencing, for example, is simple and cheaper; two-way video teleconferencing is more complex and costly.

Experimentation with teleconferencing for education in India started in 1983 in the form of tele-symposia, and since then considerable expansion in the use of this technology has taken place. The early experiments, from 1983 to the University Grants Commission's Talkback Experiment of 1991, focused largely on the testing of technology and platforms and were more like feasibility studies. Since then, significant expansion has occurred with the medium in the education, development and business sectors in India.

System efficacy demonstration studies

Summarising the findings of five experiments on teleconferencing conducted by the Indian Space Research Organisation till 1992, Agrawal and Pande (1992) reported that the system provided immediate, instant, lively and spontaneous interaction among experts at the teaching end, and among participants at the receiving end, which otherwise was not found in the existing distance teaching and learning system.

In a study on distance teaching through cable television network conducted in a small town in India, Chaudhary and Behari (1994) found that a large number of learners, including homemakers, participated in interactive television. The participants could discuss various issues related to the subject (food and nutrition) with experts at the teaching end. The experiment motivated more cable operators to use their cable television network for educational purposes.

Sahoo (1994) conducted a study to assess the impact of teleconferencing on students of the Post-Graduate Diploma in Higher Education of the Indira Gandhi National Open University from two angles: (i) effectiveness of teleconferencing as a means of distance education; and (ii) teleconferencing as one of the components of the extended contact programme, which included other components such as group discussion, practicals, individual projects, group projects, brainstorming and question-answer sessions with experts. The findings revealed that both the participants and the resource persons favourably commented on the use of teleconferencing as one of the components of an extended contact programme.

Teleconferencing as an effective trainer tool

Using interactive television technology, the National Council for Educational Research and Training in India conducted in-service training programmes of primary school teachers in 1996, which came to be known as Special Orientation Programme for Primary School Teachers. Dash (1997) studied the reactions of the participants regarding the content and its presentation, interaction between the experts and the participants, technology-related matters, and activities at the learning centres, and found that the participants reacted favourably on all those counts.

Phutela (1998) studied a pilot project experiment on the use of teleconference to orient 850 primary school teachers in the state of Karnataka in India. The evaluation indicated significant gains on the learning of concepts and practices relating to the large number of themes covered in the programme. The teachers welcomed the technology, but bemoaned the lack of opportunities to interact with the experts because of limited telephone lines. The experiment demonstrated the potential of the technology in meeting the training requirements of large groups, such as teachers, at a distance.

Production aspects affecting teleconference effectiveness

In an experiment conducted by Goa University, it was found that a large number of students (91%) considered teleconferencing sessions to be relevant and useful. It was evidenced by the overwhelming response during the interactive sessions. However, the majority of them found that the quality of audio and video was average. They suggested inclusion of video clippings, animation sequences and so on. to make the presentations interesting, lively and effective, and added that the teaching end should be equipped with more telephone lines so as to accommodate more questions during the interaction sessions. The personnel involved in organising and utilising teleconferencing sessions expressed the need for training in this respect.

Parkash and Lal (1998) studied presentation and production aspects in relation to the effectiveness of teleconferencing for orientation of primary school teachers. They found that language, presentation style, pace of presentation, clarity of graphs/charts/text used and the teaching aids had a direct bearing on effectiveness of teleconferencing. They suggested that the design of the sessions should be learner oriented and spontaneous to ensure active participation of the learners, for which the experts/presenters must be trained in teaching/learning through interactive technologies.

Mishra (1999) conducted a micro-level study on teleconferencing at Indira Gandhi National Open University (IGNOU). The major findings of the study were as follows:

- On average, each session received around 11 calls and the resource persons responded to all the calls by telephone. This indicated a rich quality of interaction.
- About 90% of the interactions were related to the topics being deliberated. However, some questions were repeated.
- The mean duration of calls was 34.5 seconds. The total duration of interaction calls was little less than 10% of the total teleconferencing time.
- Forty per cent of teleconferencing time was devoted to presentation and 60% to discussion.
- The overall quality of the teleconferencing was rated "good" to "very good." The technical quality was rated very high.

Taleem Research Foundation (1999) assessed the effectiveness of the teleconferencing system of the Distance Education Programme of District Primary Education Programme (DEP-DPEP) in the state of Tamil Nadu. The study found that the participants were in favour of teleconferencing because of its novel nature and perceived benefits, technology was user-friendly in nature, and the interest level was high among the participants on the first day and kept on increasing day after day.

Trivedi (1998) analysed various experiments on interactive satellite-based communication technologies conducted by the ISRO from 1991 to 1998. She summarised the main findings as follows:

- Interactive communication using satellite- and long-distance telephone links contributed to the knowledge gain of the participants.
- The conceptual understanding of the participants improved significantly.
- The question-answer sessions were more effective than just viewing telecourses. However, more time was needed for question-answer sessions.
- Non-transmission of the programme because of electricity failure de-motivated the participants.

In her evaluation of more than 25 operational uses of teleconferencing for education, she concluded that:

- Inter-institutional co-operation is necessary for this system to be effective.
- Initial establishment of infrastructure at the learners end (i.e., the provision of a dish antenna, telephone line, television set, and other peripherals) can be expensive.
- Once infrastructure is in place, operational costs are very low.
- Teleconferencing requires careful planning, attention to detail and close matching of content to learner needs.
- While this method of teaching/learning is not necessarily more effective than classroom instruction, it is a cost-effective alternative, especially in situations of great distances and inequalities of resources and facilities.

In studying the impact on learners, Reddi (1996) analysed the research findings of four teleconferencing experiments carried out by different institutional stakeholders between 1991 and 1995. She concluded that while undoubtedly there was greater access possible, there was no clear-cut evidence to show that interaction through the one-way video, two-way audio approach produced higher learning outcomes or that it was more effective than the mere one-way transmission of information through television. Novelty effect wore off quickly and general patterns of television viewing were observed, including significant drops in attendance and attention, and disturbances in and around the room.

Planning and management issues related to teleconferencing

Reddi (1996) also found that while attitudes and reactions towards using teleconferencing as a mode of instruction were generally favourable, audiences clarified that regular use of teleconferencing in future would depend upon improvements in timing, access to telephone facilities, and high quality programme content. Across all the experiments she studied, students and other viewers complained about inadequate interaction time, long holding time before a call would mature, poor quality of audio in the telephone call, and echoes caused by not muting the television set when questions were asked.

Raghubanshi and Mishra (1996) undertook a study to find out reasons for poor attendance in teleconferencing sessions. The findings revealed that although a majority of the learners (70%) were aware of the teleconferencing facility, they could not attend the sessions because of lack of information or late information about the teleconferencing schedule.

Impact on teachers

There is little or no research on the impact of teleconferencing on teachers. Anecdotal evidence, however, shows a favourable attitude among teachers who participated in teleconferencing sessions. Such evidence must be tempered by similar anecdotal evidence that shows teachers find the preparation for a teleconference difficult and cumbersome; and that the failure of teleconferencing is sometimes a result of inadequate preparation and presentation of content, and a lack of attention to details by the managers, whether at the teaching or learning end.

Rao and Khan (1997, 1998) identified the pitfalls and offered some possible solutions for improving the teleconferencing system as a pedagogic strategy for the distance teaching/learning system. After reviewing the teleconferencing sessions conducted at

IGNOU over a period of three years, they found that professional courses were more suited to teleconferencing, because the learners enrolled in these courses were mature and motivated enough to extract optimum benefit from the system. They suggested that to make teleconferencing sessions more effective in terms of utilisation by learners, serious planning and continuous monitoring are required. Planning and management at the administrative level is also crucial. The talkback system needs improvement in terms of efficiency and numbers.

Impact on learners

Reddi's 1996 study summarised findings from the teleconferencing experiments into issues relating to managerial and content issues. She identified technical, operational, cost and institutional processes as being important managerial matters and pointed out in particular that adequate attention at the learner's end — to ensure awareness, the provision of comfortable viewing conditions, communication links with the teaching end and the timely supply of support learning materials — enhanced both the quality and the extent of learning from this medium. Her study showed that planning and sound instructional design in content are critical for any impact on learners.

Summarising various research studies conducted on teleconferencing in India, Mishra (1999) remarked, "Interestingly, none of these studies look into the question of interactivity from the viewpoint of their nature, quality, and effect on learning. Participants' reaction has always been the major area of concern. But for determining the pedagogical utility of teleconference, it is essential that the nature of the interaction be dealt with in depth" (p. 251). The quality of the interaction needed to be looked into and improved as much as possible through such measures as training presenters (resource persons) in interactive techniques, allotting more time to the question-answer component, providing more telephone lines, using graphs/charts/text in the electronic version (including Powerpoint presentation), and generally making the presentations learner-centred.

Teleconferencing sessions proved more useful for the disadvantaged group of learners, including those living or working in remote areas and difficult terrain, as this group lacked necessary facilities for education and training. As a result, the teleconferencing sessions for primary school teachers working in villages in different parts of India proved useful, providing immediate, instant, lively, and spontaneous interaction among participants and experts. The teachers, in general, welcome the technology.

All told, there is a great need for attention to detail in the planning, designing, execution and evaluation of educational teleconferences. What is clear is that teleconferencing is economically and technically feasible and can serve as an important educational tool, provided the snags in the system are worked out.

CONCLUSIONS

The conclusions from this review can be summarized as follows:

- Many studies show a favourable attitude among both teachers and students towards ETV programmes. However, when it comes to the utilisation of these programmes, the majority of teachers show indifference. Thus, there is a strong need to integrate the medium in the teaching/learning process rather than allow it to remain as an adjunct.
- The reactions of both teachers and students suggest that the programmes could be better used if they are syllabus based.
- The design of ETV programmes has to be looked into seriously. The programmes should be based on the interests and cognitive level of the targeted groups. Any impact study to be conducted on ETV programmes should take into account the process involved in programme design and production.
- None of the studies reviewed in this chapter have made any categorical attempt to look into the process of learning (i.e., how students learn from the educational television programmes) either within the school complex or at home. This process of learning might show variations in various programme design and production types, and across a number of discipline areas. It may well be that educational programmes designed and produced with these considerations in mind might significantly enhance students' learning from the medium.
- Teleconferencing as an interactive and cost-effective system appears to hold promise for education in the developing countries in future, provided systemic problems are sorted out.
- A key gap is the inadequate documentation of processes, whether in the use of educational television or teleconferences. We know, having watched such programmes in different Asian countries, that television is used for education, both in a linear and interactive mode. Yet, finding research on its use in developing countries is near impossible, which is why there has been a greater emphasis on Indian findings than on research done in other Asian countries.

While there have been a large number of studies conducted on educational television and teleconferencing in India, the unfortunate reality has been that these have not been longitudinal studies that would enable evaluation of the impact of these modes as learning tools over time. Still fewer are studies that gather evidence from the learner or the user as a primary source of data. Thus, while we know that the system does work, we still do not have a clear picture of learner benefits from the use of these media for teaching and learning.

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CHAPTER 8

COMPUTERS, MULTIMEDIA AND E-LEARNING

Paul Kawachi

"*non scholae sed vitae discimus*"
— We learn not for school but for life —

BACKGROUND

Distance education in the West has developed as a discipline with its own research alongside and distinct from conventional education. This distinction prevails despite some aspects of computer-mediated education also involving a face-to-face component (e.g., to establish early on the basis for an online community of learners, or to support synchronous computer-mediated conferencing at a distance). Convergence is, however, beginning to occur not from distance education moving towards conventional education, but the reverse. We are now seeing conventional universities and schools throughout the world adopting distance learning technologies not only to reach the unreached, but, notably, to augment their current on-campus students. This trend towards convergence arising from within conventional education is nowhere more evident than in Asia. In the early 1990s, openness, access and equity were the driving forces of distance education. In the late 1990s, the emphasis was on providing improved distant student support — both academic and non-academic support. Now in the 21st century, we see uptake of computers and multimedia for e-learning in our conventional classrooms as well as in distance education. To examine these and other current developments, this chapter reviews the research published on the utilisation and efficacy of computers, multimedia and e-learning in conventional education and in distance education in Asia.

COMPUTERS IN EDUCATION

The use of computers in education can be classified into four types: computer-assisted instruction (CAI), computer-managed instruction (CMI), computer-based multimedia, and computer-mediated communication (CMC) (Willis [nd] c. 1996). The first two are stand-alone usages. The third computer-based multimedia is dealt with as "multimedia" below. The fourth, CMC, involves computer-to-computer transactions, including e-mail. It is sometimes referred to as online learning and is dealt with as "e-learning" below. These four types are embedded in turn — CAI is often contained inside CMI, both CAI and CMI are used inside multimedia, and all three may be used inside CMC e-learning. CAI is basically taken to mean a self-contained machine for drilling, practising

and problem-solving; while CMI involves data storage, retrieval and administrative organisation of education. These first two uses are common in most educational contexts. CAI is used for self-paced individualised learning, giving immediate reinforcement with feedback.

This review examines the first two uses of CAI and CMI in educational interactivity among institutions, tutors and students, for both academic purposes (storage, delivery and retrieval of content) and non-academic purposes (such as administration and counselling support). Where they are used for social extrinsic purposes (relating to matters outside the course), this is categorised as non-academic support, although it is recognized that even social intrinsic use in community building might be simply preliminary activity before actual learning takes place. Library resources and support services are the most common CMI use of computers (excluding their functions in multimedia and e-learning, dealt with separately below. Asynchronous e-mailing appears to be the most common CMC use, and in the highly developed centres of excellence in Hong Kong, Japan, Korea, Singapore and Taiwan, synchronous text-chat is common. This occasionally becomes multimedia with the addition of digital graphics and even video transmissions along with plain text. In the rural regions of Asia, computers have entered classrooms in the past few years, though as recently as two years ago (for example, in India) schools were despondent with their computers in the room and no educational interactivity taking place (Noronha 2000). However, the first planned activity to introduce computers in school was in 1984, known as the Computer Literacy and School Studies project. Evaluation of the project revealed problems due to lack of infrastructure and other management and administrative hurdles (Agrawal 1996; see Chapter 2).

One reason that more educationally effective use cannot be made of these computers in classrooms is the lack of regional infrastructure (such as no Internet provision and inadequate or unreliable connectivity regarding telephonic transmission rate or very low bandwidth), preventing the use of multimedia and e-learning (Kurbel 2002). These difficulties in connectivity and infrastructure — seen in much of rural Asia — could be circumvented by the use of CD-hybrids (Diaz 1999). Even where the infrastructure is established, research shows "many students enter online courses with insufficient computer skills" (Pulist 2002, p. 102), causing a drain on student support services. Many researchers throughout Asia report the inadequate provision of technical support, even when the computer is only used for CAI or CMI as a stand-alone library resource device. If computers are networked, then this lack in basic computer skills can indeed hinder the achievement of any collaborative CMC e-learning.

Research in CAI notably includes research into computer-assisted language learning (CALL). Some success has been achieved (Hegelheimer and Chapelle 2000) drawing from second-language acquisition research. In general, however, CALL research is undermined by neglecting the important factor of learner motivations, as well as by overlooking authentic communicative language use.

EDUCATIONAL MULTIMEDIA

The definition of "multimedia" used here is the one used by Jonassen (2000, p. 207): "[Multimedia] is the integration of media such as text, sound, graphics, animation, video, imaging, and spatial modelling into a computer system." The term multimedia could be applied to a document consisting of text and graphics (Greenlaw and Hepp 1999, p. 44) or any form of presentation using multiple media (Schwartz and Beichner 1999, p. 8). In this discussion, however, only multimedia *through computer presentation* is reviewed.

There is little research on the educational effectiveness of applying multimedia. Most reports just advocate the desirability of a future deployment of multimedia in a "silver-bullet" or bandwagon approach. A few describe simply an introduction of multimedia and assert its effectiveness without analyses and usually only on the basis of student post-test satisfaction. Student satisfaction with a programme is important, but does not necessarily correlate directly with improved learning outcomes. For example, in a well-designed, three-way controlled comparative analysis by Boling and Robinson (1999, p. 170), the addition of interactive multimedia to a distance programme proved to be less effective for learning than the face-to-face equivalent. The authors found that students enjoyed their distance learning experience most when the online lecture was supplemented by CMC video conferencing with other students — more than when supplemented by face-to-face co-operative group discussion, and more than when supplemented by only individual study (the control). However, their students, through testing, showed most learning after the face-to-face group discussion. This indicated that the level of student enjoyment or satisfaction cannot be equated automatically with better quality learning — there is some trade-off between these.

Teacher-to-student and student-to-student interactions have been reported to be a key basis for high-quality learning outcomes (see, for example, Wegerif 1998; Kawachi 2003a). However, even this research is not yet fully clarified. While an online community of students is believed to foster learning, at least in the early stages of a course (Kawachi 2003b), some students, especially adults, do not engage in distance education for intrinsic social reasons. For instance, student-perceived learning and course satisfaction have been related more to the amount of information received than to online rapport with tutors and other students (Walker and Hackman 1992).

An overview of how to deploy multimedia is given by Reddi and Mishra (2003) in a learning resources module for teachers. They provide a succinct interpretation of Jonassen's list of media, with their categorisation of the media as text, audio, visual and animation, plus the navigation interactivity. The various sub-types were also given as audio (narration or voice-over, music and sound effects), visual (static graphics and moving video) and animation (of the text and of the graphics — using movements, fade in/out and zoom in/out). And they clearly described the step-wise construction of a multimedia presentation that could be uploaded to the Internet for online learning or provided on a CD-hybrid for offline learning. Each page, according to them, could be enhanced through the addition of multimedia to reach simultaneously the senses of the student. Indeed, the current power of instructional designer software can provide the platform with templates for this. However, there is little research yet on the educational effectiveness of deploying multimedia, particularly when it is aimed at simultaneously engaging the senses.

Most design is simply intuited from pre-computer studies that said more media results in more learning (such as the findings reported by Geisman [1988]: that students remember 20% of what they see, 40% of what they both see and hear, and 70% of what they see, hear and do). Screen design is an important factor found to affect both the completion rate (poor design caused a 39% decrease in completion rate) and study time required (good design required one-fifth of the time to complete the lesson) (Szabo and Kanuka 1999). Concerning the additive and potentially synergistic advantages of multimedia for learning, the educational value of plain text can be enhanced through adding multimedia to simplify comprehension (Hashim 2000). However, some additions, for example of text to a presentation of animation and narration, have been found to result in poorer learning outcomes (Doolittle 2001; for a comprehensive review, see Najjar 1995). And Beccue and Vila (2001) found no learning benefit from adding audio to multimedia of text

plus graphics. Beyond its potential to reach the senses simultaneously, multimedia also incorporates the capability for horizontal and vertical navigation to other pages. Most research studies have found that the complexity of the navigational steps to be mastered either required very much more time of a student than guided learning or, in a same-duration-paced class, resulted in the students becoming disoriented (see, for example, Rouet and Levonen, 1996) and led to poorer learning outcomes. Guided navigation or semi-guided navigation can be built into a hybrid-CD. While online on the World Wide Web, a printed manual may serve adequately to guide the student's construction of an expeditious narrative.

The gender barrier in Asia related to the use of computers continues to be a concern (Tandon 1998). The gender difference in learning outcomes in a conventional classroom was eliminated when a similar course was delivered through a multimedia Web site, indicating multimedia can provide improved equity (D'Souza and Bunt 2000). Using feedback from women students, a gender-specific multimedia package has been developed and found to show improved learning (Thomas 2002). This suggests that one of the effects of using multimedia is to broaden access. This would likely be especially true in designing for inclusiveness — for example, to add text for those with hearing impairment, and/or to add narration voice-over for those with vision-impairment. Accordingly, multimedia to reach the various senses should be selectively employed and the navigation needs guided or semi-guided. Therefore, the use of multimedia needs careful planning to enhance learning, and the research available needs a careful review.

EDUCATIONAL E-LEARNING

"E-learning" (short for "electronic learning") is more difficult to define. In this chapter, e-learning is taken to mean learning that uses electronic means of information and knowledge management in a wide sense, and, in a narrow sense, social constructivist learning through computer-mediated communications in a virtual space. Hirumi (2002, p. 19) defines e-learning as "Learning that is stimulated primarily through the use of telecommunication technologies, such as electronic mail, bulletin board systems, electronic whiteboards, inter-relay chat, desktop video conferencing and the World Wide Web." A simple working definition by Jung is that e-learning is "the Internet-based delivery of information, communication, education, and training" (Jung 2002, p. 63). E-learning is a relatively new term, and derives from the development of alliances and consortia consisting of corporate businesses and education providers emerging around 1995 (Jegede 2001, p. 75). These new corporate-university institutions are reviewed by Moore (1999).

Internalisation through e-learning

This development has occurred through the Internet and has brought internationalisation through sharing of knowledge. It has also brought globalisation and different cultures into juxtaposition — and into superimposition when, for example Asian students engage in a Western-provided course. Differences in cultural ways of learning are, therefore, in the limelight. It has been previously argued (Kawachi 2002a) that non-participation by Japanese in global education was due to language and cultural differences. This argument is further expanded since few Europeans living in Europe currently participate in Asian distance education. One reason is that Asian courses are not fully global or open, in that they usually require local residency. Notwithstanding language and cultural barriers, approaches to learning differ. There is a philosophical difference between "distance

education" — which seeks to maintain standards, institutional conformity and uniformity — and "open learning," which values diversity and seeks personal individual growth in the learner's own context (Edwards 1995).

In the past, global providers were very much concerned with instilling traditional Western Socratic and critical thinking skills through distance education — and a few still are. However, as constructivist theories of learning were taken up, so open learning has developed more strongly. Now even conventional face-to-face institutions are opting to use e-learning and open learning values in the classroom. In discussing the raising of Western sensitivities to other cultures, Moore (1999) acknowledged the need for open learning and the need to adopt the learning perspectives of foreign students in American distance education programmes, but he nevertheless firmly adhered to the fundamental need to instil critical thinking skills in these foreign students, as much as in American students. In Asia, critical thinking skills are not so highly valued (except in cases where emulating American values is desired). The past preoccupation with fostering a deep approach and dissuading students from a surface approach has shifted. It is now recognised that this is not an either/or situation (with a "cognitive jump" from a surface approach to adopting a deep approach, as suggested by Eklund-Myrskog 1997), but a realisation that approaches to learning are task-specific, that there are regional as well as individual predispositions culturally towards preferring one way over another, and that both ways should be valued and acquired. In Western-based distance education, standardisation meant conforming to the institutional values deriving from a deep approach to learning. This review finds that higher education institutions in the West and the few Westernised, highly developed centres of learning in Asia still value the collaborative process and the acquisition of hypotheses-testing and critical thinking skills, and they recognise that their students find great difficulty in acquiring these skills. This review also finds that institutions in Asia generally hold on to an apprentice model and experiential learning through a co-operative process. Even with e-learning technology, the apprentice model is still employed (Patel et al. 2000).

Internationalisation through e-learning has brought these two processes of collaborative learning and co-operative learning into the same forum. In the next section, these processes are analysed in a country-by-country review, and interpreted as complementary within a cognitive learning cycle model.

Even when similar e-learning technologies are employed in Asia as in the West, the provision in Asia produces an effect beyond that seen in the West. In Asia, social economics has meant a student who is busy e-learning is more isolated from his or her surrounding culture than a student, for example, in London, where the surroundings may be all high technology, conducive, motivating, encouraging and accepting of a person engaged in e-learning. In rural India or China it is easy to imagine that the student is not only physically alone, but psychologically and emotionally as well — without social infrastructure supporting e-learning. Thus, in Asia, computers and multimedia are not simply instruments for the student, but provide the total environment for learning.

A final point to note here is that it is difficult to identify research on the educational use of computers distinct from research on multimedia or e-learning. Where such distinction can be discerned in the research, the following review will make this clear. Most of the research in Asia has been institutional or regional rather than generic (Murphy and Yuen 1998). Thus, to review this research, several regions are examined below in some detail, and then common threads are drawn out with analysis. At present, the proportion of the population in Asia engaging in e-learning through the Internet is small compared to the West, but the growth rate in Asia is probably greater (Robertshaw 1999).

The experience of e-learning in various countries

Here, research from the following regions is examined (in alphabetical order): Bangladesh, (mainland) China, Hong Kong (China), India, Indonesia, Iran, Japan, Korea, Malaysia, Pakistan, the Philippines, Singapore, Sri Lanka, Thailand and Vietnam.

Bangladesh

In Bangladesh, research shows very little use of even computers in education and the region generally uses print, radio, television and audio/video cassettes only (Tandon 1998). Where use of computers is envisioned, it is intended for access to information and library resources (Saadat-Ali 2002).

Mainland China

In mainland China, research is still lacking. While there are leading centres of excellence in Beijing (CCRTVU), Hong Kong (HKOU) and Shanghai (SHTVU), the situation outside of these is poor — in China generally "current e-learning is far from being at a mature stage of development … with no in-depth successful experience to reflect upon critically or to disseminate to others" (Huang 2002, pp. 127–128). Zhaoyang Education Resource Centre of Beijing University has been conducting evaluation research of educational multimedia software for several years (Junjie et al. 2002). Their research methods are good and the conclusions are useful, but the multimedia software evaluated was simply poor quality. Junjie et al. found the available software was inflexible, with no choices for navigation by the student and with fixed linear content. No data on learning outcomes were collected.

Hong Kong (China)

In Hong Kong (China), research into using computers, multimedia and e-learning is being done at the Open University HK and its Centre for Research in Distance and Adult Learning (CRIDAL). Robertshaw (2002) has reported that only a small proportion of the students actively used an e-learning bulletin board for posting problems and to obtain student-to-student peer support. He reported that use of the bulletin board was mainly for sharing views. This co-operative sharing of experiences and views occurred similarly in Indonesia (see below). Robertshaw suggests that the "vast majority of students [who] contributed nothing" (p. 117) might learn through vicarious interaction, but recent research (Kawachi 2003a) indicates this is unlikely. Multimedia CD-ROM packages have been produced by the Open University of Hong Kong (OUHK) for several years. In 1996, the (then) Open Learning Institute of Hong Kong, with its advanced technology, set out to improve on the commercially available language-learning CD-ROMs (Murphy et al. 1996). The institute added voice-recognition and other feedback activities, including visually stimulating video material, to its multimedia package. It is not yet known if this new multimedia package has made a profit. There is research in advanced e-learning technologies including intelligent tutoring, which scans for certain keywords in the text of incoming email requests for support and a computer responds to these keywords. Also with concern over high attrition rates from courses, CRIDAL is developing self-administered course-aptitude tests (Zhang and Au-Yeung 2002), based on its research into student psychological profiling, having found that Western instruments were unsuited to the Chinese context. Although the instrument is downloaded from OUHK onto the student's own computer, this research falls under computer-assisted instruction (CAI) use of computers in education. Other notable research from OUHK has been in computer-

mediated communication (CMC) e-learning, concerning factors related to participation in online collaborative learning communities (Tang and Fung 2002).

It was discovered in a comparative study of two contexts that accrediting online participation was more effective than having optional participation, and bringing in the students' prior practical experience was more effective than a rather theoretical content. Also, the researchers confirmed that the wider the diversity in students, the more collaborative was the learning that took place in the asynchronous forum (having had 196 students on one course, compared to only 42 in the other). In another study, Shin et al. (2002) found that when participation was optional, the achieved quality of learning was related to the amount of participation. And when participation was an accredited part of the course, the achieved quality of learning was more related to the student's individual perception of an institutional "presence" than to the amount of participation. Thus, research in Hong Kong can be seen to be challenging the problem of facilitating collaborative asynchronous e-learning. (Of note is that OUHK is collating research resources and making these freely available through the Internet as the East Asia regional site of the Global Distance Education Network.)

India

In India, research shows that first-generation distance education has expanded rapidly in the past few years with two noticeable results: 1) that the hitherto unreached rural population is now provided with educational opportunity; and 2) that the overall quality of learning has consequently dropped, both in terms of grades and retention rates (Manohar 2002). Research is currently underway to discover if learning technologies can help alleviate these. Panda and Chaudhary (2001) found that computer access could help reduce costs, but that access centres tended to use only one-way interactivity — either in institutional content delivery, or in students accessing content on the Internet or two-way telephony to add interactivity to television delivery. Manohar (2002) surveyed in detail, through questionnaires and interviews, 200 students in their final year of a three-year undergraduate course. All had access to multimedia: 12% with computer access (Internet and e-mail) from home and 25% from near their home, and 100% with multimedia at a study centre located an average of 50 km from home. At one of the two universities surveyed, two-way CMC was provided and two-thirds of the students there used this. Despite this full range of multimedia being employed for education, mechanical breakdown (for example, of electric power supply — reported by 82% of students) was too frequent for any meaningful comparative results to be measured. As a result, CMC was reported as most useful by only a small percentage of students. Over all media, print was most useful, followed next by face-to-face contact at a study centre with other students or a tutor. Panda and Chaudhary (2001) also reported that breakdowns in electric power supply were the major factor for the poor effectiveness of multimedia in helping students learn. A research survey in a university in India delivering business courses (Thilagavathy and Namasivayam 2002) found 60% of students thought that a course delivered at a distance was not adequately linked to future employment and was too theoretical. IGNOU has reported similar findings: Vyas et al. (2003, p. 125) concluded the way forward should be towards less structure and more dialogue to better serve the individual wants and needs of each student. They were concerned with undergraduate learning. In contrast, in the West, incoming tertiary Asian students wanted and required more structure (Briguglio 2000). At the postgraduate level, face-to-face sessions were found to be not so popular by Mishra (2002). Mishra's findings also suggested that computers be used to speed up the turn-around time for tutor-marked assignments and feedback, and to improve access to library resources at study centres. (It should be kept in mind that May [1993] found that Western women succeeded in learning with minimal

interaction, and suggested that "more interaction is not necessarily better" [p. 47], though she added that this may be not generalisable.)

In summary, the situation in India is difficult because fewer than 5% of the population are conversant in English — often the medium of instruction in e-learning — and in the more rural areas in the north-east there still remain villages without electricity (Tandon 1998). Recent research on the language issue in online learning has found improvements in the capabilities of using *devanagari* and other local scripts — notably through local and private educational providers (Thakur 2002). Gharpure et al. (2002) reported that Web-based courseware designed according to instructional design principles resulted in better and improved learning than just Web pages.

Indonesia

In Indonesia, research into adoption of computers and multimedia by the leading distance education provider, Universitas Terbuka, found that most communications are and will likely remain in conventional mode using mail and face-to-face communication (Belawati 2002). When asynchronous computer conferencing was provided in two trials of the new technology, specifically for collaborative group learning used for in-service university teacher training, the participants were found to move over into a chat-room for synchronous discussions whenever any difficulty or interesting point developed (Lawanto 2000). In so doing, they abdicated their opportunities for reflective learning. Computer conferencing was used by only a few of the group, and these few used it for posting their experiences or views to share with others. As a result, Lawanto reported, their face-to-face meetings went successfully and were more lively since they had already read and shared their various different positions prior to meeting face to face.

Sukono (2002) emphasised that e-learning was too expensive, especially when the costs had to be borne by the students. He stated that real cost is the monetary cost (of developing, delivering, and purchasing the course, plus one's own software and hardware) plus the loss-in-effectiveness cost (since students pay but do not receive the same value as in conventional classroom learning). Usually the distant students must expend more time, and Sukono asked whether, after all this investment in time and money by the student, the learner really learns the subject (p. 3). Moreover, Sukono felt that it is unfair that these new technologies also have a higher failure (drop-out) rate, which is passed on as a monetary cost to the poor distant student.

Iran

In Iran, research is in the early stage of describing new technologies, but only in terms of their capabilities to deliver massive amounts of texts (Vaziri 2002). Access is dealt with as meaning access to knowledge, to books and other content resources, which are becoming ever more voluminous and which will soon require more powerful and faster technology (p. 102). Dalili (2002) summarises that "the only thing which the student needs is an Internet connection to connect to the university website and use all the programmes and materials provided by the university" (p. 120). Little or no research examines learning as such, or teaching. However, Iran is aware of the need to develop teaching skills in conventional education to keep abreast of the technological developments (not mentioning here the new ways of e-learning). In-service teacher training is in the face-to-face mode through lectures, followed by question-and-answer sessions, so it has been estimated that if interactive television media were used, every teacher in the country (4,000 teachers per year) could be upgraded every three to five years (Ghaffari 2002)

(not mentioning here the need for continuous e-learning by teachers). Mohamadi (2002) reported that video-conferencing and Internet communications cannot replace face-to-face education at Payame Noor Open University.

Japan

In Japan, much distance education is in vocational and technical training and can be categorised as on-the-job training or experiential learning (which is the traditional way of learning in Japan). The National Institute of Multimedia Education undertakes research, but its results are mainly descriptive of how technology is used in a local specific context. For example, Yoshida (1996) looked at a group of students around one computer, compared to one student per computer, and found that individual study achieved faster learning. It is difficult to generalise this finding to other settings even within Japan. Notwithstanding these findings, NIME operates, since 1996, a satellite-linked network of about 120 universities throughout Japan, for graduate classes to receive synchronous delivery of face-to-face lectures from any participating lecturer (Sakamoto [nd] c. 2000).

In school education, research has been conducted by the Centre for Educational Computing every year since 1994 (Centre for Educational Computing 2002) mainly into the effectiveness of government-organised projects in the nation's 40,000 schools. Computers and the Internet are used only to give users access to content, and to send content to one another using multimedia (such as digital cameras and e-mail). Classes at schools are mostly for achieving computer literacy. The only other subject of note in which computers and the Internet are used is English language studies. This is done through cross-cultural interactions, taking advantage of the available Western Web sites for English language study. The research of the Centre for Educational Computing suggests that future use might include students posting questions through a school home page or listserv for teachers and parents to answer. The Centre identifies a growing need for technical assistants for schools. No evaluation of e-learning outcomes has been reported except to note that students become interested in the transmission of information. In higher education, Kawachi (2002a, 2002c) found that students use the Internet only for accessing knowledge co-operatively, and do not engage in collaborative learning, for example using listervs or bulletin boards — even in their native language. Multimedia is highly advanced, with widespread use of wireless media including digital-audio-video cameras inside mobile pocket-phones which can access the Internet or send digital audio-visual and text data. However, these are not used for educational purposes, except perhaps for non-academic student support services. An Asian eLearning Network (2002) conference held in Tokyo in July 2002 resulted in several graduate collaborative e-learning projects, linking seven leading e-learning centres in Tokyo (mainly in one-to-one collaboration in these early stages), with one centre in Malaysia, one in Philippines, one in Thailand, and one in Vietnam. However, Tsuji et al. (2002) report that in the case of the Japan–Vietnam project, a face-to-face lecture was simply transmitted in voice and video by telephony and discussions were live synchronous. The quality of the transmissions in these cases is not without technical problems — and discussions (in both the instances of graduate-level trials) were mainly social pleasantries, with occasional requests for repetition or re-phrasing. As such, they were co-operative and not collaborative.

The use of English (a non-native language) as the medium in these transnational endeavours was a factor in collaborative learning not being achieved. It is not yet clear whether such synchronous co-operative learning through video conferencing stimulates an unintended follow-up asynchronous collaborative aspect. Chen and Willits (1999), using factor analysis of dialogue in video conferencing (with the first factor being the intended synchronous in-virtual-class interaction), found a second factor of asynchronous

out-of-class (mainly through e-mail) interactions. Others have suggested that asynchronous interaction can lead to synchronous interaction — for example, Lawanto (2000) in Indonesia (reviewed above).

Korea

In Korea, the Korean National Open University (KNOU), Seoul, is the leading centre of excellence in Asia (Srivastava and Venugopal Reddy 2002, p. 51). They use interactive video conferencing, and conduct interactive tutorials with distance students. Many universities collaborate to form virtual universities that offer an increasingly wide range of course options to their students and externally to others in lifelong education and training. These Korean virtual universities are now becoming global, though limited to only the native language. Research done into the students' perceptions of e-learning (Kwak et al. 2002) found that students preferred plain two-way interactive media rather than one-way "fancy" multimedia. This finding is consistent with recommendations by Doolittle (2001) who found poorer learning resulted from three or more media used simultaneously (such as text being detrimental and redundant when added to animation with narration). Kwak et al. also found that those students with more prior experience in e-learning spent more time learning (and were keener to continue e-learning), which suggests that motivation to lifelong learning may have been achieved here. Along a similar vein, Kim Hyesoo and Cheol-Hyeon (2002) found that students at KNOU wanted easier access to online learning resources and more help from tutors — both factors indicating a continued dependence on traditional ways of learning.

Malaysia

In Malaysia, Saleh ([nd] c. 2000) reports that highly advanced learning technologies have now been designed at the Universiti Sains Malaysia, using CMC synchronous audio-visual conferencing over the Internet at 384 kbps and incorporating full-motion 30 fps video. Saleh reports that if adequate public funds were provided, their system could be constructed as part of the dream Multimedia Super Corridor. In moving toward the synchronous face-to-face conferencing system, she explains that if she were a student she "would like to see the lecturer, or at least to listen to his or her voice" (p. 6). So, despite the advanced technologies, research in Malaysia still seeks to emulate the conventional classroom. Meanwhile, other research is focusing on providing more affordable connectivity and student support services (Tandon 1998; Linux 2003).

Pakistan

In Pakistan, the government has recently distributed 50,000 low-cost computers to public schools and colleges (Linux 2003). Research finds that these computers are not yet networked, so interactivity remains based on print, radio and television (Tandon 2002).

Philippines

In the Philippines, UPOU relies heavily on face-to-face interaction. Use of computers and multimedia has been reserved mainly for administrative research on student learning and to provide limited content resources for some students and faculty. At the Polytechnic University (PUP OU), similar strategic dependence on face-to-face interaction is also widespread, and though print-based courses are the norm, research has found that students "learn more by direct experience and least prefer reading," which resulted in

students "performing unsatisfactorily academically" (Sabio 2002, p. 128). The lack of infrastructure is the root-cause for the weak uptake of e-learning, with high recurring costs associated with connectivity for using the Internet and e-mail.

Researchers in Asia also often point to the high attrition rates from Western distance education. They see the emphasis on theory as one aspect to be avoided if the aim in Asia with distance education is to reach a maximum number of people and reduce poverty and eliminate illiteracy — aims not felt to be priorities in Western distant education. High local context relevance is seen as crucial for e-learning in Asian countries. To counter the very high attrition rates reported from Western distance education (ranging between 28 and 95% attrition), Dalit (2001) advocates more regionally specific Asian approaches. She concluded that a student-centred open learning approach with high personal relevancy would be best for the Philippines "to serve the unique characteristics and needs of the Filippino learner" (Dalit 2001, p. 103).

Singapore

In Singapore, research is concerned with the efficacy and development of reusable learning objects for helping students learn collaboratively. Joung and Kim (2002) report that for dealing with large resources (of content, administrative matters, teaching, and a large number of students), systematic management is needed, using structured learning objects. Each structured learning object contains the objectives and contents of other emerging e-resources, and the collaborative learning activities for the students. Thus, they are researching the development of e-learning through a flexible structure of many learning objects that can be selected by each student according to, and responsive to, their different individual learning needs and wants. The emphasis here is on using computers and multimedia efficiently in e-learning. With an established e-library of learning objects, teachers can be used to teach and facilitate students learning, rather than spending their time preparing course content. Also, related to the development of an e-library of learning objects (for example, SCORM), a Commonwealth of Learning conference on technologies for developing countries found that a key advantage was that educators were setting the educational standards, and not the profit-seeking commercial vendors (Fricker 2002).

Sri Lanka

In Sri Lanka, the Open University Sri Lanka operates highly developed e-learning programmes using online interactive multimedia with discussions (probably synchronous) and virtual laboratory capabilities. These likely stimulate collaborative critical thinking among the participants. However, Coomaraswamy has pointed out that future employers find the courses too theoretical and irrelevant to employment needs (Tandon 2002). Jayatilleke (2002) has reported research findings from using a multimedia CD-ROM produced by the UKOU. Most (91%) of their undergraduate student volunteers reported the graphics (static and video) to be very good. Only 31% thought the narration was good (with others citing poor sound quality and difficulty with the English medium, including the various accents of the narrators). With respect to cognitive overload, narration with graphics was reported as sufficient and the added text was reported as overloading. Jayatilleke's research should provide useful empirical evidence for developing multimedia CD-ROMs. Since the high costs of designing and developing were noted, importing such multimedia was suggested. However, during formative evaluation of a multimedia CD-ROM by target users (within the same local culture as the designer) Steed (2002) found the need for many changes. These findings would suggest that when a

multimedia CD-ROM was used in an unintended context, especially in a faraway culture, then it might be unsuitable.

Thailand

In Thailand, research into e-learning and the academic use of the Internet has been promoted by ThaiSARN for the past 10 years (Prammanee 2003). As recently as three years ago, research showed that the use of English was the major barrier against adoption of imported e-learning resources (Hongladarom 2000), but this has largely been overcome now with much available in Thai (Linux/NECTEC 2003). Sukhothai Thammathiral Open University has developed its own e-learning material in the Thai language, putting multimedia lectures onto CD-ROM and distributing these through the Internet to its students, who can download and study them offline (Boondao 2002). At present these CD-ROMs are rudimentary in content, and no evaluation of learning outcomes has been reported.

Vietnam

In Vietnam, little or no research has been reported on the educational uses of multimedia or on e-learning. Use of learning technologies has been largely limited to enabling graduate students to participate in transnational interactions (Robinson et al. 2001), for example in the co-operative synchronous sharing of knowledge through CMC face-to-face mode with Japan (Tsuji et al. 2002).

DISCUSSION

This research review shows that acquisition of critical learning skills is not an objective in rural Asia where occupational skills are valued. Only in highly developed centres, such as in Hong Kong, Korea, Singapore and perhaps Shanghai, is there a keen interest in helping students develop these critical thinking and analytic skills for personal growth. In Korea, for example, computer-mediated communications are used for effective learning through collaborative tutorial interactions — though Asian students are still found to want and need an initial face-to-face real meeting in order to establish a basis for a later online community of learners (Jung 1999, 2002). Most research reports in Asia see the need for greater dialogue as the key to successful learning. Research finds students in Asia preferring not to become embroiled in the analytic argument through collaborative processes and theorising, but to reflect on their own context and then move directly, using human interactions among the tutor and other students to experiential learning for personal relevance. This avoidance of hypothesising and questioning the text — seeing the learning of critical thinking skills as an unnecessary element — characterises education and training in Asia. Socratic Western methods in this respect are not seen as relevant to Asia.

The distinction between co-operative and collaborative learning

It is important to distinguish co-operative learning from collaborative learning (for details, see Kawachi 2003a, 2003b). *Co-operative learning* essentially involves at least one member of the group who "knows" the content soon to be learnt by the others. Learning takes place through the "knower" — for example, the text or the teacher delivering the content to be learnt. *Collaborative learning*, on the other hand, follows

a scientific process of testing out hypotheses. A participant publicly articulates his or her own opinion as a hypothesis, and being open to the value of conflict allows this to be negated if possible by others, in which case the original participant or another offers up a modified or alternative hypothesis for public scrutiny. In collaborative learning, disagreement and intellectual conflict are desirable interactions. All participants share in co-constructing the new knowledge together, and this learning occurs inside the group as a type of consensus achieved through analysis and argument. In collaborative learning, there is no "knower" prior to the learning process taking place (in contrast to the situation of co-operative learning).

The research in educational media from many rural regions of Asia is currently concerned with the co-operative learning mode and avoids collaborative learning through critical thinking. It is a Western view that education should aim to develop reflective critical thinking skills in the student (especially in adults in lifelong learning, and in teacher training). This translates to a need for promoting collaborative learning, not just co-operative. Experiential learning does have a significant role to play, but this is only after the collaborative process, after alternatives to current practice have been argued out and the students then test their findings in their own context — through experiential learning. Collaborative learning is an essential stage in the overall cognitive development cycle of learning. In collaborative learning, the participants (having reflected on and conceptualised their own practices) articulate their individual practices and, being open to the value of contradiction, allow others to question and seek rationale behind the practice. They defend their practice with reasons and, through such hypotheses testing, are open to consider other ways that are also examined by the group. Only after this group collaborative process does the individual take what he or she feels is best and goes away and tests out this new way in his or her own practice, experientially and publicly. So, co-operative and collaborative modes are used sequentially in the cognitive learning process of acquiring critical learning skills — a universally avowed aim of adult education.

CULTURAL DIFFERENCES BETWEEN DISTANCE EDUCATION AND OPEN LEARNING

Approaches to learning differ between cultures, and Asian students have been discovered to prefer approaches different from those of Western students (Kawachi 2002a), though overall stereotyping is unreliable because individual and local differences still show wider variations than those found between Asian and Western students (Kember and Gow 1991). For instance, differences in approach to learning have been identified in three different groups of Chinese according to their local cultural context (Hong Kong, Malaysia and Singapore) (Smith and Smith 2000). Fu and Townsend (1998) found that Chinese students approach the writing of English differently, while Ayers and Quattlebaum (1992) have found that English test proficiency was not correlated with overall academic achievement. Instead, cross-cultural differences impact on the time expended for interacting and on the quality of learning achieved in terms of the extent to which a deep — as opposed to a surface — approach to learning is adopted (Kawachi 2002b). The dilemma here is that if students copy the required way of writing — the vocabulary, the rhetorical design, and the acceptable conclusions (in the college or professor's context) — then a high grade can be obtained. In contrast, if the students re-interpret the content to be relevant in their own context and write in their own culturally deep way, then they may be marked down as misunderstanding and not fluent, and be given a low or failing grade (Kawachi 1999a, 1999b, 2002c). This dilemma is at the centre of the philosophical difference between distance education and open learning: where "distance education" seeks to impose uniformity and conformity to an institutional

standard, and "open education" seeks to value and foster the diversity of the students (Edwards 1995).

The challenges of using e-learning in Asian education

In Asia, this review has found that computers and multimedia are used for access to content. This can be described as asynchronous and co-operative, where cognitive learning takes place individually, after the inter-group interactions, through social reconstruction of the received information. During the e-learning co-operative knowledge-sharing process, the student is passive and the experience is similar to being in conventional education.

In the West, Spender (2002) has noted that the diversity of knowledge available through the Internet as non-narrative media means that students will need to become more active learners to question and discern what content they access. This questioning and selectivity are not yet apparent in Asian students generally. Students should take more advantage of computer-mediated communications to interact collaboratively. Spender (2002) identifies several characteristics of e-learning that may distinguish Asian e-learning from Western, as far as the above research reports show. Spender (2002, p. 25) characterises e-learning as follows:

- E-learning is education as a commodity rather than as a right.
- E-learning is for everybody, rather than is the case with controlled entry.
- E-learning skills are part of a lifestyle rather than a qualification.
- E-learning occurs at any time, any place, any pace, rather than as a scheduled activity.
- E-learning is making information rather than taking in content.
- E-learning is demonstration of performance rather than memory testing.
- E-learning is collaborative.

According to Spender's definition, e-learning does not generally take place in Asia. In those few places of excellence, where collaborative e-learning is taking place in Asia, this is usually only at the post-graduate level — for example, in the Asian eLearning Network (AEN). However, e-learning essentially depends for its success on addressing local needs within the local context. How far such transnational, cross-cultural e-learning can succeed is yet to be seen. The collaborative development of reusable learning objects in video cassette format across national and cultural borders was found to be too difficult even pair-wise between the technologically advanced centres of FernUniversitat (Germany), KNOU (Korea), Stanford University (USA), UAJ (Japan), and UKOU (Britain), according to research by Nagaoka (2002), who attributed the difficulty to the finding that the aims and targets of education were too largely different among the ODL institutions.

The challenges of using collaborative learning in Asian education

Some research, notably from the centres of excellence in Hong Kong, Japan, Korea and Singapore, is concerned with the collaborative mode that involves questioning one's knowledge and practice, and the knowledge and practice of others, and questioning the content to be learnt. These might be interpreted as not typically Asian — but Western — values in education. Indeed, research in the West is particularly focused on the collaborative phases of learning. Western research clearly identifies the issue of

forming early on a community of learning, and the movement to reduce the maximum transactional distance towards development of "transactional presence" (Shin 2002). In Western conventional face-to-face education, Perry (1970) concluded that Western conventional face-to-face education relied overly on co-operative learning and that the collaborative mode of learning was the most troublesome, was often avoided and therefore not achieved. Piaget (1977) also acknowledged that many people do not reach the level of "formal operations" (hypotheses-generating and testing) even in adulthood. Meanwhile, Renner (1976) found that only 81% of final-year students at two American law schools were at the collaborative formal operations level, and McKinnon (1976) found only 50% of college students at seven institutions were skilled in collaborative learning. In their analysis of computer-mediated conferencing, Gunawardena et al. (1997) found that participants did not proceed beyond the co-operative sharing of ideas, concepts and statements, and did not reach the collaborative phase of negotiation and co-construction of new knowledge. The participants in their study were relative experts in the use of distance education being (likely) graduate students and university-level teachers participating in the ICDE95 Online, a virtual pre-conference of the International Council on Distance Education. In a following study, Gunawardena et al. (2001) again found that the "intended collaboration simply did not happen" (p. 39).

Clearly, students — especially adolescents and young adults — find it hard to engage in collaborative learning. While e-learning has its basis in the power of the Internet, successful e-learning outcomes depend on collaborative human interaction more than on the technological infrastructure.

THE WAY FORWARD IN EXPANDING MULTIMEDIA AND E-LEARNING IN ASIA

In Asia, the few centres of excellence that do exist are rapidly developing e-learning, and these centres are becoming more focused and concerned with research into collaborative learning. To what extent can these centres help the rural regions of Asia move beyond the traditional co-operative modes of content acquisition and experiential learning? The digital divide in Asia may currently be widening. If that divide is to be reduced, these centres of excellence should put new research efforts towards promoting collaborative learning in the rural regions. The rural regions of Asia in turn need to consider more theory and critical thinking in their research.

In the West, Ainsworth (2000) and the University of Illinois (1999, p. 3) reported that the advantage of computers and the Internet over a textbook was that they facilitated synchronous discussions. However, since synchronous computer-mediated communications are limited to 12–20 participants optimally, then massive numbers of students are unlikely to be reached. In Asia, though, this review of the research confirms that computers and multimedia are primarily used for asynchronous co-operative learning, and in this use can be cost-effective in reaching hundreds of thousands of students at a distance. Most of the research in Asia on the educational use of computers, multimedia and e-learning has focused on foundational knowledge acquisition at the school level for basic human resource development, and is not yet widely concerned with new knowledge construction. However, for emancipation and future lifelong learning, developing countries need to become more aware of the importance of developing critical thinking skills (McLoughlin 2002). Also relevant generally to the Asian context, Wang and Beasley (2002) found that students with low predisposition to critical learning (having to navigate hypermedia to learn) required more self-determination and close tutor guidance, compared to students with a high preference for learning through hypermedia.

To improve the cost-effectiveness of using e-learning rather than conventional face-to-face education, there are three strategies: reduce costs (keeping current levels of learning effectiveness and same numbers of students); increase the number of students (while keeping costs fixed and learning at the same levels); and improve learning effectiveness (while keeping costs and number of students steady). All three strategies can be applied in the Asian context, with a realistic probability of success. Daniel identifies cost-effectiveness as a key issue for research in distance learning in Asia (Daniel 2002), along with the need for research into understanding the concepts underlying the use of multimedia, and the need for research into how to make collaboration work. However, it should be noted that Daniel does not see any need to compare these distance learning issues with those in conventional classrooms.

As the above review shows, most e-learning that is taking place in Asia occurs through access to content on the Internet, and there is increasing availability of lower cost access to the Internet and cheaper software even in the local native language. However, increasing the learning effectiveness requires a switch in emphasis from student-to-content interaction to student-to-teacher and student-to-student interactions. This will be more expensive to do. In Australia, Curtain (2002) reports that e-learning with high levels of interactivity costs about twice that of low-interaction, print-based correspondence course provision per student (p. 6). How this translates in Asia will depend on whether students move from individual and co-operative mode towards more critical thinking and collaborative learning mode. Where this is indeed occurring in the centres of excellence in Hong Kong, Japan, Korea and Singapore, the digital divide in education is widening between these centres and the rest of Asia.

With regard to the availability of the technologies and availability of funding to overcome this digital divide, a recent conference organised by the Commonwealth of Learning on the future of computer, multimedia and e-learning technologies for developing countries (Fricker 2002) found that with their limited funds, institutions were concerned whether now was the optimum time to buy into technologically mediated learning. With prices for new media continuing to fall, many institutions felt that perhaps the near future would be a better time in which to invest. This trend may be related to the current development of wireless technologies that could enable developing countries to leap over the costs of hard-wiring buildings for connectivity (Bates 2001, p. 29).

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COMMONWEALTH *of* LEARNING

Part III: Case Studies

CHAPTER 9

EDUCATIONAL MEDIA STRATEGY AT INDIRA GANDHI NATIONAL OPEN UNIVERSITY, INDIA

Ramesh C. Sharma and Suresh Garg

INTRODUCTION

The rise of open and flexible learning as a major mode of acquiring knowledge and imparting education and training to vastly scattered, heterogeneous groups has facilitated equitable access to educational opportunities at sustainable costs. Bates (1995), in his significant enquiry on media technologies, has suggested major changes in the delivery of programmes by the open and distance mode. Different media tend to support self-directed, individualised, as well as collaborative learning, and add new dimensions to the transaction of course curriculum (Horgan 1998). Distance education has evolved from print-based media to Web-enabled media in a very short period — a feature characteristic of dynamic organic entity. Furthermore, new distributed learning communities have evolved over this time. Daniel (1999) and Bates (2000) have suggested that a new instructional paradigm is likely to result, given the way the concerns of online teaching and learning are being addressed by open universities the world over.

Since the mid-1980s, India has witnessed a phenomenal growth of open and distance education. We now have 11 open universities and more than 100 Correspondence Course Institutes. The system caters to about 2 million students (20% of total) in higher education in the country. It has been projected to cater to 40% enrolments in the next five years. To provide quality services to such a large learner population, Indian open universities have adopted various media technologies — including self-instructional print media, audio, video, teleconference, radio broadcasts, telecasts and online lessons.

In this chapter, we focus our attention on the development of technologies suited to the needs of a very large population and we discuss the media strategies by Indira Gandhi National Open University (IGNOU) to meet those needs. In the following sections we discuss various kinds of educational media as adopted in Indian open universities.

MEDIA USE IN INDIAN OPEN UNIVERSITIES

Currently in India, 11 open universities and 102 Correspondence Course Institutes (CCIs) in dual-mode institutions are offering 360 programmes and 2,788 (including CCIs, 6,788)

courses at different levels pertaining to general, professional and technical/vocational areas. These cover both traditional and non-traditional programmes. Together these universities enrol more than 700,000 students (the cumulative enrolment for 2002–2003 stood at over 5 million students, including CCIs). These open universities provide student support services through a strong network of Regional Centres and Study Centres. As of January 2003, there were 92 regional and 3,579 learner support centres/work centres. More than 43,000 academic counsellors provide academic guidance to learners all over India. Open universities make use of audio and video programmes in the course curriculum. Till January 2003, there were 1,859 audio and 1,870 video programmes available for educational use in Indian open universities, with IGNOU topping the list with 1,235 audio and 1,520 video programmes.

Table 9.1 gives an overview of the various media options (self-instructional print material, audio cassettes, video cassettes, interactive radio counselling, teleconferencing, and Web-enabled education) being used by the 11 different Indian open universities. As may be noted, except for Nalanda Open University (NOU), all other universities are using a variety of multimedia-based instructional techniques, including first-generation to fourth-generation tools.

INDIRA GANDHI NATIONAL OPEN UNIVERSITY

The establishment of IGNOU in 1985 gave impetus to open and distance education in India. It provided a gateway for all those students wanting to improve their qualifications and sharpen their academic skills and competencies. It bridges the divide between education and vocation, remoteness and quality higher education, socio-economic deprivation and sustainable development. Within a short span of 15 years, IGNOU has made its mark as the top ranking educational institution in the country and abroad. It has more than 1 million students with extremely varied profiles, spread throughout the length and breadth of the country. The annual intake in the past three years has been around 300,000. The learner population is served by the university through an efficient network of 47 Regional Centres and over 1,100 Study Centres which are spread all over India. In addition, IGNOU has crossed national boundaries: its presence in 23 countries and its multinational student profile reflect the success of the open distance learning system. IGNOU has also played a significant developmental role across the world by assisting other developing countries to establish their own viable distance education systems.

IGNOU is a technology-enabled education provider. The use of technology has considerably reduced the gap between teacher and learner. In addition to imparting higher quality education, IGNOU is responsible for setting up norms for standardisation of distance education in the country. It has been entrusted with the task of regulating, maintaining and promoting distance education in India. The recent foray into the domain of online education by IGNOU in offering courses over the Internet has further extended its national, as well as international, reach.

Instructional system

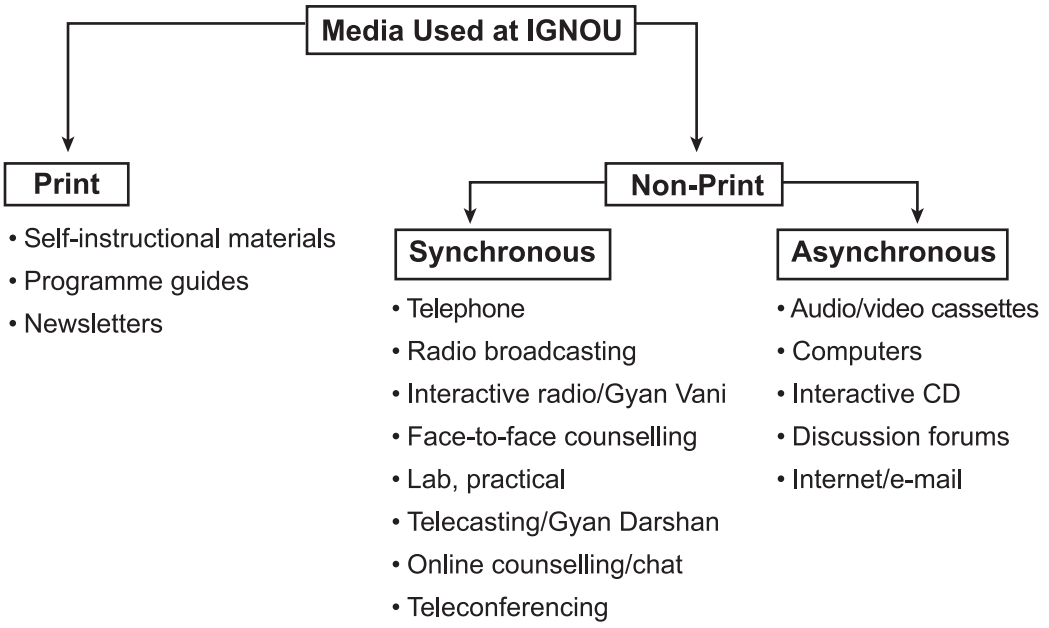
IGNOU has adopted a multimedia approach for instructions. Communication technologies have a central role in IGNOU's instructional system. The multimedia packages arranged for learners include a range of technologies: print, audio tapes (average two to four per course), video tapes (average one to two per course), interactive radio counselling, one-way video, two-way audio, teleconferencing, television lessons, CD-ROMs, and Web-based content delivery. These form nearly 20%, on average, of

Table 9.1: *Media adoption in Indian open universities.*

Open University	Audio Cassettes	Video Cassettes	Interactive Radio Counselling	Interactive Teleconferencing	CD-ROM	Web-Enabled Education	Instructional support
Indira Gandhi National Open University (IGNOU)	√	√	√	√	√	√	Print, multimedia mix, online system
Dr. B.R. Ambedkar Open University (BRAOU)	√	√	√	√	√		Print, multimedia mix
Yashwantrao Chavan Maharastra Open University (YCMOU)	√	√	√	√		√	Print, multimedia mix, online system
Madhya Pradesh Bhoj Open University (MPBOU)	√	√		√		√	Print, multimedia mix, online system
Karnataka State Open University (KSOU)	√	√	√	√			Print, audio, video, and radio
Vardhman Mahavir Open University (VMOU)	√	√		√			Print, audio and video
Babasaheb Ambedkar Open University (BAOU)	√	√		√			Print, audio and video
Netaji Subash Open University (NSOU)	√			√			Print, audio
Nalanda Open University (NOU)							Print
Uttar Pradesh Rajarshi Tandon Open University (UPRTOU)	√	√					Print, audio, video and radio
Tamilnadu Open University (TNOU)							Yet to offer any programme

a course. The preparation of audio and video cassettes is undertaken at the Electronic Media Production Centre of the university. A schematic representation of the media used in IGNOU is given in Figure 9.1. As a part of its media strategy, the university has taken up a number of new initiatives to enrich learning experiences. It is encouraging sharing, collaboration and convergence for seamless access to learning.

Figure 9.1: *Media used in IGNOU (based on IGNOU Profile, 2000).*



Print media

Print material has been the primary source of content material for students in IGNOU. Printed study material (written in self-instructional style) for both theory and practical components of programmes is supplied to the learners in batches of blocks for every course (on average, one block per credit of 30 study hours). A block, which comes in the form of a booklet usually, comprises three to five units and is spread, on average, over 40–80 pages. The process of development of Self-Instructional Materials (SIMs) is very rigorous. These are prepared by the most eminent experts available in the country, but keeping in view the needs of learners. The SIMs perform the functions of a teacher, providing guidance, motivation, questioning and feedback. Those used by IGNOU are self-motivating, self-directed, self-evaluating, self-explanatory and self-contained. In a way, this specialised task involves building the teachers in the text. The materials developed so far have been widely acclaimed as the most authentic, and combine best practices and a collective pool of wisdom. These are in great demand and have helped in providing the same quality of classroom transactions as well.

AUDIO AND VIDEO CASSETTE

Audio and video have been a vital element of instructional strategies in IGNOU. To make best use of audio and video cassettes, all the learner support centres have been provided with gadgetry to enable learners to listen or view the cassettes during face-to-face counselling sessions at Study Centres, where an academic counsellor is available to explain or discuss the vital points. Cassettes can also be purchased for personal use. Recently, IGNOU has produced video CD-ROMs of the content matter on audio-video cassettes and Study Centres have been provided with VCD players. In addition, the video programmes are telecast on the national network, Doordarshan. Some of the selected stations of All

India Radio also broadcast the audio programmes. Table 9.2 gives the figures for the number of audio and video produced annually between 1994/95 and 2002/03.

Table 9.2: *Growth of audio and video cassette production (cumulative) at IGNOU.*

Year	Video	Audio
1994–95	512	605
1995–96	554	645
1996–97	606	659
1997–98	729	768
1998–99	863	834
1999–00	941	984
2000–01	1102	1051
2001–02	1246	1109
2002–03	1520	1235

Radio

IGNOU-All India Radio (AIR) broadcasts were started in 1992 for students of distance education. In 1998, Interactive Radio Counselling (IRC) was started to provide on-the-spot advice to the learners. Encouraged by the success of this experiment, the university planned to use the medium on a large scale. As a result, a proposal to start a radio co-operative was made to the Ministry of Information and Broadcasting through the Ministry of Human Resource Development. In view of access for the entire population to this medium, the proposal was accepted. The open and distance learning system received a big boost when the radio co-operative, Gyan Vani, was launched in 2001. Starting with just one station in November 2001 in Allahabad, the Gyan Vani programmes are now broadcast from Bangalore, Coimbatore, Vishakhapatnam, Mumbai, Lucknow and Bhopal radio stations. IGNOU will have 40 Gyan Vani FM radio stations by the end of the current plan period. These give enormous time to educators for interacting with learners and minimising their isolation. This also places huge responsibilities on the system for preparing appropriate software. A pilot project on Radio Vision has also been carried out in IGNOU, with the support of UNESCO, for testing the feasibility of using new digital technology for cost-effective transmission of audio-visual courseware. The project proved that FM radio transmitters and Satellite Radio transponders could be used successfully to transmit, downlink and download multimedia courseware, in this case by using the Asia Star of WorldSpace (Dikshit 2003).

Educational television

Television has emerged as an important medium to disseminate information to the students. It is more effective than radio, in spite of its comparatively shorter reach and lesser availability. The IGNOU-Doordarshan telecast started in May 1991 through the national network of Doordarshan, aiming to provide telecounselling to students of open universities in remote areas. Doordarshan still continues to telecast IGNOU

programmes daily, at 6.30 am every morning. In January 2000, Gyan Darshan, the exclusive Educational TV Channel of India was launched jointly by Union Ministry of Human Resource Development, Prasar Bharti (Broadcasting Corporation of India) and IGNOU under its "Training and Development Communication Channel Initiative" for the benefit of Indian learners. This channel transmits programmes for 8,760 hours in a year and covers a major part of IGNOU's programmes. Gyan Darshan now has capacity for three channels to deliver educational programmes. On January 26, 2003, Gyan Darshan–III, an exclusive free-to-air Technical Education Channel (called *Eklavya*), was launched with IGNOU as the nodal agency. Gyan Darshan–I has become a nationwide platform beaming educational programmes round the clock for all categories of learners. It telecasts programmes of IGNOU and the Central Institutes for Educational Technology (CIET)/ National Council for Educational Research and Technology, including the National Institute of Open Schooling (NIOS), programmes of the UGC and various ministries of the Government of India. The success of this experiment can be gauged from the fact that the university has plans for growth in other sectors, such as agriculture and elementary school education. To harness the benefits of digital technology, Gyan Darshan has gone completely digital and its delivery is being diversified. At the national level, implementation to launch an exclusive educational satellite, EduSAT, with a capacity of 70 channels has begun.

Teleconferencing

One-way video and two-way audio teleconferencing was introduced in India by the University Grants Commission in 1991 and subsequently by IGNOU as an additional element of interactivity to supplement satellite-based television broadcast. This has resulted in considerable enhancement of the effectiveness of the teaching-learning process. IGNOU now uses this facility to motivate learners through induction programmes, to train counsellors and to conduct extended contact programmes as well as contact with the Regional Centres for various administrative facilitations. Initially it was made functional through the Training and Development Communication Channel (TDCC), but now Gyan Darshan is being used for extensive coverage. In this arrangement, the "teaching-end" comprises a studio where the experts deliver, either live or through pre-recorded tapes, lectures on a subject. The satellite relays back the TV signal for reception directly by small satellite terminals and TV sets in "classrooms" that are spread all over the country. The participants in the "classroom-end" can ask questions of the experts present at the teaching-end on an audio channel through the satellite terminals located in the classrooms via satellite. At the teaching-end the questions received from the classroom-end are looped back on the audio channel of the TV signal and are received by all the classrooms. This mode of interaction essentially simulates an environment, as if the entire learning process is being carried out in an extended classroom. The university intends to promote the use of this medium considerably in order to reach the remotest corner of the country.

To this end, a very strong network of about 500 downlinks has been created in the Regional Centres and Study Centres of IGNOU, its headquarters, and the Regional Centres and Study Centres of state open universities. IGNOU intends to bring the benefits of the best teacher to the most obscure learner by creating 1,000 additional downlinks in the next two years. Correspondence Course Institutes in the conventional universities are being encouraged to establish these facilities using the grants received from the Distance Education Council.

Interactive radio counselling

Interactive Radio Counselling (IRC) of IGNOU was initiated on an experimental basis as a sponsored programme in May 1998 from the All India Radio (AIR) station in Bhopal. The very next year (in March 1999), the services of IRC were extended to nine more stations. Currently, the same facility has been extended to all the primary channels of AIR. The programmes are broadcast live through 186 radio stations across the country, mostly on Sundays. In IRC, subject experts are invited at a fixed time and day to the AIR station. The students and other learners are informed in advance through various media about the topic of discussion. IRC is a live programme, where the learners dial the studio when the programme is on air, to interact with the subject counsellors. Toll-free telephone facility is available from 80 cities, enabling learners to interact with experts and seek instant clarifications. This particular facility is being shared with state open universities, as well as being used for the coordinated growth of the open distance learning system in the country.

Computers

IGNOU entered into the arena of computer-mediated learning through the Virtual Campus Initiative (VCI) in 1999. It launched two important programmes: BIT (Bachelor of Information Technology) and ADIT (Advance Diploma in Information Technology). The learning resources and counselling for these programmes are offered over the Internet. The VCI incorporates learning resources such as live satellite-based teleconferencing lectures, recorded video lectures, practical laboratories, computer-based training tutorials, Internet learning resources accessible in Internet browsing, and online interactive chat with peer group, faculty and external experts. Another Web-based certificate programme on Resettlement and Rehabilitation, with the support of the World Bank, started in 2001. This programme provides a complete Web-based learning experience to the learners, with Web-based learning materials (with interactive self-check exercises), an online computer-marked assignments (multiple choice type with fixed time), participation in discussion forums, online virtual library and online diary/ journaling (Web log type) (Mishra and Jain 2002). The lessons learnt from these offerings are being built into future programmes such as the Post-Graduate Diploma in Library Automation and Networking and programmes under the MEIDS (Management Education through Interactive Delivery System) project.

RESEARCH ON MEDIA

IGNOU has an in-house scheme of promotion of research, and it also promotes research on media through the Distance Education Council. Media used at IGNOU have been the subject of study for many researchers within and outside the university. We report some of the studies and their findings here.

Research related to TV and cable TV

Basu (1996) conducted an opinion survey to assess the impact of IGNOU video programmes telecast through the Doordarshan network of India. He reported non-awareness of programmes, awkward timings of telecasts, inaccessibility and lack of relevance as some of the major stumbling blocks to be dealt with. Chaudhary and Behari (1994) studied the Modasa experiment (distance teaching through cable TV system)

conducted at Modasa Town in the State of Gujarat. They examined the benefits and restrictions of a cable-based interactive network system when adopted as a tool for distance teaching. One of the objectives was to assess the effectiveness of the network system as an instructional and interactive medium. The investigators found that although the duration of 20 minutes was adequate for presentation, it was not sufficient for discussions.

Research related to radio

Sharma (2002) examined interactive counselling through radio to ascertain its overall effectiveness. It was suggested that all educational systems that aim to expand their reach to students would do well to integrate Interactive Radio Counselling (IRC) into their student support services. The participants of IRC reported that the level of content matter and the level of clarity in the presentation were satisfactory.

Sukumar (2001) studied the extent of utilisation of IRC by the students of IGNOU under the jurisdiction of the Regional Centre in Cochin. The results of this work showed that IRC was more attractive to students than any other electronic/communication media (audio, video, teleconferencing, etc.). The main reason given was that students had easy access from their homes. The author has suggested that since the medium is so popular, there should be provision for all the programmes to have equal weight in the IRC sessions. Furthermore, it was suggested that a provision for toll-free numbers should be made to universalise access to this facility (and this is now in place).

Satyanarayana and Sesharatnam (2000) pointed out that radio is useful in providing remedial tutorials, as well as some other forms of tutorial-based feedback such as providing corrections, alterations or updates to material (where print re-make budgets are limited or where print cannot reach students quickly enough) and providing recordings of naturally occurring events (e.g., a political speech, children talking, a concert or performance).

Bansal and Chaudhary (1999), in their evaluative study of the effectiveness (pedagogic, access and utilisation) of interactive radio instruction on students, were encouraged to find in interactive radio sessions the participation not only of IGNOU students, but also of students from other institutions and the enlightened public. They also found higher student participation in interactive radio sessions than in teleconferences and face-to-face personal contact sessions.

Research related to teleconference

Sahoo (1994) studied teleconferencing sessions conducted as a part of the extended contact programme for the Post-Graduate Diploma in Higher Education of IGNOU, organised at the Bhopal Regional Centre of IGNOU. Although the sample size was small — only eight participants attended the extended contact programme — the findings are of interest. The study was conducted to find the effectiveness of teleconferencing as a means of distance education. The extended contact programme included activities such as group discussion, practicals, individual projects, group projects, brainstorming and question-and-answer sessions with experts. Various aspects of the teleconference sessions were examined: content quality, presentation quality, quality of visuals, audio talk-back quality and overall effect. The participants were positive on the role of teleconferencing and responded positively to almost all the sessions. The quality of presentation of all the programmes was found to be either of average or high standard; the quality of presenters

was rated high. The time provided for reinforcement and other immediate follow-up with learners was found to be average in most of the sessions.

Sinha et al. (1994) undertook an evaluative study on the ISRO-IGNOU experiment to understand the participants' perceptions about the advantages and limitations of the interactive mode of teaching for distance education. The perceptional differences among three user groups — regional director/assistant regional director, academic counsellors and students — were studied. One of the objectives was to find out if the interactive mode of teaching could be a workable proposal for regular education and training in future. A significant majority of all participants reported that this interactive mode of teaching was useful for distance education, as well as for the Extended Contact Programme. The majority of the regional directors, assistant regional directors and academic counsellors found the experiment satisfactory to a great extent and held the opinion that it was possible to provide counselling best through such experiments and to provide opportunity for the learners to interact.

Raghubanshi and Mishra (1996) conducted a survey to assess the reasons for poor attendance in teleconference sessions. Their study revealed that only 31% of prospective participants knew a reception facility was available, although 70% were aware of teleconferencing as a medium for interaction with the resource persons. Non-receipt or late receipt of information regarding teleconferencing schedules was also one of the main reasons for the poor attendance. Home delivery of teleconference was suggested as a solution for most of the problems faced by learners, as 47% of the respondents in the survey had access to cable television. This suggestion has now been implemented, with the availability of teleconference having been made through Gyan Darshan's cable reach.

Dash (1997) in his evaluative study of interactive television use in training primary school teachers reported the favourable reactions of participants towards interaction between resource persons and the participants. Subhayamma (1998) conducted an evaluative study on IGNOU's teleconferencing system and indicated that the students were apprehensive about certain aspects related to participating in question and answer sessions and also lamented that inadequacy of time allotted for interaction negatively impacted the effectiveness of such sessions.

Mishra (1999) conducted a ground-breaking study on the nature of interactivity during teleconferencing sessions. His findings highlighted the need for training resource persons in the use of this technology. He also emphasised the importance of orienting learners before a teleconferencing session on how to put forth their questions and comments correctly over telephone.

The university now plans to establish an inter-university consortium for technology-enabled education. This platform will be available to researchers to encourage the dynamic, broad-based, highly innovative and professional growth of technology-enabled approaches and practices. It should enable us to constantly revisit and redefine the form, quality and utility of our programmes. IGNOU is also contributing to, and co-operating with, the electronic journal — Global e-journal of Open Flexible and Distance Education — to promote dissemination of research findings in technology-enabled education.

CONCLUSIONS

The adoption and usage of the appropriate and the latest media technologies in Indira Gandhi National Open University have brought about significant improvements in the delivery of educational programmes and services to the learners. These have made education accessible to the wider cross-section of our society and have introduced a paradigm shift in the responsibility of the teacher from "repository of all knowledge" to "facilitator of information and student learning." The recent initiatives to encourage research on media and development of a systematic policy framework for adoption of educational media in the programme planning stage itself will go a long way in institutionalising multimedia strategy for educational transactions.

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CHAPTER 10

APPLICATION OF EDUCATIONAL MEDIA AT UNIVERSITAS TERBUKA, INDONESIA

Tian Belawati, Dewi Padmo and Eduard Sinar

INTRODUCTION

Established in 1984, Universitas Terbuka (UT) is one of the mega universities of the world. A state university, UT is the only university in Indonesia that is using the distance education mode of teaching entirely. One of UT's missions is to widen access to higher education for Indonesians who do not have access to conventional, face-to-face higher education. With this mission, UT was designed to be a flexible and inexpensive university. Furthermore, as the university is operating on a national basis and students are spread throughout the archipelago of Indonesia, selecting appropriate media for use in delivery of learning materials and learning support services has been a real challenge for UT.

This paper describes how UT selects media for its instructions and learning supports. The experiences of UT presented in this chapter depict how an open university operating in a developing country with limited technology is trying to provide accessible and quality higher distance education. This experience will benefit other open universities in similar situational contexts to Indonesia.

ORGANISATIONAL SYSTEM AND NETWORKING

As one of the biggest universities in the world with over 230,000 students, UT needs a strong management system that will ensure the smooth operation of daily activities. To manage these activities, UT has a Head Office located in Jakarta, the capital city of Indonesia, and 33 regional offices throughout the country. A Rector heads the university, assisted by four Vice Rectors for academics affairs, general administration and finance, student affairs, and operational affairs and collaboration.

UT uses both a centralised and decentralised management system. Institutional policies such as those for quality assurance (namely, development and production of course materials, development of test/examination items, and examination data processing) are centrally managed from the Head Office in Jakarta. The regional offices (known as UPBJJ) are responsible for, among other things, carrying out daily operational activities. These activities include student registration, face-to-face tutorials, some administrative counselling, and examinations. Furthermore, since the heads of regional offices come

from and are nominated by the Rector of the local state university (but appointed by UT's Rector), regional offices are also expected to maintain UT's partnership with the local public (conventional) universities in their region. Thus, regional offices are an important part of UT's organisation and management system.

To secure services for all students throughout the country (see Table 10.1 for data of students' location by island), UT has established a long-term collaborative relationship with:

- the well-known state and private universities (for writing up manuscripts for printed learning materials);
- the Indonesian Postal Corporation (PT Pos Indonesia) (for distributing and delivering course materials);
- the state-owned radio station (Radio Republik Indonesia or RRI) and local radio stations (for airing radio programmes);
- a private TV station (Q-Channel) (for broadcasting its TV programmes); and
- Internet kiosks (known as Warnet) (for providing access to UT's online services to students).

With a large area of coverage and the many study programmes that are offered, it is impossible for UT to carry out its mission without collaborating with other institutions that already have the necessary supporting infrastructure. This networking system has enabled UT to reach and provide educational services to almost all inhabited islands in Indonesia.

Table 10.1: *Students' locations by island.*

Island	Number of Students*			
	Working		Not Working	
	Female	Total	Female	Total
Sumatra	29,720	54,030	658	1,259
Java	37,983	88,003	5,440	11,839
Kalimantan (Borneo)	8,785	21,992	448	937
Sulawesi (Celebes)	10,208	19,634	173	344
Irian (Papua)	2,070	5,715	55	121
Bali and Nusatenggara	5,769	15,480	131	232
Maluku (Moluccas)	2,686	5,307	94	191
Others (outside Indonesia)	52	112	5	7
Total	97,273	210,273	7,004	14,930

**Based on data of active students of Semester 2, 2002.*

STUDY PROGRAMMES

UT offers more than 700 courses within 35 study programmes in four faculties — namely the Faculty of Economics and Developmental Studies (FEKON), the Faculty of Social and Political Sciences (FISIP), the Faculty of Mathematics and Natural Sciences (FMIPA), and the Faculty of Teacher-Training and Educational Sciences (FKIP). While the first three faculties are open for high school graduates as well as working adults, FKIP offers only in-service training programmes for practising primary and secondary school teachers. Since 1990, when UT was appointed by the Indonesian government to upgrade primary teacher qualification to Diploma II level, the study programme of DII-Primary School Teacher Training (for classroom teachers) has been the biggest programme, with an average of 50,000 students per intake. The study programmes within each respective faculty are shown in Table 10.2.

LEARNING MATERIALS

As a distance education institution, UT has to deliver its learning materials through the use of media. Even though distance education is now in its fourth or even fifth generation according to Taylor (1998), UT still relies on the medium of the first generation, namely print material. This is mainly due to its high accessibility. To deliver materials to all students who are scattered all over Indonesia (some even located in very remote and isolated locations), only the Indonesian Postal Corporation has sufficient infrastructure and the appropriate system to do so.

Nevertheless, UT also develops non-print materials, mainly for supplementary as well as enrichment purposes. At the initial stage, UT developed mostly radio and television programmes. With the enhancement of computer use in Indonesia since 1998, however, UT has also been developing computer-based materials such as computer-assisted instructions (CAI) and Web-based materials (termed "Web Supplement").

In 2001, as part of the efforts to enhance the quality of learning materials, in 2001 UT started to develop multimedia learning packages that consist of print-based materials and audio/video/CAI programmes. As of January 2003, UT has been able to launch 112 multimedia learning packages for 112 courses. The year 2005 targeted for presenting all courses in the form of multimedia learning packages.

Print materials

As previously stated, since print materials are the most accessible medium for most UT students, UT has been extensively using print materials as the main medium for instructional delivery. Therefore, it is mandatory that the print materials (known as modules) contain 100% of the course content stated in the course syllabi.

The courses are developed by course teams made up of a content expert and an instructional designer. The content experts are mostly (about 97%) invited and hired from nationally recognised conventional (face-to-face) universities, such as Universitas Indonesia, Universitas Gajah Mada, Universitas Airlangga, Universitas Diponegoro and other recognised universities. On the other hand, the instructional designers are 100% UT academic staff. The content experts are responsible for writing manuscripts and UT's instructional designers format the content, based on UT's standard. The instructional designers are also responsible for ensuring that each course is broken down into several modules (each one representing three credit units). Each module consists of general and specific instructional objectives, introductory parts, the body of the content, exercises, a

Table 10.2: *Study programmes offered by Universitas Terbuka.*

Faculty	Level of Education	Study Programme
FEKON	Degree Programme	Economics and Development Studies
		Management
	Diploma II	Manufacture and Industrial Services Supervision
FISIP	Degree Programme	Business Administration
		Public Administration
		Government Science
		Communication Science
		Sociology
	Diploma III	Taxation
		English Translation
		Extension Communication
	Diploma II	Library Science
FMIPA	Degree Programme	Mathematics
		Statistics
	Diploma III	Agricultural Extension
	Diploma I	Environmental Management Studies
FKIP	Degree Programme	Bahasa Indonesia
		English
		Mathematics Education
		Physics Education
		Primary School Teacher
		Biology Education
		Chemistry Education
		Primary School Teacher-Training (for classroom teachers)**
		Civic Education
		Economics Education
	Diploma III	Bahasa Indonesia
		English
		Mathematics Education
		Natural Sciences Education
		Social Sciences Education
	Diploma II	Primary School Teacher-Training (for classroom teachers)*
		Primary School Teacher-Training (for Physical Education teachers)*
		Social Sciences Education
	Certificate	Teacher-Training (for Field of Study teachers)

* *Qualification Upgrading Programme for primary school teachers, known as DII-PGSD.*
** *Known as S1-PGSD.*

summary and formative tests. The modules are designed to be self-instructional so that they can be used by students with minimum assistance from instructors or tutors.

Non-print materials

As mentioned, UT develops non-print materials for supplementary as well as enrichment resources. Most non-print materials are for radio and television programmes, which are broadcast through a private cable/satellite television station (Q-Channel) and the state-owned national radio (RRI) station. In addition, UT has also developed several CAI and Web Supplements distributed through the Internet. Since 2002, with the availability of video streaming technology, UT has also been distributing some television and video programmes through the Internet as "Video on Demand" (VOD).

Right from script writing to production, UT staff do most of the developing of the non-print learning materials. UT has its own audio and video production studio, with full crew and capacity to produce up to 144 video programmes (each of 25 minutes' duration) and 520 audio programmes (also of 25 minutes' duration) a year. In addition, most of UT's academic staff is trained to write audio and video scripts.

The number and variety of learning materials that have been produced is shown in Table 10.3.

Table 10.3: *The production of non-printed materials/programmes by Universitas Terbuka.*

Type of Materials	Number of Production (in Title)	Disseminated/Distributed/ Transmitted by
Printed materials/modules	1026	Postal service *(Only 826 are still being offered)*
Multimedia learning packages *(Printed with audio tapes/ VCD/CAI)*	112	Postal service
Audio	3000	Radio Postal service as audio tapes
Video	500	TV Cable Postal service as VCD Internet (200)
Computer-assisted instruction (CAI)	49	VCD Internet (15)
Web Supplement	161	Internet

LEARNING SUPPORT SERVICES

When it was opened in 1984, UT started with six study programmes and 65,000 students. During its initial years, UT was able to provide two free tutorial sessions per semester for each of the courses offered. However, evaluation studies (see Belawati 1998) showed poor attendance at those free tutorials for various reasons. One of the most frequently cited reasons by students was that the locations of tutorials, which were usually held in the capital city of the province, were too far from where they lived. Some students claimed that they had to travel for at least a day to be able to attend tutorials. This made the tutorial provision inefficient. Thus, UT decided to terminate the tutorials, providing them on voluntary basis when requested by at least 20 students. Evaluation studies again showed that only a small number of students ever requested tutorials.

At the same time, however, students who lived in relatively urban areas and had access to good tutors tended to set up study groups and invite tutors on their own. Those study groups usually hired their own tutors and set up regular study times to suit their convenience. This seemed to work very well — so much so that UT started to encourage all students to set up study groups for their own benefit. Along with that encouragement, UT's regional offices, which are located throughout Indonesia, now also organise initial gatherings for students (especially new ones) so that they can meet their peers and set up study groups. UT also helps these study groups to find tutors as necessary. Data show that over 1,000 study groups have been established and are working well throughout the programmes.

As mentioned above, the student body has now grown to over 230,000 students. UT's study programmes have increased to over 35, involving more than 700 courses per semester. With such a large number of courses, UT definitely needs to look for alternative models for providing tutorials, other than the face-to-face one. Therefore, based on the availability and accessibility of different kinds of technologies suitable for different characteristics of students — from those who have access to and proficiency in higher technology (such as computer and Internet) to those who lack access and are not computer-literate) — UT is now employing a "supermarket model" of learning support services. As indicated by the term, learning support services (i.e., tutorial services) are designed to employ various technologies from print at the low end (or even hand-written correspondence) to computer technology at the high end. The models include correspondence tutorials, face-to-face tutorials, tutorials through radio, written tutorials via Internet, and written tutorials through integration of fax-Internet.

Correspondence tutorials

Correspondence is the medium most accessible to all students. Involving written tutorials sent through the post, this mode is intended to reach students in isolated areas covered by postal services. Even though correspondence has long turn-around times, some students prefer this mode of interaction because of where they are situated. Telephone tutorials, for example, are not popular at all. Even though UT provides special telephone lines for this, many students seldom use the telephone for "real" tutorials. The reason for this is that the telephone is relatively expensive, especially if students have to make a long-distance call.

There are three designs of correspondence between students and tutors: 1) question-based correspondence, 2) assignment-based correspondence, and 3) supplementary material-based correspondence (Universitas Terbuka 1999a). In question-based correspondence, tutors set tutorials based on questions raised by students. Tutors are not to initiate contact, but need to respond to students' initiatives. Therefore, the substance of tutorials depends

on what is raised by students' questions. In assignment-based correspondence, tutors are supposed to prepare certain materials based on the main learning materials (i.e., modules) and some assignments, and to comment on students' responses. Students are expected to complete the assignments and submit according to set schedules. In the third design, tutors are supposed to develop articles that highlight the core substance of the subject matter being taught and publish it in pre-arranged local newspapers. Based on the published article, students are expected to ask questions or to make comments to which tutors give feedback.

Of the three designs, only the first design has been implemented. The other two designs are now in the process of being implemented through Internet tutorials.

Face-to-face tutorials

The face-to-face tutorial model is aimed at enhancing the quality of the learning process. The target students for this model of tutorial are those who reside in relatively urban areas and those who have access to the nearest face-to-face tutorial locations, which usually are in cities. This model of tutorial, however, requires students to pay some extra fees.

There are two kinds of face-to-face tutorials: 1) obligatory tutorials for particular courses; and 2) voluntary tutorials as requested by students. The first type is an integral part of the teaching-learning process, in which students' assignments during tutorials are marked and integrated with the final examination results for their final grades. The selection of courses is based on the nature of the course content; 43 courses were provided with this tutorial in Semester One of 2003. For the second type, the regional offices only organise the tutorials for particular courses requested for by at least 20 students. In 2002, there were 79 such courses requested by students.

Tutorials through radio

Radio has a unique characteristic: the ability to reach remote areas in spite of difficult geographical terrain. It is therefore an effective medium in reaching students who live in remote areas, especially those living on small islands. Radio is also an accessible medium because it is relatively affordable and easy to use. In fact, almost every household in Indonesia can be said to have at least one radio.

Besides the ordinary one-way radio broadcast, radio tutorials are also designed to have follow-up interactions between tutors and students via telephone. Materials are supposed to be developed and recorded, and then the pre-recorded audio programmes are sent to regional offices to be broadcast by local radio stations. After the pre-recorded tutorials, students are given the opportunity to phone in (when it is feasible) to ask questions and/or comment. Tutors respond from the radio stations (Universitas Terbuka 1999b). From 1993 to January 2003, more than 1,776 pre-recorded radio tutorials were produced and broadcast twice a day, seven days a week, on RRI.

Tutorials through the Internet

This model of tutorial is intended for students who live in relatively urban areas and can afford the necessary costs, but are too busy to attend the tightly scheduled face-to-face tutorials. This model is considered to be a feasible alternative since Internet facilities are now available in many Internet kiosks, as well as in post offices in big cities. The rental cost for using the Internet public facilities is also relatively affordable, especially if it is

shared among students within a study group. Experience showed that the cost could be kept down to Rp. 3.500 (equivalent to US$0.50) per month per student when 10 persons shared it.

Initially, the tutorial is conducted on an e-mail/mailing-list basis. This allows students to interact with both tutors and their peers asynchronously. The strength of the tutorial with asynchronous communication system lies in its ability to overcome scheduling problems that usually arise in face-to-face tutorials. Because the interactions are not real-time, students can post questions, raise issues and read tutors' or other students' responses to their questions any time, at their convenience. Similarly, tutors also have the flexibility to schedule their tutoring times, as well as the comfort to prepare materials and to look for answers to students' questions. Therefore, even though the system has now been changed to Web-based, the asynchronous communication system is maintained. Web-based tutorials are conducted using a free-source learning management software called Manhattan Virtual Classroom (MVC). In Semester 2003.1, UT offered tutorials via the Internet for 161 courses, which were attended by about 1,200 students.

Tutorials through fax-Internet

Even though there is public access to Internet through Warnet, UT's students, who are mostly low-income working students, still find the cost too high. To overcome this obstacle, UT has developed an alternative model that combines Internet with facsimile, basically providing an expansion of tutorial via the Internet. The only difference between the two lies in students' access points.

Within the design of tutorials via the Internet, students are required to have access to the Internet and to have some computer operational skills, at least being able to open and send electronic mails. In the design of tutorials via fax-Internet, students are only required to have access to fax machines, which are now widely available to the public in telecommunication kiosks throughout Indonesia, up to the district level. Students can communicate via fax and do not have to be computer-literate (Hardhono and Belawati 1998). Depending on the destinations (local or long distance), the cost for sending and receiving faxes through Wartel, ranges from IDR 2,500 to 5,000 per page. With the integration of fax messages into the Internet system, students send their faxes to the closest fax gateway, which is installed in UT's regional offices. Therefore, the fax charges to be paid by students will be based on either local rates or long distance to UPBJJ, but not to UT's office in Jakarta where the tutors are.

On the other side, students' faxes are received as e-mails by the tutors, who then send their responses by e-mails. This way, messages from tutors are sent to students through the Internet and therefore save communication costs.

ONLINE SERVICES AT UT ONLINE (WWW.UT.AC.ID/)

The recent development of ICT as well as its infrastructure in Indonesia has opened up the possibility for UT to provide its students with a fast, reliable and affordable two-way communication channel. In Indonesia, nearly 2,500 Warnets provide Internet access at reasonable rates to the general public. Warnets are usually owned by local business communities and independently operated by individuals living in the community or district. Warnets are distributed throughout the country, especially in most populated islands, such as Sumatera, Java and Bali. A previous survey on the availability of Warnet within UT students' residences and work places revealed that 33% of the surveyed

students are within 30 minutes travel from the closest Warnet and about 40% of students said that they could access Internet using their office facilities (Toho et al. 1999).

A typical Warnet would have three to five workstations connected to the Internet and one or two printers attached to the system. The speed of the Internet connection from a typical Warnet is about 50 kbps, and the average rates of accessing the Internet in a Warnet range from IDR 4,500 to 9,000 per hour (Toho et al. 1999). This has created a new opportunity for UT to develop and offer an online integrative service for students. This online service (termed UT-Online) provides students not only with general academic information (such as available study programmes, academic calendar and course descriptions), but also with specific and individual academic information (such as examination results and grades, temporary transcripts, online tutorials, video tutorials/Video on Demand, and online counselling services). UT-Online can be accessed by both students and general public at www.ut.ac.id/.

UT realises that student access to the Internet is still limited, since most UT students do not own computers (fewer than one is connected to the Internet). Therefore, UT collaborates with the three biggest Internet access providers: Warnet Association (AWARI), which has over 2,500 members, the Ministry of Research and Technology, which owns 116 Information Technology Kiosks (WARINTEK), and the Indonesian Postal Corporation, which owns Electronic Postal Kiosks (WARPOSNET) in about 60 major post offices. Altogether, they cover all major cities in Indonesia and almost all districts in Java and Bali. It is expected that by the end of 2004, the three providers will have around 10,000 outlets. The collaboration gives UT students discounted rates to use the facilities and sees the placement of UT-Online's posters in Warnets' window (the campaign slogan for UT-Online is "UT's services are as close as the nearest Warnet").

UT-Online is rapidly evolving. UT is now developing a system that will provide individual Web pages for each student in accordance with his or her course registration status, for individual staff members in accordance with their functions and responsibilities, and for the general public. The implementation of individualised UT-Online pages will in time be integrated with the application of new facilities such as online registration, online payment, and online testing/examination.

CONCLUSION

The keys to achieving good quality distance education are providing standardised multimedia learning materials and good learning support services. Under the circumstances, UT has been struggling to provide these multimedia learning materials and support services so that students can study effectively. Characteristics of Indonesian demographics, economics, politics, socio-cultural and educational traditions have a part to play in the Indonesian learner's lack of readiness for distance education, which has made UTs job more difficult.

Even though UT has started launching multimedia learning packages, most learning materials are still print-based. Online services are also now being provided, but only a small percentage of students access them. This, however, does not discourage UT from continuing to develop and promote the use of non-print materials, especially those accessible to students through the Internet.

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CHAPTER 11

USE OF INFORMATION COMMUNICATION TECHNOLOGY IN TEACHERS' PROFESSIONAL DEVELOPMENT COURSES VIA DISTANCE: A CASE STUDY OF TEACHERS IN KEDAH

Hisham Dzakiria and Zuber Hassan

ICT AND EDUCATION IN MALAYSIA

In recent years innovative changes have been introduced in primary, secondary, vocational and tertiary education in pursuit of educational improvement to extend education to all in Malaysia. Information and communication technology (ICT) play an important role in gearing the education system for the future, both in terms of improving it and extending educational opportunity to more people. ICT has infiltrated not just practice, but policy, in a way that no other teaching technology has done in the past. Governments in particular have seized on it as a device for "modernising education" (Murphy et al. 2001, p. 2).

In view of today's globalisation and development of the world economy, Malaysia recognises "knowledge" as the passport to prosperity and social stability. To survive and flourish as part of the "global village," Malaysia has to become a learning society. Lifelong learning is an essential requirement for a learning society. Today there are a growing number of people who expect to learn in formal and informal settings throughout their lives. For many, access to higher education is especially critical. In that vein, distance education has been recognised as one of the most cost-effective ways of democratising education and allowing access to lifelong learning.

As a result, there was a significant increase in the number of institutions offering distance education in Malaysia in the period 1993–2002. This came about as a consequence of the Ministry of Education's new policy that encourages the introduction of distance education in Malaysian universities. Such development is parallel to the belief that "it is the knowledge, skills and insights of the population that is the key to future prosperity" (Brown and Lauder 1977, p. 179).

Malaysia is a fast-developing nation. The country is transforming itself and moving aggressively towards building an effective and successful "K economy." Our society, according to Tan (2000, p. 59) "is information and knowledge-hungry. We need greater

speed, more efficiency and effectiveness in all our endeavours. For this, we need all the knowledge and information that we can get from all sources and from around the world." Because of changes that have taken place for the last 15 years, a market-sensitive education system is evolving in Malaysia. Schools and higher institutions in the country are taking up the challenge of globalisation by changing not only the content of curriculum and programmes, but, more importantly, the delivery systems. IT-enhanced teaching and learning are already being realised: the use of computers in schools, expansion of distance learning programmes and courses, video conferencing and ICT create countrywide links. The Malaysian Ministry of Education is racing ahead to significantly transform Malaysian educational infrastructure in order to meet the 21st century as a technologically competent and scientifically adept society, in line with the aspiration laid down in Vision 2020 by Dr. Mahathir Mohamed, Malaysian Prime Minister, in 1990.

Vision 2020 is not new to Malaysians in general. It is not about one man's view or dream of the future, but a carefully planned response by the government and the Malaysian people to global change and development. Malaysia's own development has reached a critical juncture. The structural transformations of its economy place the people of Malaysia at the threshold of a fundamental shift: first, to an information-based society, and then beyond to a knowledge-based one.

Ever since the launch of the Multimedia Super Corridor (MSC) project, ICT has caught the public fancy in its expanding capabilities and has begun to alter some people's sense of community, ways of work and play, and, most notably, education (Harasim 1993). In the implementation of the flagships of MSC, for example, an integrated set of strategies is being employed. ICT will be the prime focus in all of these strategies, supported by the appropriate people, skills, policies and processes.

The implementation of the "SMART Schools" concept, for example, will render approximately 7,000 primary schools and 1,500 secondary schools in Malaysia beneficiaries of the MSC project in due time. The Malaysian government envisages conversion of all these schools into SMART schools by the year 2010. The first implementation started in January 1999 with 90 schools. These constitute the pilot schools, a sampling of a collection of schools in the country. From January 2000, there was to be a broad-based implementation according to zones. Multimedia technologies would create the infrastructure for new teaching-learning and management processes and introduce an educational network to link all SMART schools, and inevitably, the entire educational system (from primary to tertiary institutions) would incorporate the use of modern technologies and facilities. Such progress and development is not a matter of jumping on the bandwagon, but a matter of the nation's economic survival. Malaysians in general need to be equipped with, exposed to and trained in ICT. And, there is no better place to begin than school. The earlier a student is exposed to and trained in ICT, the better technology literacy will result. Such reality generates high standards and expectations of teachers. To promote, teach and use ICT among learners effectively, teachers themselves have got to be not only knowledgeable and frequent users of ICT, but also advocates and believers of its potential in education.

It is because of these reasons that education structures, planning and policies have been in position to draw together well-educated, highly skilled and strongly motivated teaching professionals. The nation's human capital is its most important economic and development resource. Today, the nation is embarking on an educational journey that will deliver the promises made to establish Malaysia as a fully industrialised country in the 21st century. One important decision and policy change that has been implemented is the conversion of all non-graduate teachers into professional graduate teachers by the year

2010. Future teachers at all levels will be professional teachers with a basic first degree as a minimum requirement. In light of such major change, most of the public higher education institutions have been instructed to develop programmes for teacher training, and this includes training teachers through the traditional campus-based approach as well as training them at a distance.

Industry, government and the public expect students to be proficient in ICT. In today's competitive market, organisations and employers look for "employability skills," or skills, attitudes and behaviour that organisations would like to see in their employees. Among these, an important requirement is to "use information systems effectively." The MSC often speaks of education linking the use of information technology with Malaysia's economic future. With the realisation of the importance of ICT, the Ministry of Education is getting computers into schools. Now, in its more direct involvement with educators, the ministry is receiving strong support and considerable attention from the federal government. Through strategic targeting of educational projects, the Malaysian government is contributing to a national focus on science, technology, culture and heritage and is helping to bring together a wide range of educators and other stakeholders to collaborate in making ICT part of daily reality in every classroom for all students. It is quite common to hear teachers say, "It's the way of the future."

TEACHER EDUCATION IN MALAYSIA

The philosophy of teacher education in Malaysia is a subset of the philosophy of education, which is based on the political and social philosophy of the nation. However, the goals and objectives of teacher education lead the way for teacher training in Malaysia. As described in a report of a national workshop and survey (1982), one of these goals and objectives includes perceptions of the teacher's roles and tasks in the school and community in the context of change.

In the 21st century, technological changes "exert strong reformative influences on the education system. As these changes continue to generate powerful demands in society, educational reforms must surely be formulated and implemented. Such reforms in education have strong implications for teacher-education" (Bascia 1994). As Malaysia is rapidly becoming a technologically oriented and industrialised country, multiple social changes, problems and needs are encountered. These social problems and needs demand attention in planning for educational reforms. Since Malaysia is a plural society, it has a clear ethnic identification with geographical areas, as well as types of schooling or ethnic homogeneity of classes in a plural set up/context/society. Urban-rural imbalances of ethnic origins, wealth distribution, educational opportunities, and availability of amenities and facilities are clearly evident. Changes in these have direct implications for the education system in terms of school mapping, curricular change and teacher education. This is because demands made by a changing society on a school system involve the training of teachers. Hence, the opportunities provided with current innovation in teaching supposedly bridge the gap of job opportunities in rural-urban settings in the context of knowledge-based society, to improve the nation's economy.

TRAINING TEACHERS AT A DISTANCE: A PERSPECTIVE

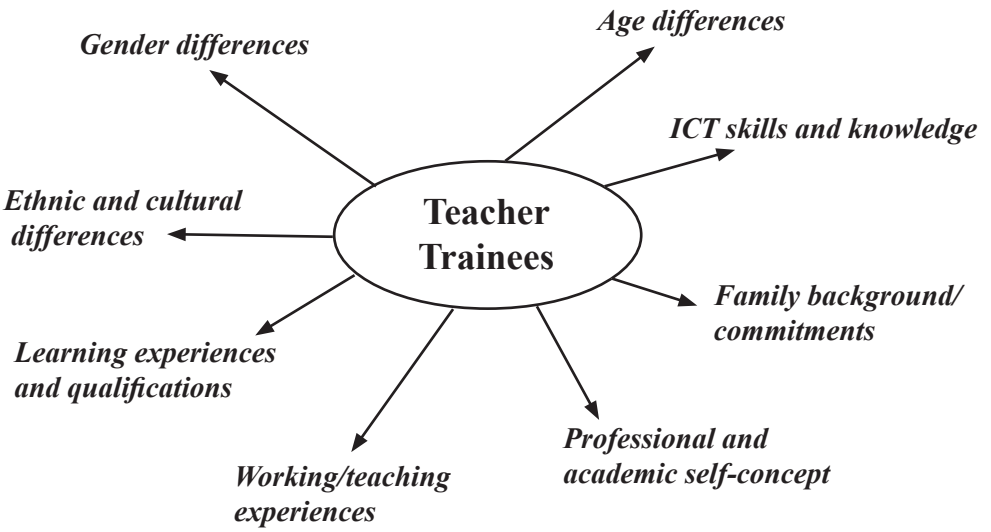
Distance teacher education programmes have the potential to provide all prospective teachers and trainees in Malaysia with the opportunity for training, retraining and professional development, as well as with access to higher education, promoting equality and higher standards in educational teaching and learning regardless of geographical barriers.

As distance education has become a popular instructional delivery mode in the training and retraining of teachers, much research has focused on investigating distance education instructional design and delivery. However, most such research has focused primarily on instructional design considerations. This emphasis on structure and delivery has not been matched by an emphasis on learning (Gibson 1998), an area that has a potential to change and improve distance teaching, learning, and material and course development. Consequently, knowledge in this area is rather limited. Gibson (1998) noted that what is *not* known about distance learning exceeds what we know about it. Therefore, effective distance education providers that offer teacher-education programmes need to integrate efforts from all parties — distance-teacher trainees as distance learners being the most important of all. Meeting the learning needs of distance-teacher trainees is the foundation of the distance teacher education programmes. It is also the foundation to improve distance education materials and course development.

Managing the changing patterns of learning orientations of distance-teacher trainees today is one of the major challenges faced by educators. In a distance education setting, the process of student learning may be even more complex than in a conventional face-to-face setting. The reason is that the perceived obstacles learners encounter may be different from one trainee to another, with varying degrees of complexity. This situation may even be more so in Malaysia as cultural diversity adds to the existing complexity of the heterogeneous profile of today's distance-teacher trainees.

Every distance-teacher trainee, like any distance learner, brings with him or her a profile (as suggested in Figure 11.1) that may be similar to or different from profiles of other trainees. Holmberg (1995) points out that there "is no evidence to indicate that distance learners should be regarded as a homogeneous group." However, as indicated by Gibson (1998, p. 10), "distance learners do share broad demographic and situational similarities that have often provided the basis for profiles of the 'typical' distance learner in higher education." In terms of teacher training, there are three possibilities: that every distance-teacher trainee is, in certain respects, like all other distance-teacher trainees, like some other distance-teacher trainees, or like no other distance-teacher trainees.

Figure 11.1: *The diversity among distance-teacher trainees.*



We have to realise that there is a proliferation of distance education courses and programmes at the higher education level, and universities are continuing to pour human and monetary resources into further developing distance education offerings. As more and more teacher trainees enrol in distance education courses to upgrade their professional qualifications in Malaysia, we will see distance-teacher trainees with different backgrounds begin to take advantage of learning opportunities.

Being an effective distance education provider requires the integrated efforts of several participants, principally the distance-teacher trainees themselves. Meeting the learning needs of the trainees is the foundation of distance education. Increased access to educational opportunities is not sufficient if the experiences are not meaningful. Some teacher trainers mistakenly assume either that trainee needs are self-evident, that adult learners are self-motivated, or that others can make related decisions without a clear understanding of the needs and constraints faced by the remote audience. In a distance setting, the process of the distance-teacher trainees' learning may be even more complex than in conventional face-to-face education, because the perceived obstacles that the trainees encounter may be different from one teacher trainee to another, and the complexity could vary from one extreme to another. This entails pedagogical change in teaching and learning at higher institutions.

Distance teacher-educators have to bear in mind the "baggage" that these trainees might bring with them (i.e., their perceptions of the learning experience, and the coping and adapting processes they develop) to gain an understanding of how to better meet the diverse ICT needs of the trainees and to improve the quality of the distance education materials, courses, instruction and the learning process in the new learning environment.

Building on the premise that distance education learning conditions are more complex than conventional learning conditions, this case study sets out to seek an understanding of potential barriers in distance learning and training and the use of ICT among teacher trainees, particularly those attending higher education to receive or upgrade their professional development qualification.

The benefits of distance teacher education programmes are no doubt numerous. However, there is also a downside to it. Distance-teacher trainees who are able to study their courses at "any time and in any place, at the trainees own convenience" can all too frequently end up trying to fit their studies into odd corners of time in between, while striving to meet the continuing demands of teaching and family. Also, conditions at home may not be suitable for study. Overcrowding, noise, lack of privacy and lack of required space to spread out books or to write assignments are, for many distance-teacher trainees, the realities of home-based study. In addition, not every trainee has a computer and access to the Internet. For others, they may have a computer but not the linkage.

The heterogeneous make-up of distance-teacher trainees, the vast development in higher education, the continuous development in ICT and the complexity of learning at a distance have drawn attention to the trainees and their perspective on, and experience in, learning and training at a distance. Such genuine concern has led to different research in the area.

THE CASE STUDY

This section describes the research methodology and method employed in this study. In the literature review leading to this study, it became apparent that while open and distance education has become an active research field in the past two decades, most of

this research has been conducted from the viewpoint of the providers. Only rarely has research been pursued with the aim of gaining learners' insights into and perspectives of distance learning. Yet, we know that the distance teacher education programme attracts distance-teacher trainees who have different characteristics, motivations and prior backgrounds of study to those in the mainstream programme. Moreover, it provides a learning mode where the social and domestic context can be very different from that associated with traditional educational settings.

Given these changes in trainees' characteristics, educational contexts and settings, research in distance learning can provide insights into how and why distance-teacher trainees undertake their studies. In the context of this study, understanding the distance-teacher trainees' perspective and experience on ICT and its usage in their training and daily routine as teaching practitioners will elicit knowledge on the effectiveness of teacher education training within the ICT environment. In addition, a qualitative study exploring the trainees' experience and perceptions would illuminate understanding of issues and concerns related to ICT and its capabilities. This is especially significant as distance education becomes less and less a marginal educational enterprise and more and more an integral part of the mainstream.

This discussion looks at the use of information communication technology in teachers' professional development courses via distance. Most important, it seeks to understand the distance-teacher trainees' perspectives and experience in the use of ICT in their distance training and in their professional lives as teachers. The issues raised in this study emerged from discussions with distance learners rather than being preordained by the research design or derived directly from our own interest as distance educators and researchers. Our position is that we should value the diversity of the distance-teacher trainees' perspective, experience and educational background and use that diversity to maximise the benefit of their training in the ICT environment.

We believe that a dynamic educational phenomenon such as the use of ICT in distance teaching and learning can be understood by systematic inquiry into the reality constructed by the distance-teacher trainees themselves. This formed the conceptual framework underpinning the investigation. The distance-teacher trainees in the study were encouraged to share their perspective and experiences and make comments on the use of ICT related to four common areas of education: distance learning, distance teaching, curriculum and courses, and learning environment.

Research respondents

The experiences of seven distance-teacher trainees were studied as they progressed through their courses at Universiti Utara Malaysia (UUM). All of them have teaching certificates conferred by different teaching colleges to meet the minimum professional qualification to become teachers in the country. For the purpose of this study, these practising teachers were acknowledged as teacher-trainees in their present capacity and status as registered students at UUM. The distance teachers and lecturers were acknowledged as distance-teacher trainers, because in many ways they help to train trainees. It is the use of ICT in distance teaching and learning, as perceived by the trainees, that this study sought to understand.

All of the teacher-respondents attending UUM were pursuing their first degree qualification via distance programme in either Business Administration (BBA) or Public Administration (BPA). These programmes are not total teacher-training programmes, but

rather programmes pursued by the trainees to further their professional development with the result of obtaining an honours degree. Nevertheless, the two degrees do give these practising teachers various opportunities to obtain new knowledge and information, and they can alternatively be viewed as providing valuable training for the seven teachers involved in this study. The trainees are teachers teaching in schools in the northern region of Kedah. Participation was on voluntary basis. All of them were approached individually and briefed on the study, its intention, informants' consent procedures, and ethical considerations taken into account by the project.

Methodology

Two considerations influenced the choice of methodology. First, because this was a study that involved the understanding of human behaviour (Strauss and Corbin 1990), a qualitative methodology was used. Second, although there is a large amount of literature on open and distance education, little research has been done to elicit deeper perspectives on distance learning valued by distance-teacher trainees' own perspective and practices.

Inductive qualitative technique, which uses successive interviews, was employed in the study. Open questions based on "what" or "how" were asked to allow the distance-teacher trainees to provide their own accounts of their distance learning experiences. Insights and understanding of the distance-teacher trainees' perspectives on and experiences of distance training are then inductively drawn from the data. All the distance-teacher trainees were interviewed on a one-to-one basis. In some cases, multiple interviews were carried out with the trainees. This study was participatory in nature and built on the basis of partnership between the researchers and the subjects. The interviews were conducted in very informal settings and situations. The confidentiality of the distance-teacher trainees was respected at all time.

Study limitations

This was a self-funded project that arose based on our interest in ICT and its use in distance teacher training programmes. Just as the time in which we had to perform this small-scale study was limited, so too was the number of respondents. Thus, we must emphasise that it was not our intention to make generalisations based on our findings, but to seek an understanding of the perceptions and experiences of the seven distance-teacher trainees from the State of Kedah in depth, and to use that understanding to negotiate for plausible action plans needed.

FRAMEWORK FOR DATA ANALYSIS

As educators, we believe that to fully understand the distance-teacher trainees' perspectives and experiences on the use of ICT and its impact on their learning, we must understand why they are undertaking it. The approach chosen may be the most logical for the desired outcome. What the distance-teacher trainees want from their training may well be related to the approach they take to it. Other factors worthy of consideration include individual predisposition to learning based on past experiences (i.e., how individuals have learnt to learn and their conceptions of what learning actually is). This interestingly, helped to develop their conceptions of teaching and their trainers.

ICT AS A NEW TEACHING AVENUE AS ITERATED BY THE DTTS

Many distance-teacher trainees, perhaps for the first time, are now "faced with a new learning environment and the expectation that they will have independent learning skills and the capacity to engage in activities that require self-direction and self-management of learning" (McLoughlin and Marshall 2000, p. 1). It can be argued that distance-teacher trainees pursuing their professional development at institutions of higher learning should already have these attributes. However, this generalisation does not apply to the trainees in this study and may not be applicable to all teacher trainees. Every trainee, every institution, every curriculum is unique and each exhibits different strengths and weaknesses. Most of the distance-teacher trainees journeyed through 12 years of primary and secondary education and may not have had an appropriate educational concept of learning for distance education. It could be very teacher-centred, so their learning is characterised by dependency on teacher trainers as knowledge providers. The transition to becoming distance learners is not an easy task (Saw et al. 1999). The diversity in age, educational background and working experience only magnifies the fact that each trainee could be similar or vastly different from other distance-teacher trainees.

The introduction and use of ICT and its usage in teacher education bring not only educational advantages, but also pose challenges to trainees:

> "The progress in ICT in this country is too fast.… I simply don't have the energy to keep up with the pace; that to me is sometimes sad.…"

> "You talk about technology, the government, Ministry of Education, instructors, everybody talks about IT, ICT, e-learning, e-government … but reality is you are moving too fast ahead. Have you ever thought about the learners? The sorts of problems that they may encounter.…"

> "My age is 45. I left school and education a good 20 years ago. Things are different today. You have too high an expectation of the use of a technology. Getting near it is scary… using it is unthinkable. That was what I felt when I first came back to pursue my degree course through DE [distance education]. Even today, I feel uneasy using technology in my learning. What I need is help, coaching and more training."

Nevertheless, over the past decade, a growing number of teachers have used ICT, as exemplified by the following discourse:

> "I use ICT more often now than before… but mostly to check my email…"

> "Unbelievably, ICT changes teaching and learning.... [Not] to use or not knowing how to use it, I think, will put you behind.… I struggle to use computers and everything else, but I do make attempts.…"

In many of these comments, it is evident that ICT is looked upon as a "bank" of information and a medium of highly purposeful and creative communication and publishing. Evidently, however, as noted earlier, ICT brings with it challenges that are worthy of discussion.

Use of ICT in schools is a modern extension of past and current educational use of communications media. Now teachers are turning to ICT for similar resources and activities, as revealed by the following discourse:

> "I find today teaching is very different from when I first started 17 years ago. I can find many adjectives to describe the experience — interesting, colourful, exciting.… [You] can get information and enhance your knowledge, and it helps you to prepare your lesson with such technology; but equally, I can also find words that describe the problems that I had along the way … challenge, technophobia, technology moving too fast to cope with.…"

ICT undeniably has great potential to improve teacher training, and it is the "way of the future" in the training of teachers and its professional development, but what is the role of ICT in the learning environment? Does it enhance teaching, training and learning? What impact has it on the trainees? Does ICT change the distance-teacher trainees' conception of their training and distance courses? What challenges does it pose to trainees, and how do they cope with these challenges? These questions and concerns are pertinent to the use of ICT in education, as evident in the following discourse:

> "Sometimes you are not so sure what role you play in today's teaching and learning. I always believe that teachers have to be superior … in technology, ICT and everything else. I feel that I am being confronted with too many smart students, and in some cases they outsmart you. That is the reality of today's student.…"

> "Sometimes I feel ICT makes teachers look not-so-smart … it is embarrassing.…"

> "It is good that we can still teach and at the same time get further education or re-training or whatever you want to call it; but the distance component of learning is sometimes problematic … I am referring to, for example the use of technology in the learning requirement. It is sometimes frustrating when you sit in front of the computer screen and feel the darkness of not knowing what to do next.…"

As the above comments show, using ICT demands much of teachers and trainees: making a long-term commitment, overcoming many technical obstacles and acquiring considerable technical knowledge. They need not only a general knowledge of computers and computer networks, but still also knowledge in using e-mail, gopher servers, file transfer protocol (ftp), and the World Wide Web. If they wish to publish materials on the Web, they need a rudimentary knowledge of standard Hyper-Text Mark-up Language (HTML). Teachers also need a sense of the structure of ICT, of what constitutes acceptable use, and of how other teachers have used it.

On top of the technical requirements of pressing ICT into teaching and learning, teachers face deeper questions:

- What values does ICT use in the classroom express?
- What does it mean for an educator to use the ICT wisely and effectively? Does it mean producing information-literate workers who will conform to norms? Does it mean developing media literacy so that students can read and understand how new media and new information technology shape reality?
- Does it mean critically examining whose values control the medium?
- What does "effective use" mean? Getting more students more fully involved in the classroom? Effective use in good design? In scientific investigation? In humanitarian effort? In preserving cultural heritage, honouring history, and cultivating the arts? In spiritual growth?
- Is effectiveness a matter of teaching the same stuff more efficiently, as measured in total cost per unit learned per student?

Further analysis of the data in this study revealed two underlying causes of the frustrations and setbacks encountered in using ICT: the lack of student support and sensitivity to the distance-teacher trainees' needs. In-depth investigation suggests these frustrations are caused by poor communication, and technological barriers. Poor communication between trainee and content, or between one trainee and another is less critical, but significant in terms of trainees with teacher-trainer interaction.

Most distance-teacher trainees need continual interactions with their instructors, and they need clear directions that are not ambiguous in any way. This helps them understand the content and enables them to learn effectively. With regard to the technological barrier, it is imperative for teacher trainers and distance education providers to be sensitive to the different needs of distance-teacher trainees. One cannot assume that every trainee knows the basics of computing. In this study, some of the trainees had minimal access to computers and exhibited inadequate knowledge or incompetence in the use of computer technology. In addition, Wallace (in Murphy et al. 2001, p. 26) stated that: "Programming decisions should not be based upon assumptions about student demographics and needs…. On the other hand, all educational experiences are value-based, and part of the learning experience is development of the concept of a community of ideas and practice." The value of learning is something that learners know best.

This knowledge provides endless possibilities for improving existing distance education courses and programmes. Distance-teacher trainees need to be integrated in the cycle of improvement of distance teacher-training courses. Listening and getting constant feedback from distance-teacher trainees on what works and what doesn't is crucial, as pointed out by Murphy et al. (2001, p. 172): "The value of listening to students is apparent… with evaluation featuring strongly as part of the iterative cycle of development. Student feedback… helped… to realign their assumptions about student interaction."

We believe that teacher trainers and trainees have to address these questions on top of all the technical and instrumental concerns. Distance-teacher trainees, then, should be offered adequate training, support and opportunity for professional development in their training and throughout their careers as professional teachers. Malaysia's population is growing, schools are expanding, and new schools are being opened every year to ensure that the younger generation gets quality education. Teachers will always be in demand to serve the education sector. Can their professional development be sacrificed and ignored? Not in most respects and aspects of their professional lives. Teachers' knowledge and skills in ICT need to be improved and upgraded from time to time if ICT in education is to be sustained. Certainly, training teachers through distance requires some degree of competency in ICT-knowledge and usage. The successes and failures of training teachers through distance on a large scale depends most importantly, we believe, on the trainees' knowledge, skills, attitudes and realisation of the importance of ICT in their profession.

Many of the trainees, as evident in this study, require support and guidance to make the most of their distance learning experiences (Threlkeld and Brzoska 1994). This support typically takes the form of some combination of learning interactions. Research findings in this study identify important guidelines for distance education considerations. For example:

1. Distance-teacher trainees at UUM value timely feedback from their instructors regarding course assignments, exams, projects and their enquiries.
2. Distance-teacher trainees seem more motivated if they are in frequent contact with their respective instructors.

3. Distance-teacher trainers who develop a personal rapport with their students and who are familiar with ICT (e.g., software, hardware, equipment and other course materials) increase their own satisfaction with their distance training programmes.

CHANGING EDUCATIONAL ENVIRONMENT: A REFLECTION

This study reveals that one of the greatest problems experienced by distance-teacher trainees was their feeling of isolation, which makes establishing a trusting relationship between the trainers and trainees difficult. The meaning of such frustration is not well understood, and it is still not clear to other distance education stakeholders. The consequence is that many teacher trainers and instructors have little sympathy for distance learners.

Success in the use of ICT depends a lot on the trainees' skills and their accessibility to ICT facilities. But for this to be realised, it is imperative that interaction, particularly learning interaction and support, two important components of survival, are present and sustained in a distance learning scenario. ICT and other media can easily fulfil the task of providing such support and interaction. The question is: Is ICT used rigorously and effectively to realise this? This is a concern, especially in the Malaysian context. As one respondent expressed it:

> "Interaction is the essence of distance learning. ICT has helped the learning process. Without it you can be assured that success in DE will be more challenging. Nevertheless, interactivity in distance learning is not the responsibility of just the distance learners.… The reality is, there's a lot more to do, like providing effective IT infrastructure, better access to ICT facilities, training and much more. We don't get enough support."

Clearly, then, a lot more needs to be done to provide ICT infrastructure and training. The trainees need to be assisted in improving their skills and usage of ICT in their learning. In terms of accessibility, access to a computer connected to the Internet will itself be limited. Good connections may prove to be expensive. In addition, accessibility to computers for many of the distance-teacher trainees is limited to opportunities in the schools where they work, and not at home.

It is also important to realise that distance-teacher trainees need different learning strategies, and that what works for some trainees may not work for others. Some group interaction and collaborative work may not be an effective and attractive mode of learning for all distance-teacher trainees. For some this approach may be a deterrent. Therefore, how do you support the heterogeneous nature of the trainees and make their training successful? Embarking on a distance education course is not an easy task. Distance education providers and institutions need a lot of planning and vision. They need to be sensitive to the needs of distance-teacher trainees in order to have effective and successful distance teacher-training programmes.

How do distance teachers prepare to guide their trainees wisely and effectively in using ICT? Teachers, according to the following comments, have received little preparatory support for using computers.

> "All depends on your area of specialisation. An IT teacher trainee, perhaps in tertiary institutions, i.e. UPSI, UUM …, I assumed, would be 10, or maybe 100 times better trained and knowledgeable in using ICT in her/his classroom. But a language teacher like myself, or a teacher in another area of specialisation, like art or geography,

may have insufficient knowledge and skills. I remember as trainees, all of us were required to take just two computer courses in college, and that is all throughout the two-and-a-half years of training. Is that sufficient? With the rapid expansion and development in ICT, it is almost impossible for us to practice and advocate the use of ICT in our classrooms."

"As a teacher I am scared looking at the massive development of ICT in education. I always feel that the students today know more than me. They are knowledgeable, skillful, and creative. If you ask me … I know very little, and I am definitely less knowledgeable than my students. You want me to use ICT in my classroom, [but] it will be a difficult choice, a path that I am not inclined to follow … not just yet."

"I am just a language teacher. English proficiency is declining among our students. I don't think using ICT can reverse the proficiency level. I believe the attitudes towards language and reading are the two ingredients to improve English language teaching and learning in Malaysia. Furthermore, I know little about ICT or educational technology...."

"There have been many training courses developed by the ministry at all levels, but you know… there are so many teachers in the country; my school is an A school, if I were to wait for my turn that will take some time. Say you attend a course; the next course will come quite some time later … so that itself is a problem, especially when ICT progresses so fast."

"I think there are so many problems with the use of ICT in education. One in particular, is the problem of accessibility: we have eight computers in the school, with so many teachers around … on top of that, not all the computers are working. So, how?"

"The success of ICT in schools depends on all parties involved … top-down. The heads, first and foremost, have to be believers, practitioners and more IT-literate than us. If the headmaster of the school is himself not an avid user of ICT and perhaps knows little about its capability, or perhaps knows very little just like me, then who is pushing whom … no motivation, no directive … no ICT in classroom. I don't deny the potential of ICT, but a few things need attention first."

"If you are teaching in towns or urban schools it is okay, but when you are teaching in a rural school, like myself, then logistically it is not feasible. How many of these students have computers in their homes? Those with and without computer exposure — all should be considered before you opt to use ICT or education technology in the classroom.…"

Analysing all the quotes above, the problems and issues of practising teachers and teacher trainees learning through distance became apparent? How will they learn? What support will they receive? How will they survive the learning process? Will they be better learners and users of ICT? Can they sustain the use of ICT in their professional lives as teachers?

ICT and educational technology training at teacher-training colleges, it seems, has often focused primarily on technical matters. It needs, however, to deal as well with pedagogical concerns (Bennett 1993; Siegel 1995). MacArthur et al. (1995) described an integrated support programme, using carefully trained peer-mentors. A well-rounded programme of preparation should match school resources and curriculum. It should also include technical and pedagogical training that examines what other teachers have

done, and provides ready access to guide materials, opportunities for peer collaboration, and ongoing support from experienced classroom teachers, librarians, support staff and principals.

Training, support and professional development activities only have value when the technical infrastructure is in place. The Malaysian Ministry of Education is trying to install the resources needed for ICT use. Simply having networked computers in place (i.e., in teacher-training institutions and in schools) and working well will not ensure proper or effective use of ICT. Once teachers are aware of the potential of ICT, they are keen to include its use in their repertoire of teaching techniques, but they do not have time to venture beyond that without any assistance. They need enough equipment to provide access, and they need support that is well adapted to their teaching and working environment.

Often the most effective training and support comes from teachers themselves. A mentor-mentored approach is a common but effective way of learning and teaching. Teacher trainees who are good and efficient users of ICT can teach computer skills and ICT to their colleagues. ICT can be of considerable service to teachers in seeking and offering peer support (Bascia 1994). Using e-mail and computer conference systems, teachers request information and guidance from distant and often unknown colleagues and publish resources and notes on their experience. In this way, they take initiative and responsibility for their own professional development. All of these programmes and systems help trainees help themselves in exchanging information, in questioning underlying assumptions, and in realigning values and practice.

In addition to knowing how to use ICT resources and knowing what is available, teacher trainees need to figure out: how to organise the classroom depending on the resources available; how to plan, develop and undertake ICT-based activities and projects; how to justify their work to parents and the public; and how to collaborate on all of this with colleagues. Much of this they can figure out on their own, once they have initial support and guidance from their teacher-training courses and programmes.

In most teacher-training institutions where access to ICT resources is provided to all teacher trainees, it is possible, with considerable effort, to establish the habits of using ICT. Teacher trainees should be given access to a computer conference system, which they can use extensively for, for example, peer-moderated discussion of the practicum. That discussion could spill over into course work and other areas of concerns. In some teacher education programmes, teacher trainees are able to provide leadership in the use of computers during their practicum simply because they have had more opportunity to work with computers. At the same time, teacher trainers should also work diligently to use ICT to enable close collaboration with schools in the preparation of new teachers. These efforts are the beginning of a continuum of professional development for both new and experienced teachers, including teacher trainers themselves. Improvement should be ongoing.

The following is an ICT Action Plan that we have developed, based on the issues and concerns discussed here. Our intention is to bring about constructive discussions on ways to ascertain the sustainability of ICT in teacher education, both through distance training and traditional face-to-face training. The six parts of the action plan are a result of our analysis based on our interviews with all the distance-teacher trainees involved in this study. The action plan is a result of our partnership with the trainees in understanding the essence of issues surrounding ICT in teacher education.

ICT ACTION PLAN TO CONSIDER

For ICT to be sustained, we feel six areas need to be addressed. These are outlined below:

Development of teacher knowledge, skills and attitudes

The way ahead in realising the maximum usage of ICT is to develop a good sense of competency in ICT among teacher trainees. This effort entails a close examination of today's curriculum and training of teachers and asking the following questions: How effective is the present teaching of ICT for teacher trainees? Are we (teacher-training institutions) producing competent ICT users? Are there continuities in the use of ICT among qualified teachers? Do teachers have the right skills and attitudes? How often are they being assessed and examined on their use of ICT in the classrooms and teaching and learning in general?

These are fundamental questions that need to be addressed and discussed among the stakeholders, namely, the educational policy-makers, the curriculum designers, the teacher trainers and the trainees themselves. One effective way of approaching these questions is to pursue research of different kinds, exploring issues and concerns pertaining to ICT and teacher-education.

User of research to improve teaching and learning

Research is a vital instrument for generating knowledge. Educationists, policy-makers in education, teacher trainers and trainees, and education practitioners all need to know what works and what does not. They need to know what are the effective ways of teaching and learning and *vice versa*. Research affords endless opportunity to grasp an understanding of a particular issue or concern. Research in education, according to Elliot (2001) "is best characterised by the intention to link research with action in a form that generates actionable knowledge." It is when one understands and has sufficient knowledge of a problem, an issue or a concern that actions can be taken to rectify the problems. The same goes for ICT with relation to teacher education. ICT curriculum developers and ICT teacher trainers need to explore and reflect on the progress of such courses and examine issues and concerns by undertaking research that gives them the power to change. Irrespective of the different type of research used (e.g., action research, applied research, participatory action research, collaborative research), one of the many intentions is to bring about change. A teacher trainer, for example, can pursue research within his or her classroom and make the research a collaborative effort with the trainees. Thus, if a lesson or a course that incorporates ICT in the lesson is not "inviting," then one needs to explore why. Such understanding will lead to some changes that might be of interest to the course designer and the teacher-trainer. The important point here is that teacher trainers and trainees need to reflect and assess their performance as frequently as possible. Learning to research for a better understanding and reflection is certainly encouraged.

Integration of ICT in teacher-training curriculum

ICT does not exist in isolation. It is not a single courseware like mathematics, English, history or physical education that teacher trainees have to take within the three years of their training. ICT has the potential to be the base or the medium of instruction for almost all courses available to teacher trainees. ICT has the potential to be a learning

and teaching tool of the 21st century. It is not in any way meant to replace teaching and learning; it is a teaching and learning tool that enhances the two processes. Therefore, in light of today's development of ICT and the world economy, it is imperative that ICT be part of any curriculum design in teacher-trainee programmes. As much as possible, ICT should be integrated into pedagogical aspects of teacher training. And this has to be implemented in a wider scope and should be incorporated in many or most of the distance teacher-training courses.

Use of innovation and creativity

Innovation and creativity are two plausible approaches that teacher trainees need to look at in the use of ICT in their everyday routine training to be teachers. Developing competency, skills, attitudes and interest in ICT is the pre-requisite or basis to a person becoming innovative and creative in the use of ICT. The point here is that teacher trainees need to be continuously trained in, and exposed to, the use of ICT. ICT is not just any teaching and learning tool: it is an innovative and creative teaching and learning apparatus. Teacher trainees need to develop a liking for using ICT in their teaching and using it creatively. ICT applications can certainly enhance the educational experience for both teachers and learners.

Team effort

The Multimedia Super Corridor would not have prevailed if it not for the support and co-operation of all sectors involved. The same goes for the realisation of ICT in schools and educational settings. The massive amount of resources poured into the education sector in planning SMART schools and planning a national network among and within schools will not prevail if support is lacking from any segment of educational institutions. At the macro level, a teacher trainee who has just graduated will not be able to implement his or her training in ICT if the school principal and administrators don't see eye to eye on the use of ICT and its importance in education. Similarly, if the ICT infrastructure is absent from the educational setting, both the teacher and the students will feel that absence. Evidence of sustainable use of ICT for teaching and learning will then be lacking and failure will emerge in terms of planning, policies made, curriculum developed and resources poured into education and telecommunication. The government has to ensure that the planning and progress of change and improvement of technology — in particular, the ICT infrastructure — has to be in place (i.e., in teacher-training facilities, schools and classrooms) for maximum utility of ICT in teaching and learning.

At the micro level, in training, team efforts are dependent on the teacher trainers and trainees. They need to learn to work well together, often learning from and with each other, and working side by side. Trainees have to be trained to take ownership of their work and to be independent, yet the trainers should be well informed of the trainees' work. In addition, teacher trainers may conduct their own research and keep their own records of teacher progress for reference and reflection. Report writing will help them (the trainers) see what they accomplished and sharing these reports will give them a sense of being part of a learning and teaching organisation. Last but not least, the trainers have to develop trust and effective learning relationships with the trainees. This may necessitate trainers wearing different hats and playing multiple roles to realise their teaching objectives. Trainers, for example, are not just trainee instructors, but also mentors, friends, ICT "buddies" and, most importantly, partners in teaching and learning.

Partnership

The concept of partnership, an extension of teamwork, is another key point in the success of realising ICT as a teaching and learning tool in schools. The sense of partnership should be one of the many products of training, research and assessment in teacher trainee institutions, carried forward into schools and classrooms by the qualified teachers. Smart partnerships or alliances can be developed among the trainees while in training, and among teachers in a specified school, teaching a particular course. Such partnership can also be extended to teachers from other schools. Both will allow discussion on how the involved teachers and partners view ICT, how they have used the technology in the classroom, what common teaching and learning barriers exist using ICT, and so on. Such partnership is a powerful strategy in using ICT to its maximum capacity. At the very least, it could provide a good forum for ICT reflection on teaching and learning in schools.

Presumably many teacher trainees in Malaysia enter teacher-training institutions with little specialised training in ICT. With strong alliances or partnerships complemented by effective curriculum on technology and ICT the trainees will quickly learn on the job, take initiative, and very soon provide strong leadership in ICT. Collaboration can emerge naturally, taking the form of sharing resource documents, discussing solutions to common problems and sharing accomplishments and approaches in teaching and learning in general.

CONCLUSION

At the 2nd annual CARE Conference held recently at the University of East Anglia, United Kingdom (2001), Michael Schratz commented that "nobody likes changes except wet babies."

In the context of teacher training and education, trainers and trainees have to be willing and open to change, and be given opportunities to fit that within the heavy demands of teaching and learning in Malaysia. The expectation weighing down today's teachers is incredibly high. Teachers were never bionic supermen and superwomen. They are just normal human beings whose primary role is to educate the younger generation of the country, preparing them for the world and for life ahead of them. What the qualified teachers and teacher trainees need — irrespective of any changes in educational policy, new curriculum, new training, new technology and ICT — is support that is attuned to their particular situation and fits the pace of their professional routines.

This chapter has highlighted several important issues and concerns in relation to the changing world, all of which have implications for education. These include problems of increasing imbalance of access to the very resources claimed to be the way of the future, changes in community and place, and the imminent change in classrooms and schools as ICT enters the mainstream of education. Change in technology is more rapid than any other change in the entire history of education, and that makes teachers in Malaysia and in many other countries highly vulnerable.

If we expect the Malaysian education system to help society deal with such change, then we have to invest heavily, spending as much on support for teachers as we do on computers. The investment should not be driven by technology alone, but by the desire to encourage and support teachers as responsible professionals. They deserve the best tools we can give them because they hold our future in their hands. They need a strong professional community to reach greater heights. What we have now is much talk about possibility, many demonstration projects, much excitement about technology, the

Multimedia Super Corridor, e-university, e-government and a paperless world. ICT is not itself an agent of change; it will not cause educational reform. We will lose a great opportunity for the improvement of the quality of education if we do not support teachers in whatever way they need, to use ICT wisely and effectively. Together, let's reflect and work on changes and actions needed.

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CHAPTER 12

EDUCATIONAL MEDIA IN DR. B.R. AMBEDKAR OPEN UNIVERSITY WITH SPECIAL REFERENCE TO TELECONFERENCE

V. Venkaiah

INTRODUCTION

This chapter deals with the educational media used by Dr. B.R. Ambedkar Open University (BRAOU) in the teaching-learning process of different academic programmes offered by the university. BRAOU has been using different educational media in its instructional strategy since its inception in 1982. While print materials, radio, audio and video lessons were the media used until 1998, tele-lessons and teleconferencing were introduced in 1999 and they have become vital media since then. This chapter presents an analysis of the role played by these diverse educational media in providing learning support to the students. A few other aspects, such as the cost of each medium, the benefits and limitations of each medium, have also been discussed. The focus, however, is more on the teleconference mode used by the university, which has gained importance and popularity in the instructional process during the last two years. Some suggestions are also made to help improve the effectiveness of teleconferencing as an educational medium in BRAOU. These suggestions will be useful to other institutions using teleconference and other educational media as well.

ROLE OF TECHNOLOGY IN DISTANCE EDUCATION

Information and communication technologies play a major role in the distance education system. Educational technology, which had a modest beginning with audio cassettes in the 1980s, has come a long way and today we use computer conferencing, Internet and computer-based multimedia. As Bates puts it, "the value of technology is its ability to reach learners not well served by conventional education institutions, to meet better the newly emerging educational needs of an information society, and to improve the quality of learning" (Bates 1995, p. 18).

Advanced technology is used extensively to produce self-instructional print material, which is the most widely used medium of instruction, particularly in the case of developing countries such as India. Computerised printing, word processing and

transmission of digitised manuscripts are commonplace in the 1990s. Educational radio and TV broadcasts have also been supplemented by audio and video cassettes.

The role of technology is significant in neutralising the negative effects of isolation and lack of regular personal contact among distance learners (Croft 1991). Distance education uses technology to mediate the necessary two-way communication (Garrison and Shale 1987). Jenkins notes that "the new technologies make learning more accessible. Barriers of place and time dissolve; the potential for mass access is combined with greater adaptability to the needs of individuals or groups" (Jenkins 1996, p. 61). In the words of John Daniel, "the new technology is making the Open University even more open" (Daniel 1996, p. 114).

It is evident that technology plays a significant role in distance education. In fact, open universities have been the leaders in technological innovations and making the best use of them for better results. Perhaps Garrison (1987, p. 45) did not exaggerate when he stated, "Distance education is inexorably linked to the technology of delivery. Without the use of technology, distance education would not exist."

Dhanarajan (2003, p. 124) also emphasised the value of technology in education, saying "the opportunity is to utilise every technology that is appropriate, to deliver those educational services at an acceptable cost, with convenient access and, most importantly, without losing the desirable good traditions of the teaching and learning environment."

TECHNOLOGY THRUST IN INDIA

In India, the Indira Gandhi National Open University (IGNOU) has been promoting the use of technologies extensively in distance education. Teleconferencing uplinking was established at the university headquarters and receiving-end rooms were established by IGNOU at Regional Centres, Study Centres and at various places in collaboration with State Open Universities and other educational organisations. IGNOU has been organising teleconferencing (one-way video and two-way audio) covering different academic programmes offered by it. The Ministry of Human Resource Development, Government of India, has identified IGNOU as the nodal agency for a 24-hour education TV channel, Gyan Darshan, and a radio co-operative, Gyan Vani. It also proposes to establish soon about 2,000 satellite downlink facilities and 40 FM radio stations all over the country. These developments have already made available 8,760 hours of TV time, and more than 350,000 hours of radio time will also be available once all FM radio stations become operational (Dikshit 2002).

BRAOU — FIRST OPEN UNIVERSITY IN INDIA

The Government of Andhra Pradesh established the Dr. B.R. Ambedkar Open University (BRAOU), formerly the Andhra Pradesh Open University, in August 1982 through an Act of the State Legislature. It is the first open university in India to provide higher education through distance mode. The university has been fulfilling its mandate by providing opportunities of higher education to different sectors of society. The university started offering academic programmes with a modest student enrolment of 6,321 in 1983, through a network of 22 Study Centres. Since its inception, the university has witnessed a steady growth and impressive performance, both in terms of student intake and number of Study Centres. The university now offers 22 academic programmes and had an annual enrolment of 1,250,000 students attached to 144 Study Centres. The total number of students enrolled at the moment is more than 0.5 million.

With the motto "Education for All," the university has been serving society by providing a large number of people continuing and lifelong education and equal access to knowledge and higher education. Having served the cause of higher education for the last two decades, the university has carved out a niche for itself in the field of open learning by:

- providing access to more than 100,000 students every year, who come from different backgrounds/occupations;
- designing the undergraduate curriculum as Foundation Courses, Core Courses and Application-oriented Courses;
- providing a wide range of learner support services through a network of 23 Regional Co-ordination Centres and 144 Study Centres;
- reaching out to the unreached through different instructional media, including broadcast and telecast modes;
- enhancing the interactivity of instruction through regular live radio phone-in and teleconferencing programmes;
- offering courses in three mediums of instruction: English, Telugu and Urdu;
- Organising lab-based practical training for science- and computer-related courses; and
- offering academic programmes of different levels: certificate, degree, post-graduate and research degrees.

An analysis of the social and educational profile of the students of undergraduate programmes (who constitute 90% of the total student population) in the academic year 2002–2003 indicates the following characteristics (Venkaiah and Srinivasacharyulu 2003):

- Sixty percent of the students are from rural areas.
- Two-thirds of the total students (i.e., 66.33%) are drawn from weaker sections. Backward classes students account for 37.45%, scheduled castes constitute 21.52% and scheduled tribes 7.36%.
- Just over one-third (34.22%) of the learners are women, of whom housewives constitute 50%.
- The average age of students is 26 years.
- A large number of students are unemployed.
- Most of the students neither have independent study room facilities nor personal audio record players, video playback equipment, etc., at their residences.
- The students are conditioned by the traditional mode of learning and lack skills required for distance learning.
- The students come from a wide variety of backgrounds, both educational and occupational, and are highly motivated and mature.

TEACHING AND LEARNING STRATEGIES AT BRAOU

BRAOU's approach to designing and imparting education through its various courses is based on the following premises:

- Self-instructional materials encourage students to become independent and active learners.
- Audio-video lessons and interactive teleconferencing sessions play a supplementary role in the learning process.

- The policy of open access implies that distance learners themselves decide whether they will be able to manage the demands of the courses they want to study and cope with their studies.
- Student Support Services are to be designed on the assumption that the students are mature enough to take responsibility for their own learning and should be left to organise their study according to their personal circumstances and abilities.

The different educational media used in BRAOU include:

- self-instructional print materials
- audio cassettes
- radio broadcasts
- video cassettes
- telecast
- teleconferencing

Experience reveals that among the multiple media employed by the university, print medium is the most important and widely used. In order to maintain the quality of self-instructional materials, the university adopts a house style and a code of practice in the development of self-instructional materials.

Print materials — the master medium

The university has so far developed 399 courses: 195 courses in the English medium, 135 courses in the Telugu medium, 64 courses in the Urdu medium, and five courses in the Hindi medium related to language and literature. It may be noted that nearly two-thirds of the courses (i.e., 257 out of 399 courses) are for undergraduates.

Radio, audio and video lessons

The number of radio, audio and video lessons produced by BRAOU is shown in Table 12.1. The Audio-Visual Production and Research Centre (AVPRC) of the university has produced 1,805 radio lessons, 244 audio lessons and 506 video lessons since the inception of the university. It is evident from Table12.1 that the number of radio and audio lessons was greater than that of video lessons until 1989–90. The number of video lessons produced was meagre only until 1990. The production of video lessons touched a record high with 100 lessons during the academic year 1999–2000 and was considerable with 72 and 111 in the academic years 2001–2002 and 2002–2003, respectively. It may also be noted that the production of audio lessons has come to a halt since 1999 and the production of radio lessons too has been limited since 1994–1995 with the exception of 2002–2003. It is evident from this analysis that the importance of the video component as a learning support strategy has increased in BRAOU in the last couple of years. Audio lessons have disappeared totally from the media-mix during the post-1999 period. The importance of radio lessons, however, is sustained because of the regular broadcast policy of the university through All India Radio. The increase in importance of the video component may be attributed to the policy of the university to telecast through Doordarshan, and the popularity enjoyed by the video lessons.

Tele-lessons

The university entered into another phase of educational broadcasting in 2002 when the Government of Andhra Pradesh launched a TV channel in KU-band. The Government of

Table 12.1: *Production of radio, audio and video lessons at BRAOU.*

Academic Year	Total		
	Radio	Audio	Video
1983–84	127		03
1984–85	228	22	24
1985–86	368	24	36
1986–87	221	54	24
1987–88	129	55	11
1988–89	59	43	09
1989–90	32	22	08
1990–91	29	08	07
1991–92	22	04	10
1992–93	25		18
1993–94	144		42
1994–95	18		
1995–96	12	02	
1996–97	66	07	
1997–98	71	01	19
1998–99	51	02	
1999–00	17		100
2000–01	29		12
2001–02	50		72
2002–03	107		111
Total	1805	244	506

Andhra Pradesh and ISRO entered into a Memorandum of Understanding to commission a TV channel in KU-band on INSAT 3C. In commissioning this channel, the university has played a key role in extending its own support to the Government of Andhra Pradesh by providing required land on university premises for establishing an earth station. As of now, the Government of Andhra Pradesh is operating two individual channels. While the first channel provides taped content, the second is devoted to interactive teleconference programmes. BRAOU has been contributing programmes for both channels. In channel one of Mana TV, the university telecasts lessons of one-hour duration every week from Monday to Friday. In the interactive channel, the university has also been organising teleconference programmes for three hours. As well, the university makes use of Doordarshan Kendra (DDK), Hyderabad's regional transmission, for the delivery of its programmes.

The number of lessons telecast, by faculty, through Doordarshan Kendra and Mana TV are given in Table 12.2. DDK has transmitted 878 lessons during the period 1999–2003. The number of lessons transmitted through Mana TV was 972 between March 2001 and March 2003. Lessons are telecast repeatedly up to four times, depending on the nature of the subject or course and on the number of students enrolled in a course. The lessons are telecast by DDK five days a week from Monday through Friday, from 5.30 am to 6.00 am. Mana TV also telecasts the lessons five days a week from Monday through Friday, from 8.30 am to 9.30 am and the same programme is repeated between 4.30 pm and 5.30 pm on the same day.

Table 12.2: *Broadcast of tele-lessons, by faculty at BRAOU.*

Faculty	No. of Lessons Broadcast Through DDK (from November 1999)	No. of Teleconferencing Programmes Through DDK (since December 1999)	No. of Lessons Broadcast Through Mana TV (from March 2001)	No. of Teleconferencing Programmes Through Mana TV (since November 2002)	No. of Radio Phone-in Programmes (2002–2003)	No. of Radio Lessons Broadcast (2002–2003)
Faculty of Arts	180	32	214	06	02	102
Faculty of Commerce	156	25	201	10	02	105
Faculty of Science	221	30	254	10	03	112
Faculty of Social Sciences	291	46	299	13	02	239
General	30	33	04	28	02	36
Total	**878**	**166**	**972**	**67**	**11**	**594**

Teleconferencing

The number of teleconferencing sessions transmitted through DDK and Mana TV are shown in Table 12.2. So far, a total of 233 sessions have been organised. The pattern followed for teleconferencing is that resource persons make presentations for the first 30 minutes, and the next 30 minutes of the session are devoted to interaction with students through phone-in and fax messages.

The experience of the university reveals that the response to teleconferencing sessions through DDK is overwhelming and the participation of the target learners, as well as the secondary audience, is encouraging. The number of questions received indicates the degree of interactivity and the effectiveness and the popularity of the teleconferencing programmes. A study of the questions recorded indicates that the number of questions ranged from 2 to 27. These questions could be classified into two types. The first type is related to the subject concerned and is raised by the targeted learners themselves. The second category of questions is from the general public. Based on their own experience and knowledge, professionals, practitioners and members of the public raise questions, mostly of general interest. The average number of questions received is limited in the case of undergraduate level courses such as literature, language and some science subjects. The number of questions depends generally on the nature of the topic under discussion and its relevance to the common person.

Radio lessons and radio phone-in programmes

The number of radio lessons broadcast and number of phone-in programmes organised through All India Radio (AIR) from April 2002 to March 2003, by faculty, are presented in Table 12.2. During the 12-month period, 594 radio lessons were broadcast. The range of repetition of radio lessons is 2–5 times, depending on the importance of the subject and the topic covered in the radio lesson. The university allots an adequate number of slots to student services so that all the necessary information, both academic and non-academic, is provided to the students. AIR has allotted to the university six slots per week, each of 30 minutes duration. The radio lessons are broadcast between 7.15 am and 7.45 am on Monday, Wednesday and Friday and from 10.30 pm to 11.00 pm on Monday, Thursday and Friday, every week. The university has been broadcasting radio lessons through AIR since 1983.

IGNOU has provided a one-hour radio phone-in slot to BRAOU on the fourth Sunday of every month through AIR, Hyderabad. Since April 2002, BRAOU has used this time to run an audio conferencing programme called "Radio Phone-in." During 2002–2003, 11 radio phone-in programmes were organised. Since the number of slots is limited, all subjects could not be covered, as is done in the case of tele-lessons and teleconferencing programmes. The interactivity may be rated as satisfactory.

PRODUCTION COST OF AUDIO, VIDEO AND TELECONFERENCE PROGRAMMES

The cost of production varies from programme to programme for any electronic medium, be it radio or television, depending on format and visuals. Furthermore, the production cost incurred by an individual or a private agency is different from that of a public institution or a broadcast agency. The variation is inevitable in view of the creative element on the one hand and the technological options put to use in the production on the other hand.

The average production cost for audio, video and teleconference programmes is worked out based on the cost data collected from the records of the university's AVPRC. The costs are grouped under three stages of production, namely: 1) pre-production, 2) production and 3) post-production. The details of cost items are outlined in Figure 12.1. As there is variation in each item of expenditure from one programme to another, only average cost incurred for each stage is worked out and presented in Table 12.3. Cost analysis reveals that there is a significant variation in the expenses that are directly related to creativity of the Producer, size of production crew, number of locations, days of shooting/editing, format of the programme (talk, interview, discussion, documentary, feature, drama, etc.), number and types of equipment used, and so on.

In the present context, the cost worked out is for simple formats, such as talk, presentation, discussion and interview, and the number of days accounted for in production is up to a maximum of two days. Studio cost is calculated based on the rates of hiring in practice — for hiring out the studio to outside agencies. The other costs are

Figure 12.1: *Cost items in different stages of production.*

Pre-Production	Production	Post-Production
Expert (Script) Presentation Research/Treatment	Producer time Production Asst. Cameraman Lighting Asst. Sound Engineer VTR Engineer Floor Asst. Driver Makeup Set Equipment/Facilities Camera Sound Recording Lights Screen items Location/Infrastructure Studio hire Location hire Power Telephone Video/Audio Tapes Transport Equipment Resource persons Misc. costs Programme Sundry Props. Scenic items Unforeseen expenses General Programme expenses	Video Editor Voice-over Artiste Edit Suite time Graphics/Animation Graphics Animation Photographs Title graphics Editing/Mixing Voice Over Music Sound effects Library shots Master Preparation Copies Copying Dispatch

based on the actual cost incurred by the AVPRC. The university incurs expenditures to the tune of Rs. 9,500 (approximately US$200) to produce a radio lesson of 15 minutes' duration. It does not include any transmission cost for the radio lesson, because AIR transmits free of charge. To produce an audio lesson of 30 minutes' duration, the university spends Rs. 10,200. Thus, the difference between the radio lesson of 15 minutes and audio lesson of 30 minutes is only marginal. The cost of producing and telecasting a lesson of 30 minutes' duration is Rs. 42,000 (approximately US$800) and the major cost components are studio cost at Rs. 15,000 and transmission fee of Rs. 4,000 per programme. In the case of Mana TV, the cost of telecasting one lesson of 30 minutes' duration is Rs. 38,000 only, as there is no transmission fee, because Mana TV is an educational channel of the Government of Andhra Pradesh. There is a cost variation, however, between the teleconferencing programmes telecast by DDK and Mana TV. While the cost of teleconferencing a programme of 60 minutes duration through DDK is Rs. 58, 500, it is only Rs. 18,500 through Mana TV. The major cost variation is tied to studio and transmission costs, which are very high in the case of DDK programmes as compared to Mana TV programmes. Furthermore, the participation of internal teachers is greater in the case of Mana TV programmes than in DDK programmes, and hence the pre-production cost, crew cost and studio cost are very low in the case of Mana TV compared to DDK programmes. However, the reach of DDK programmes is greater because of direct-to-home facility through cable network, and interaction is also greater through DDK programmes.

According to a study conducted by the Centre for Evaluation at BRAOU (Subba Rao et al. 1989), radio lessons and the facilities of audio and video lessons made available at the Study Centre were hardly used. It seems that although students join courses with an interest in learning through audio-visual aids, they are unable to use the aids for several reasons, such as lack of physical facilities and lack of the necessary skills of the co-ordinators and academic counsellors in using audio and video lessons effectively.

Sesharatnam (1994) observed that an insignificant per cent (3.78%) of the students listened to radio lessons regularly. While 25% of them listened occasionally, the majority of students (71.22%) did not listen to the radio programmes at all. A similar pattern of use is noticed also in respect to audio tapes made available at the Study Centres. A little more than two-thirds of the students (71.34%) have not watched video lessons produced by the university, which are made available at the Study Centres. The number of students who used the video lessons occasionally constituted 21.28%. Only 3.78% of the students have used the video lessons regularly at the Study Centres.

Srinivasacharyulu (1996) conducted an experimental study to examine the effectiveness of providing information about the radio timetable to students in advance, providing them access to pre-recorded audio and video cassettes and enabling them to play them at home (the Extended Delivery Method, or EDM). The findings were very encouraging:

- When the schedule of radio lessons was provided to the students in advance, all the students listened to the lessons, though the percentage of usage varied from 32% to 71%.
- About 95% of the students took all the audio cassettes and listened to 52–74% of the audio lessons selectively.
- All the students viewed video lessons.
- Failure in providing the timetable of radio lessons well in advance, in the case of the control group, was the most significant reason for their failure to use the same.
- The students learning under EDM seemed significantly better in the pre-test and post-test achievement tests compared to the majority of students in the control group.

Table 12.3: *Average programme production cost for audio and video programmes (amount in rupees).*

Lesson/Programme	Pre-production	Production				Post-Production		General and Miscellaneous Cost	Total Average Cost
		Crew	Studio	Equip-ment	Transport				
Radio Lesson (15-minute duration)	1,000	1,800	3,500	1,500	500	500	500	200	9,500
Audio Lesson (30-minute duration)	1,000	1,800	4,000	1,500	500	700	500	200	10,200
Radio Phone-in (60-minute duration)	1,500	800	10,000*	500	500	--	--	200	13,500
Tele-lesson (30-minute duration)	4,000	7,000	19,000**	3,500	500	1,500	2,500	4,000	42,000
Teleconferencing through Doordarshan (60-minute duration)	3,000	6,000	34,000	4,000	1,000	--	--	10,500	58,500
Teleconferencing through Mana TV (60-minute duration)	1,500	800	15,000	500	500	--	--	200	18,500

*Includes transmission cost. ***Includes Rs.4000 towards transmission fee.*

- All the students who learnt under EDM favoured this approach, that of being informed about the radio timetable regularly and borrowing facilities in the case of audio and video cassettes.
- About 62% of the students who learnt under EDM admitted that listening to the audio lessons had helped them to start reading the printed course materials in the beginning of the academic year.

In another study, Vijayalakshmi Pandit (1997) found that making available audio and video tapes at the Study Centres and broadcasting radio lessons was felt to be very useful by a majority of the learners. There was no difference between urban and rural students as far as the utilisation of video lessons was concerned. Half the students watched one to five video lessons. The reasons learners gave for not listening to radio lessons included lack of knowledge about radio lessons, non-availability of information relating to broadcast schedule, and non-suitability of broadcast time.

TELE-LESSONS AND TELECONFERENCE IN BRAOU: AN ASSESSMENT

BRAOU has been in the forefront, since its inception, in adopting the multimedia approach. It has been a concern in the university to provide media support both in print and electronic forms. While the emphasis until 1998 was more on the use of audio and video lessons by making available replay facilities at the Study Centre until 1998, the university adopted the policy of using broadcast media, including interactive teleconference mode, from 1999 onwards. Thus, 1999 is considered a milestone in the history of the university and in its policy to reach out to learners through electronic media in a big way.

The university entered into an agreement with DDK, Hyderabad in 1999 to telecast lessons and organise teleconference programmes regularly. Before entering into the agreement with DDK, the university spent approximately US$250,000 to equip the studio in the university. Having created the infrastructure, the immediate problem that confronted the university's administration as well as the Audio-Visual Production and Research Centre (AVPRC) was how to meet the telecast commitment and produce quality educational TV programmes. The problem was solved with the help of the teaching faculty and staff of the AVPRC, who made contributions to plan and produce required quality programmes according to the broadcast schedules. Gradually, the university has overcome the initial problems and now everything is streamlined and goes on smoothly. The university also organises teleconference programmes regularly through DD Channel 8 every Sunday from 2.00 to 3.00 pm. On the conduct of teleconference programmes, the university spends approximately US$20,000 every year for hiring channel time from DDK.

Learners face certain limitations in availing themselves of the benefits of telecast and teleconference programmes. One of the major limitations is that the timings of the broadcast are not suitable for the student community, as these programmes are telecast from 5.30 am to 6.00 am. Discussions with the Study Centre staff reveal that the information regarding timings, topics and subjects is not communicated to the learners well in advance. Yet another observation made is that the programmes produced by the university are not of high quality in terms of the content or presentation styles for educational television. Another observation is that some of the programmes are produced without a proper working script and visual planning because of time-bound schedules and limited human resources. In general, it is widely felt that the production aesthetics of an educational television programme are not strictly observed in these programmes.

As regards Mana TV telecast/teleconference programmes, the major limitation is that the channel is not a direct-to-home channel. The programmes are received through a dedicated network of receiving facilities (downlink facilities) at select places — the university has installed downlink facilities (KU-band) at 23 places covering all the district headquarters in the State. Consequently, students of the university are not in a position to watch this channel in their own homes. On Sundays, when the university organises teleconference programmes, weekend counselling classes are also conducted at the Study Centres. Thus, the student is in a dilemma — whether to derive the benefit of classroom teaching or to participate in the teleconference.

In spite of these limitations, telecast and teleconference programmes enable the students to receive additional learning inputs in the absence of full-time teaching. Thus, these educational TV programmes are playing a supplementary role in the learning process.

The following steps would help improve the usefulness of teleconferencing programmes:

1. Sending the timetable of teleconferencing programmes to the students well in advance (giving them information about date and time, name of the course, title of the topic, etc.). Students may also be informed about toll-free telephone numbers and fax numbers, so that it will be easy for them to interact with the resource persons.
2. Motivating students to go through the course material and literature related to the topic ahead of the teleconference programmes. This will enable them to participate actively in these programmes.
3. Sending students some activities and assignments related to the topic ahead of the scheduled date of programme. This will enable them to interact more actively.
4. Scheduling the teleconference programmes in such a way that they do not clash with the face-to-face counselling sessions.
5. Ensuring that the counsellors are present at the Study Centre to motivate the students to participate in the interactive session. The counsellor may discuss the same topic after the programme is over in order to reinforce the subject and add supplementary points related to the topic.
6. Undertaking format and content quality audits of different teleconference programmes and initiating steps to assure the quality of the programmes.

CONCLUSION

Dr. B.R. Ambedkar Open University adopted the multimedia approach for teaching-learning at its inception. While the university laid emphasis on print materials, face-to-face counselling and radio lessons in the initial years, the use of audio and video lessons has played an important role in subsequent years. While Study Centre-based audio and video support was emphasised until 1999, mass media (i.e., broadcasting of tele-lessons and teleconferencing) have become an important learning component since the academic year 1999–2000. The experience of BRAOU reveals that broadcast media have emerged as important teaching-learning tools in the recent past. The question that is relevant now is what technology and what media-mix strategy will best enable students to learn the courses. A scientific assessment of different media used by the university is needed, as is an empirical study to find what judicious media-mix strategy can be designed with appropriate technologies to match the learning requirements of BRAOU students.

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CHAPTER 13

SATELLITE-BASED DISTANCE EDUCATION PROGRAM AT THE INDIAN INSTITUTE OF TECHNOLOGY BOMBAY, INDIA

Kavi Arya, Saraswathi Krithivasan and Shyamala Iyer

INTRODUCTION

Education is one of the primary factors that takes a country to the ranks of developed nation. It also forms the foundation for growth and prosperity of the people and hence is the most important aspiration of any developing nation. In India, more than 500 engineering colleges cater to the needs of over 400,000 students, and over 800 polytechnic institutes catering to another 500,000 participants. However, considering the population of potential students in the country, there is a dire need for opening new avenues to making quality education accessible to more students. There is also the need for training college teachers, especially in the emerging and constantly evolving field of Information Technology (IT). Working professionals in the area of information technology consistently look for newer developments to keep abreast with evolving technologies and research in their fields, which they can use to increase their productivity at work.

As an attempt to make quality education available to more students and teachers across the country, the Kanwal Rekhi School of Information Technology (KResIT) at the Indian Institute of Technology Bombay (IITB) initiated the Distance Education Program (DEP) in March 2002. The goal of the programme is to make lectures by expert IIT faculty accessible to students at a distance, through the setting up of Remote Centres across the country. The DEP model was conceived through consideration of what, from a number of approaches being deployed across the globe for teaching students at a distance, would best suit the Indian context.

Distance education is disseminated in different modes. At one end of the spectrum is the asynchronous model, through correspondence, Web-based education and so on. At the other end is the live and synchronous model, which tries to replicate a traditional classroom. Web-based education with asynchronous communication through e-mail, discussion forums, etc., along with scheduled on-line interaction using chat facilities, is a rapidly growing mode of education in developed countries. While the Web-based models have several advantages of flexibility and convenience, they demand a high penetration

of personal computers and of Internet bandwidth to reach remote participants. Given the current scenario in India, the model used in the DEP subscribes to the synchronous classroom model, with live interaction with faculty, allowing effective education for distant participants.

OBJECTIVES OF THE DEP

The programme's mission is to make IIT quality education accessible to capable students, teachers and working professionals across the country and eventually across the globe. In achieving this mission, the DEP has implemented a model to support the following objectives:

- ***Reach*** – The technology deployed supports the setting up of Remote Centres anywhere in the country.
- ***Scalability*** – The solution is designed such that the bandwidth requirement remains constant irrespective of the number of centres.
- ***Cost-effectiveness*** – Through the use of scalable bandwidth, terrestrial local connections, and a revenue-sharing arrangement, the cost to the participating centres is capped to make the model viable over a period of time.
- ***Reliability*** – The technology deployed is sensitive to the nature of the synchronous model, with uptimes in excess of 99.99%.

DEP MODEL

The DEP model requires setting up remote classrooms where participants come to attend classes at predefined time slots. While the classrooms are distributed across the country, the instruction originates from IITB (central site) at a classroom equipped as a studio. The lectures from the central site are broadcast using a Very Small Aperture Terminal (VSAT) network to the classrooms and are projected on large screens for distant participants. While video broadcast is a common mechanism used in distance education, this model stands apart by providing for live interaction between the participants and the faculty. The interaction is enabled by software that simulates hands going up in a classroom when participants have a question.

The model calls for truly distributed classrooms, as the local classrooms at the Remote Centres are managed by Local Course Coordinators (LCCs) to ensure the scalability of the model. While the lecture is broadcast, participants can raise their hands if they have questions, as in a traditional classroom. The LCC, who monitors the classroom, indicates the desire for interaction from participants in the classroom by clicking an icon in the user interface. This shows up on the lecturer's monitor. Different Remote Centres can register queries simultaneously. The lecturer is allowed complete control to take one or more questions, continue with the lecture, or make the entire session interactive, as in a traditional classroom. When the faculty grants permission for it, a question from the Remote Centre participant can be broadcast to all centres. At such a point, the Remote Centre becomes the broadcasting node, with all the other centres (including the central site) becoming the receiving centres. Once the participant finishes asking the question, the control is taken back by the faculty to answer the query for the benefit of all the participants across the centres.

As participants attend classes at pre-determined timings at a physical classroom along with other participants, advantages of peer-to-peer interaction are realised. This is an important and differentiating feature of the traditional classroom model, and adds to the

effectiveness of this model of distance education for learning. To exploit the pedagogical advantages of various media during transmissions, the studio classroom is equipped with facilities to provide the lecturer with the option of switching between three inputs: a video, a slide presentation or a whiteboard.

This model captures several advantages of a traditional classroom, a paradigm that all participants are familiar with, thereby reducing the time taken for getting used to this learning style. By distributing the classrooms across various centres, constraints on the number of participants at a single centre are overcome.

TECHNOLOGY USED

Considering that the goal of the programme is to reach participants across the country, the VSAT technology, which has wide reach and reliable uptime, has been chosen. The VSAT footprint covers the entire country, thus making it possible to set up Remote Centres in any corner of India. KU-band frequencies with an uplink of 14 Mhz and downlink of 11 Mhz (which require smaller and cheaper antenna dishes) are used. The essence of scalability in terms of cost of bandwidth is realised through deploying a simplex 512 kbps channel for the lecture broadcast as well as for the interaction with participants in the Remote Centres in the multicast mode. A 16 kbps polling channel is used for control and for registering requests from the Remote Centres for interaction. In this way, irrespective of the number of participating Remote Centres, the bandwidth cost remains constant. By increasing the number of Remote Centres, the bandwidth cost is spread over more centres, thus making the model cost-effective and viable.

As the initial infrastructure requirement for the VSAT based network is cost intensive, other options to expand the network to make it affordable to institutions to join the DEP have been studied. A hub-and-spoke model — using the VSAT infrastructure to reach the first centre (local hub) in distant cities, with other centres within the same city connected to the local hub using leased line — has already been implemented. With the advent of broadband technology, connectivity costs are expected to become cheaper and more reliable. Figure 13.1 depicts the schematic representation of the DEP technology network.

FUNCTIONAL ASPECTS OF THE DEP

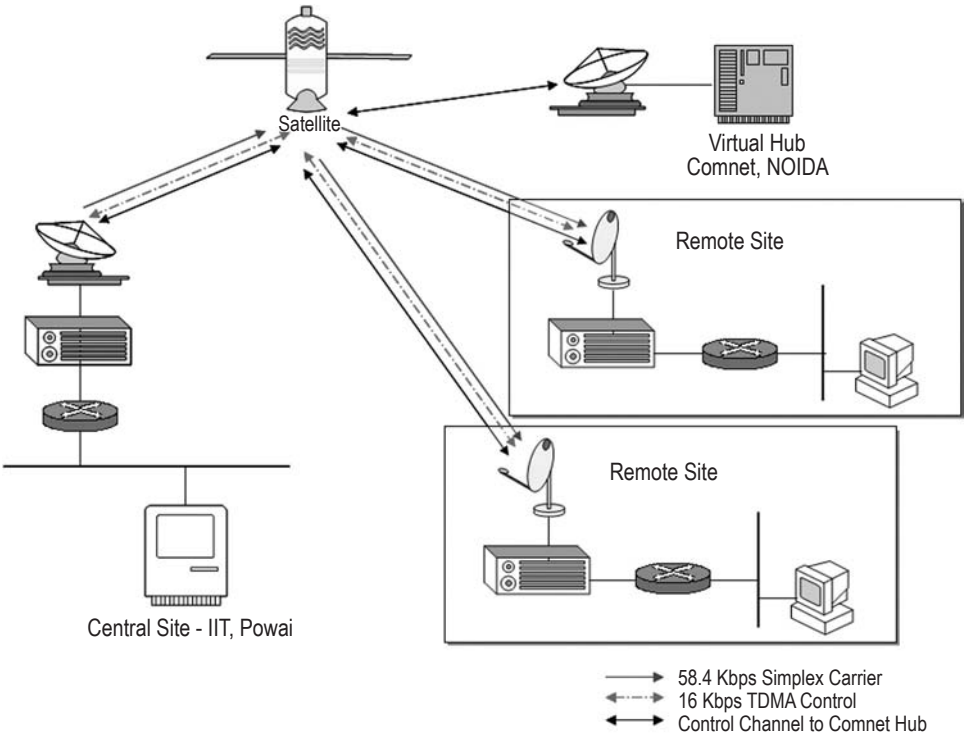
Michael Moore has observed that "the recognition now being given to distance education portends significant changes in education and how it is organized." In his book advocating a systems view of distance education, he further states that "content or knowledge, design, communications technologies, interaction, and learning environment and management are essential to distance education organizations and courses" (Moore and Kearsley 1996).

All the elements mentioned by Moore have an integral role to play in the courses offered through the DEP and there is consistent effort to seamlessly incorporate all these aspects of distance education for delivering high-quality content and services.

Organisational structure

The DEP is a self-financing unit of the School of Information Technology, even though it is a part of a publicly funded Institute (the IITB). Therefore, it follows an organisational structure of a demand model in the planning and implementation of its courses. The approach is student centric both in the courses offered and in the support services

Figure 13.1: *Schematic representation of the Distance Education Program network (Courtesy: HCL Comnet).*



provided. The organisational structure and functions are distributed over the Central Site and the Remote Centres.

Organisation at the Central Site

The Central Site is responsible for: content generation and its transmission to the Remote Centres; co-ordination of central and Remote Centre activities; and provision of leadership for the management of the activities at the Remote Centres. To achieve this, the Central Site has distributed its activities amongst three core teams:

- the studio team
- the content team
- the administration team

The DEP is overseen by a Professor in charge, working closely with the Project Managers and staff of the various teams.

The studio team: This team is responsible primarily for the production of the video lectures and their live transmission at predetermined lecture slots. However, the entire range of tasks include training of staff in the use of recording and transmission equipment, development of protocols to be followed during the transmissions, transfer of

the floor at the interactive parts of the sessions, co-ordination with the faculty teaching the courses, co-ordination with the Remote Centres in receiving requests for floor transfer when questions arise at the centres, and online troubleshooting or monitoring of audio and video signals for smooth transmissions.

The content team: Content generation is primarily the responsibility of the faculty members of the Institute, who are teaching the courses for the DEP. Faculty members have the option of teaching exclusively for the DEP or combining their classes with their regular teaching at the Institute. The presentations for video broadcast are prepared using multimedia in a specific format compatible for transmission, with the help of the content team who are proficient in dealing with multimedia content.

The content team develops course handbooks based on the presentation materials, which are compiled into support materials for the video lectures. The course handbooks are then dispatched to the Remote Centres to be distributed to the students registered for the various courses.

Content is also uploaded on specific course-wise links on the DEP Web site. These provide the course materials and instructions for students, specific to each of the courses offered in every semester. In addition, the video lectures are recorded, edited and stored as VCDs available for individual use as and when need arises.

The administration team: The administration team is responsible for communications with all the team members, the Remote Centres, and the students in the DEP setup. Support services are offered in various ways and include producing printed materials, supplying information about courses, and giving information over the telephone and through e-mail. The DEP Web site is regularly updated with courses offered and other DEP-related announcements. A student helpdesk is available for in-person queries.

In addition to the dissemination of information, the administration team is responsible for enrolling and registering students, maintaining student records, co-ordinating the certification processes and interfacing with the main institute administration for accounting purposes.

Organisation at the Remote Centres

The organisational structure at the Remote Centres is mainly administrative. Staff handle information dissemination, registrations and record-keeping of the students, in addition to doing the accounting. A local Remote Centre Co-ordinator designated for the DEP by the partner institute or organisation manages the overall functioning at the individual Remote Centres. A smaller technical team handles the reception of the video broadcast, to ensure the quality of reception and to assist the central facility in troubleshooting in case of disruptions.

The teams at the Remote Centres complement the activities at the Central Site. The designated Local Course Coordinators for every course interface with the faculty members and course co-ordinators at the main centre for instructions, quiz and exam corrections, and interactivity as far as individual courses are concerned.

The functional teams go through necessary training and upgrading at the beginning of every semester. Typically, these training sessions are also done through the videoconferencing facility of the DEP.

CHALLENGES AND SOLUTIONS

Macro factors

Scalability across several dimensions in the macro level is crucial to achieve the goals of the DEP. When the number of centres and participants grow, a robust technology alone cannot support expansion. Several administrative and logistical processes have to be handled efficiently to bring quality education to the distant participants. The DEP model supports robust technology, distributed administration, effective use of content and efficient management of interaction (Krithivasan 2003) to facilitate expansion of the programme. These dimensions are briefly discussed below:

Robust technology

The VSAT technology chosen uses a single channel to service several centres without additional bandwidth requirement. Considering that at any point in time only one centre is using the channel to broadcast, a single bandwidth of 512 kbps is used for both transmission of lectures and for interaction. The recurring bandwidth cost is spread across the centres so that by increasing the number of centres, the business model becomes viable.

Distributed administration

When the number of centres increases, along with it the number of participants also increases. A high volume of participants can lead to administrative overload if managed centrally. To overcome such a bottleneck, the DEP has devised a distributed mechanism. Many of the administrative procedures are handled locally by the Remote Centres, and include registration, fee collection, local student support, attendance and local distribution of content. To reduce the load of evaluation on the faculty, the LCCs, who are also local subject experts, locally grade assignments and quizzes. However, to ensure brand equity and quality of the programme, mid-term and end-term exams are administered and evaluated by IITB faculty. Based on the feedback on attendance and locally graded assignments from the LCCs, credit and participation certificates are awarded by the Continuing Education Programme of IITB.

Effective use of content

Considering that the availability of expert IIT faculty is a critical factor, effective reuse of the content is essential to scale the program in terms of number of courses offered. All the lectures broadcast are recorded so that they can be retransmitted or packaged into quality content to be replayed at the Remote Centres. Faculty have the option of re-transmitting the recorded lectures in the subsequent semesters while being available for interaction during the broadcast.

Efficient management of interaction

Another important factor that needs to be addressed is the scalability of the live interaction, which is the differentiating feature of the DEP model. Based on the experiences of faculty in large IIT undergraduate classes, and from the experiences of the pilot distance education courses, it is observed that similar questions arise in participants'

minds, independent of whether they are local or remote. This implies that an increase in the number of participants does not translate into a proportionate increase in the number of questions. However, if one or more Remote Centres are found to request the floor more often than is normal, special question-and-answer sessions or tutorials sessions can be scheduled. Other asynchronous mechanisms such as e-mail and bulletin boards can be used to supplement such interactions.

Micro factors

At the micro level, although many of the students taking courses through the DEP find it a satisfying experience, several challenges need to be resolved. Discussed here are problems that have been identified on course evaluation forms, discussions of management with faculty members, suggestions dropped in designated boxes placed in classrooms and other such feedback mechanisms.

Challenges related to Remote Centres

The most important component to ensure successful implementation of the DEP model is resource allocation at the Remote Centres. In an ideal situation, the participants' learning experiences across different Remote Centres should be similar. The "Theory of Equivalency" (Simonson et al. 1999) implies that even though the learning environments at different centres may be different, the experiences of the distant learners across the centres should be equivalent. In this context, an issue faced by the DEP is ensuring uniformity of resources across all Remote Centres (at present, for example, not all participating centres have similarly stocked libraries).

By implementing uniform procedures and processes across all the Remote Centres, and by developing and dedicating resources at the centres to take care of all the aspects of the DEP (including marketing, administration, and participant services), these problems should be sorted out over a period of time.

Technology challenges

The technology being new requires specific training for staff. Even though the training requires staff to have a minimum set of skills, such as booting up the computer and opening the video conferencing application, this has been difficult to follow up with regard to technical personnel at the Remote Centres. If the trained person leaves the job or is absent, then an untrained person handling the equipment incorrectly can lead to faulty transmissions and troubleshooting help may not be available. This necessitates having dedicated personnel with the necessary skill overlap built in, to ensure successful reception at the Remote Centres. Redundancy in terms of critical equipment and maintenance contracts with suppliers (to avoid disruption due to equipment failure) needs to be built into the infrastructure requirement. Having the critical equipment on Uninterrupted Power Supply (UPS) allows for some lead-time to handle disruptions due to power failure.

By creating a dedicated team to handle the studio equipment and cross training them so that all team members are familiar with the entire set-up, problems related to the mishandling of the equipment and lack of back-up personnel are minimised. As an example of cross training, the cameraman should also be required to manage the edit station on a rotational basis. Such an arrangement relieves the staff from monotony of a single job, and it adds to their motivation as they feel they can acquire additional skills.

Content challenges

Currently the course material is disbursed in the form of course handbooks. The material is also available to participants through the course Web page. CDs of the entire transmitted lectures for a course are cut and made available on request by any Remote Centre for replay by their registered participants. However, lending CDs to participants has piracy, copyright and intellectual property rights implications, which have to be resolved. Efforts to upgrade the quality of the course material to support the synchronous lectures are underway.

Administration challenges

Administrative work at the DEP relies heavily on electronic communications. However, if there are Internet connectivity problems, then communications break down. This leads to delays in relaying course-relevant information. Alternate mechanisms are resorted to in such conditions, such as the use of telephone or facsimile. However, transfer of data can become difficult. Postal services are not as fast. Courier services at bulk rates are currently being explored as a viable option to send course materials to the Remote Centres which can then function as distributing centres.

Faculty challenges

An aspect of teaching courses in distance mode that faculty find challenging is the time and effort they need to invest in preparing in advance for the courses, unlike regular face-to-face classes where they may be able to walk into a class and start teaching.

Although faculty members are attracted to teaching in the DEP through video transmission, often the movements of cameramen and other technical people in the classroom distract them. Learning to "talk to the camera" is another aspect that takes time to adjust to. By providing a studio resembling a classroom, this issue is handled to some extent, with faculty being made more comfortable in a traditional classroom setting.

Orientation programs for the faculty as well as the LCCs are conducted at the beginning of the semester to familiarise them with the various aspects of teaching and conducting classes in this mode. As part of the orientation program, faculty who taught DEP courses previously share their experiences, relate what to expect and discuss the pros and cons of teaching in distance mode. It is found that having faculty relate their experiences and efforts to newcomers helps in bringing awareness and appreciation for trying a new mode of pedagogy.

Participant challenges

As in the case of faculty, participants also take some time to get accustomed to the environment. Some feel inhibited to ask questions when they are captured on the camera, and the notion of holding microphones is perceived as alien to a normal class environment. However, through the faculty-initiated interaction, these inhibitions are eventually overcome.

As with faculty members and LCCs, orientation sessions, especially for the diploma program candidates, are planned so that the participants are made aware of what to expect in the technologically extended classrooms.

CURRENT STATUS OF THE PROGRAM

The Distance Education Program has shown a steady increase in the number of participants and in the number of Remote Centres. In the spring 2003 semester, there were 389 registrations across eight Remote Centres. Two centres, one in Pune and one in Mumbai, have also connected to the VSAT centres in the respective cities through leased lines, having stable connectivity and good quality transmission. Figure 13.2 illustrates the growth of the DEP over the one-year period in terms of number of registrations. Figure 13.3 shows the distribution of participants across the eight centres for the spring 2003 semester (Baru and Krithivasan 2003).

Figure 13.2: *Distance Education Program growth pattern between 2002 and 2003.*

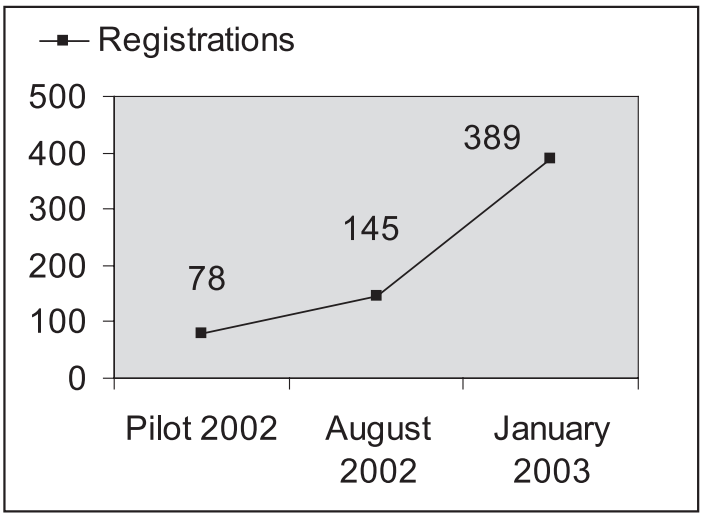
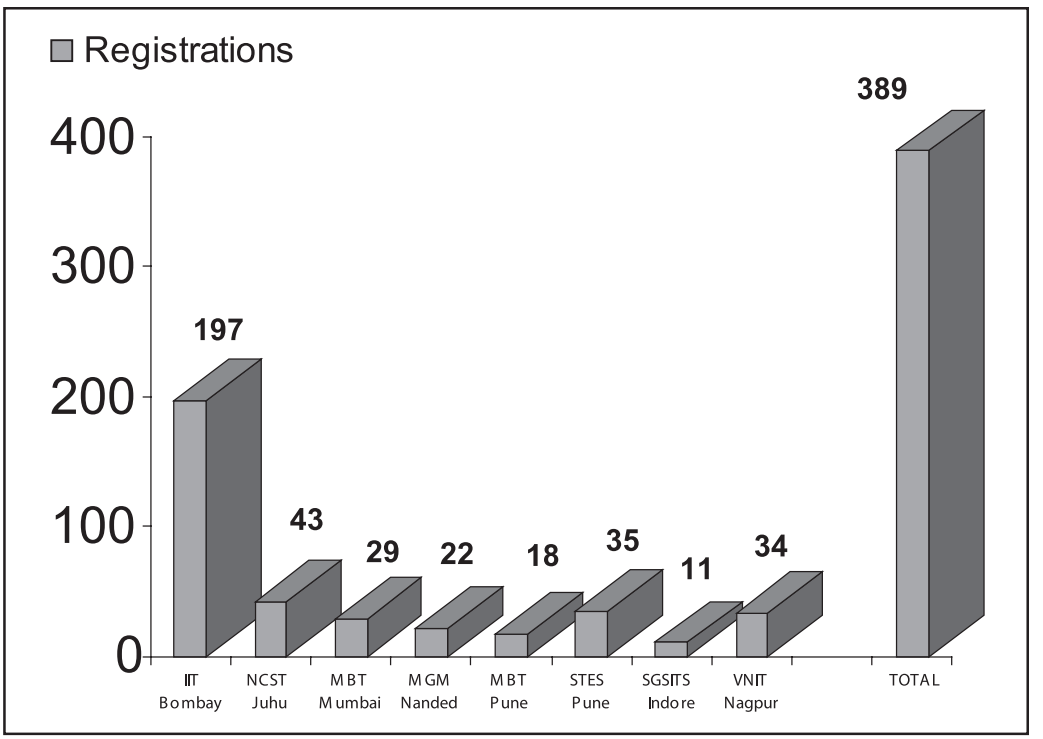


Figure 13.3: *Registration at eight centres of the Distance Education Program (January–May 2003).*



CONCLUSION

The Distance Education Program (DEP) experiment has demonstrated that it is possible to build a distance education programme to provide quality education through a live, synchronous classroom feel in a scalable manner. The initial success of the programme and the new options unfolding in communication technology leads one to believe that this is the way to the future in distance education.

The KresIT has plans to offer the Post-Graduate Diploma of IIT Bombay in Information Technology through the DEP. The innovative model experimented with thus far will be put to real test at that time. The test is expected to prove that the model is scalable and cost-effective — the two characteristics essential to allowing the courses to reach an ever-increasing number of remote classrooms, to enable distance education in its true sense.

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CHAPTER 14

E-LEARNING FOR DEVELOPMENT: THE CASE OF THE UNIVERSITY OF THE PHILIPPINES OPEN UNIVERSITY

Melinda dela Peña-Bandalaria

INTRODUCTION

Development is a most sought-after direction for any Third World country like the Philippines. While there may be a common notion of what development is, the concept, perception and indicators or measures of development vary depending on the paradigm being subscribed to by the individual.

Rogers (1976, as cited by Cadiz 1991) put together the ideas of several authors about the concept of development and forwarded the following definition:

> "…a widely participatory process of social change in society, intended to bring about both social change and material advancement (including greater equality, freedom and other valued qualities) for the majority of the people through their gaining control over the environment" (in Cadiz 1991, p. 6).

This definition emphasises three major concerns: social change; people gaining control over their environment or empowerment; and involvement or participation of the majority of the people. Both social change and empowerment could be achieved by upgrading the skills and knowledge of individuals. This can be brought about by education. Learning, as a result of education (whether formal or non-formal), changes knowledge, attitude/behaviour and skills. Having gained these requisites, the individual can have the confidence to gain control over the environment, harness it and co-exist with it to bring about material development.

It is a stark reality, however, that in a developing country like the Philippines, access to quality education has become the privilege of those who can afford to go to good schools and attend conventional classes. This implies that education itself has created a barrier, leaving some sectors of society marginalised. This also implies that those in the workforce cannot pursue continuing education without having to leave their jobs. Consequently, the task of knowledge and skills upgrading has always been left to respective human resource development officers of agencies or organisations. Short-term training and seminars have always been the response to address this need and, more often than not, they are not enough or even appropriate to meet the challenges of changing

technologies in the workplace and to keep pace with the demands and competition brought about by globalisation. The situation is a perfect picture of a vicious cycle that requires an intervention such as e-learning.

E-learning, or electronically supported learning, in general includes the wide range of learning endeavours with the help of electronic equipment. In the current context, e-learning refers to Web-based or online courses that feature the use of tools such as electronic mail, video-conferencing, and electronic bulletin board systems and chat, used in combination with Web pages and sites. By its very nature, e-learning can facilitate the education of a critical mass of the citizenry and not only those who can avail themselves of education through the conventional system. In the process, the third requisite for attaining development, that of participation of the majority of the people, can be achieved. It is implied in this definition that e-learning is a product or manifestation of progress and technological advancements. As expounded by Pachler (2001):

> "Development during the 1990s, in the field of new technologies, in particular interactive multimedia and the Internet, brought about an information revolution changing cultural practices by reshaping the way we work, study, play, form relationships and communicate" (quoted in Leask 2001, p. 15).

Using this as a tool for development, particularly as a tool for education, is a big challenge, particularly in a country like the Philippines, where the digital divide is more the rule or the predominating circumstance than the exception. This chapter describes how the University of the Philippines Open University (UPOU) used e-learning as a tool to facilitate access to quality education and, in the process, empowered the people, making them potential resources in the country's quest for development.

THE UNIVERSITY OF THE PHILIPPINES OPEN UNIVERSITY

The University of the Philippines Open University is one of the six constituent units of the University of the Philippines (UP) system. It was established in 1995 by the University of the Philippines Board of Regents to enable the nation's premier university to democratise access to quality higher education by offering the programmes of the university in the distance mode of delivery. To date, it has 22 degree programmes: one undergraduate programme (Associate in Arts); 10 post-baccalaureate diploma programmes; 10 master's programmes; and one Ph.D. programme (in Education with major areas in Biology, Math, Chemistry and Physics). In addition, the university also offers seven non-formal courses, three of which are completely online. Every semester, the university offers an average of 80 courses. Almost all of these courses have an online component, predominantly in the form of class discussion or delivery of support services such as tutorials and counselling. Sixteen full-time faculty members of the university and affiliate faculty members from other constituent units of the UP system handle these courses. In some cases, faculty members from other universities are invited to handle selected courses. This pool of faculty members is also assigned to develop more courses, improve existing ones and package learning materials for the courses approved for implementation in the distance mode of instruction.

To facilitate its programme offerings and maintain its presence not only in areas where there is a UP campus, the university is maintaining learning centres in strategic locations in the country. At present, the UPOU has 24 learning centres all over the Philippines and one in Hong Kong. UPOU has also started establishing linkages with the Philippine Embassies in other countries to cater to the needs of the increasing number of foreign-

based students. These learning centres serve as registration and testing centres for students. This is where they go to complete the registration process and pick up their learning packages. Since examinations are still proctored under the e-learning system, students still need to go to the nearest university learning centre to complete the exam.

UPOU has an average enrolment of 1,500 every year. Of these, 29% are from Metro Manila, with the rest coming from regions or areas outside the National Capital Region (71%). An employment profile of the students shows that 58% are employed by government agencies, while 42% are working for private agencies or are self-employed. The age profile of the students is as follows:

Age Bracket (years)	% of Student Enrolment
20–29	37
30–39	37
40–49	20
50–59	5
60 and above	1

In a survey conducted in June 2001, results revealed that among those enrolled in the teacher-training programmes, only about 50% have access to the Internet. Still this does not mean that even those 50% are actually using or know how to use the Internet. The number representing the last two classifications could be much smaller. As expected, more than 95% of students enrolled in communication and IT-related programmes have access to and are actually using the Internet.

DEVELOPMENT OF E-LEARNING AT UPOU

Prior to 2001, the courses at UPOU were delivered using print materials. Student support services, which include tutorials, were provided by conducting a once-a-month face-to-face session in the university's learning centres. During sessions such as these, a university-trained tutor meets the students and facilitates class discussion that helps clarify lessons. Overall, the tutor's tasks include helping distance education students to become independent learners and to overcome their learning difficulties. University learning centres also have co-ordinators who assist the students with other concerns, such as how to drop a course. In most instances, the co-ordinators, since they are the ones in contact with the students, also provide them counselling services.

The shift to e-learning was not an abrupt change from the face-to-face plus print model, but rather a slow process of incorporating other forms of media into the learning package and using available and appropriate communication technologies to provide support services to the students. Two stages can be discerned in preceding the shift to e-learning:

Stage 1. Incorporation of media other than print into the learning packages. In the development of courses and appropriate learning packages, other media, aside from print, were considered to best achieve the learning objectives of the courses. These included lessons in the audio, video and CD-ROM formats. Some lessons were even shown on national television.

Stage 2. Use of other mechanisms, aside from the face-to-face study sessions, to provide support services to students. These include telephone and e-mail tutorials and other forms of consultation, using available communication technologies.

These stages paved the way for the complete shift to online for the delivery of either instructional content or student support services (or both). Since the process of weaning the students and the faculty members from the face-to-face plus print model of distance education has been completed, exploring the use of technologies for the e-learning model of distance education proved to be the next logical step.

THE SHIFT TO E-LEARNING: A CASE OF JOINING THE BANDWAGON?

UPOU's decision to shift to e-learning was not just a case of joining the bandwagon. In fact, it was in line with the university's mission to make good-quality higher education and continuing education, accessible to all who have the talent and the discipline to pursue it. To operationalise this mission, the university aims to develop and adapt delivery systems appropriate to distance learners and provide leadership in the appropriate use of information and communication technologies for education.

The decision to shift to e-learning was brought about by the following theoretical and practical considerations:

Pedagogical concerns. Educators involved in the development of learning packages for distance learners are aware of the fact that print medium is not enough to capture and simulate the conditions present in conventional instruction that would facilitate learning. The involvement of other senses (aside from the visual) which aid in memory retention, is another consideration. Depending on the learning objectives set for the course, lessons were delivered using appropriate media.

While the main learning package, which contains the lessons, remains in print medium, there are courses wherein some portions are converted into video or audio to help best achieve the learning objectives.

In relation to this, the processes involved in the course delivery continuum were evaluated to determine which specific process could be achieved online. Two processes were identified: the delivery of instructional content and the delivery of support services to the students, specifically tutorial support, consultation and counselling.

Reduction of attrition. Kember (1989), in his drop-out-from-distance-education model, cited collective affiliation as one factor that, when absent, can influence whether a distance learner drops or continues with a course. As explained by Roberts et al. (1991), Kember patterned this concept of collective affiliation on Durkheim's concept of "anomie," or state of rootlessness, brought about by complete alienation from the production process — as a result of very distinct division of labour. Applied in the context of distance education, this can be tantamount to the student's alienation from other components of the teaching-learning environment — the classroom, the teacher, the campus, the library, the canteen and, most especially, the classmates. There is, therefore, the need to provide the students with the "sense of belongingness" to reduce attrition.

Doing this for students attending face-to-face study sessions may not be difficult, although a number of them also felt that the once-a-month sessions were not enough. In between these sessions, they still found it necessary to communicate with their professors and classmates for consultations and socialisation.

However, there was a group of students of UPOU which, throughout the years, had been increasing in number. These were the students who lived far from a UPOU learning centre and where once-a-month travelling proved to be not only time-consuming but expensive. These students opted to waive the tutorial support offered by the university through face-to-face sessions and instead they made special arrangements with their professors for consultation, using the available communication technologies. It was observed that in these cases e-mail was the dominant mode of communication, followed by the telephone, indicating the readiness of the students to explore other communication technologies for education.

Although it can be said that these students chose this way of learning in consideration of their specific situation, the university was still obliged to provide them with support services. In the process, students got assurance and even counselling to help them overcome not only their learning difficulties, but also the worries and doubts that came along their way in the course of their studies. This, presumably, would prompt them to go on to complete their courses.

Brown's (1996) study also emphasised the value of collective affiliation. Distance learners, he found, experience a feeling of isolation that can contribute to the discontinuation of courses by them. He concluded that it is important for distance learners to feel that they "belong" and for the institution to provide this to them.

This necessitated the creation of "virtual classrooms," where these students can go and simulate academic and non-academic interactions with classmates and professors.

Increase in enrolment. The very essence of the university is its students and one indicator of the success of a university is the number of students enrolling in its programmes and courses. In the case of UPOU, enrolment has to be tied to cost-efficiency of operations. Prior to 2001, when the face-to-face study session was still the predominant mode of providing tutorial and other support services, the minimum number of students per course per learning centre had to be met for the operations to be considered cost-efficient. In the absence of this number, cancellation of a course or programme in a particular learning centre meant turning away students who wanted to enrol.

In the case of online tutorials, the geographic location of the students enrolled in a course is no longer a consideration. An online tutor can be assigned to a group of students scattered all over the country and, in recent cases, even in foreign countries.

Proliferation of Internet cafés. Access to the Internet requires, at the very least, a telephone connection. In the Philippines, low telephone density means that this would be very hard to come by even if one has the means to buy a PC and use the services of an Internet provider. The shift to an information society and a perspective that sees information as a commodity has propelled the commercialisation of the Internet in many countries. In the Philippines, meanwhile, the use of the Internet as a faster means of communication and as a new way of playing games by teenagers led to the mushrooming of Internet cafés. Along the way, these Internet cafés have become the vehicles to bring learners to their virtual classrooms and make information and communication technologies more accessible and affordable to most.

Democratising access to quality education. The shift to e-learning will not only bring quality education right to the doorstep of the learners, but also right to their fingertips. Developing the skills of the Filipino learners to harness the potential of new information and communication technologies and their convergence will not only enable them to earn

advanced degrees, but also open a new horizon with a wide range of opportunities for professional and personal development. According to Pachler (2001), e-learning will:

> "develop in young people abstraction, system thinking, experimentation, collaboration and learner training, allowing them to meet the challenging requirements of the information society and equip them with the ability to be flexible, change and learn new skills for emerging contexts" (in Leask 2001, p. 15).

It should be noted that in the decision to shift to e-learning, the Internet was seen as an alternative tool for education that could make delivery of instructional content and student support services more efficient and effective.

PREPARATIONS FOR THE SHIFT TO E-LEARNING

The decision to shift to e-learning put in motion preparations on five fronts: process, PC, people, policy and price.

Process. The process of preparing the learning packages was modified, which resulted in the adoption of the "quality circle" mechanism, in which one member of the writing team is a media specialist. The media specialist recommends use of appropriate media to best deliver the lesson and achieve the learning objectives. The university identified individuals who can do this task, prepared appropriate contracts, and created a unit within the university to oversee the production of lessons using other media.

PC. Suplido (2002) presented this classification, which this review divides into two components: hardware and software. The university made sure that the faculty members and tutors assigned to handle online courses have access to computers with Internet connection, either at the university headquarters, university learning centres, or the person's place of work. Later, UPOU also leased lines to have full-time access to the Internet at the university headquarters to avoid too much traffic on the information superhighway. Likewise, all university learning centres were given access to the Internet, not only to facilitate co-ordination with the headquarters, but to facilitate student access to the Internet.

The second component of PC preparation, the software, prompted the university to look for suitable software that has the features appropriate for the identified online components of the courses. In addition, the software should be able to simulate the environment in classroom teaching and so facilitate learning (e.g., through academic interaction or discussions).

Before the institutionalisation of e-learning at UPOU, faculty members who wanted to incorporate online components in their courses made use of free software that could be downloaded from the Internet. This resulted in the absence of a uniform look and format that could be identified with the university. Of more concern was the wide range of variability in the way the course was conducted online.

Since the wide implementation of e-learning at UPOU, the university has been using the Integrated Virtual Learning Environment (IVLE) as the platform for its online courses. The IVLE has facilities for threaded discussions, which simulate classroom interactions, allow chat for synchronous consultations, handle the posting of announcements (which are automatically sent to students through e-mail), and provide the workbin for the students' submission of course requirements. Likewise, the teacher can upload additional course materials and use the rich resources presented by hyperlinks.

People. Another classification put forward by Suplido (2002) was the people component, which refers mainly to the need to train various involved sectors at the university: the faculty members and tutors assigned to handle the courses with online components and those who are part of the pool of online faculty and tutors; the staff identified to provide technical and non-technical support to faculty, tutors and students; the learning centre co-ordinators who are expected to assist the students; and the students themselves. The training can be classified into two major categories:

Training on basic computer skills. This was done on a per-need basis. Admittedly, there are faculty members of the university who still require the training on basic skills to use a computer and access the Internet. In most cases, these were senior faculty members, who have been teaching the course for a number of years already and whose authority in the specific field could no longer be questioned. Also, in most cases, they were the ones who developed the course and packaged the learning materials. This group also consisted of faculty members who considered this alternative mode of delivering their courses a challenge and were willing to be re-trained in order to meet the challenge.

Training on the use of the IVLE. To maximise the full potential of the IVLE, a series of training sessions on the navigation of software was also conducted. In addition, faculty members were taught how to create and develop online course sites, develop discussion boards, upload course materials, organise chats, retrieve course requirements submitted by the students in the course workbin and so on. They were also given training and guidelines on moderating online discussions, exercising "netiquette" and enriching course materials using the resources presented by hyperlinks.

In recognition of the fact that there may be students who may not have the necessary skills to go online and navigate the IVLE, training courses parallel to the ones conducted for university personnel were also developed and implemented for students. These training courses for students were delivered via the distance mode and were supplemented with appropriate support services such as phone-in consultation and computer/Internet facilities at the learning centre. Since the learning centre co-ordinators were also trained, they were able to assist the students.

This training component of the preparations also aimed to address one of the two major reasons forwarded by Mantovani (1996) about why equitable access to the Internet cannot really be sustained. This concerns the problem of usability. As Mantovani explained, "due to the inadequacy of some interfaces, inexperienced or occasional computer users may not even know whether a message is really winging its way or not." If this problem confronts e-mail users, then the IVLE users may face more complex difficulties.

Policy. The decision to go online also necessitated changes in the procedures and institution of policies to provide a conducive environment for e-learning. Changes in procedures were made particularly in routing communications and documents sent online and monitoring student progress. Policies specific to online courses included allocation of resources (e.g., computer/Internet time for faculty members, tutors and students) and providing an Internet subsidy to faculty members and tutors whenever necessary.

Realigning of staff function and redeployment of staff were also carried out to cover new tasks that emerged with the implementation of e-learning. Another move made by the university and one which has policy implications is the redirection of the university's research agenda to include e-learning among priority research undertakings. This was deemed necessary in order to continuously improve e-learning at the university and to

incorporate changes in the way things are being done, whenever appropriate, in order to facilitate/promote learning.

Price. Another major area noted by Suplido (2002) in the preparation activities made by UPOU for e-learning was the price. Obviously, modification in the process of preparing the learning packages to include other media aside from print, preparation of the PCs, and training of the people would mean additional cost in the operations of the university. Furthermore, while there was just a redirection of the research agenda of the university to include e-learning as top priority, this does not mean exclusion of other research areas — and it may even necessitate additional funds for the research activities of the university.

WHAT THE RESEARCH RESULTS SAY

During the two years of e-learning at UPOU, several studies have been undertaken to contribute to the efforts of evaluating the system, and in the process, improving it to further facilitate the learning process.

In a study conducted by Bandalaria (2002), results revealed that while communication interactions involving students and various sectors at the university (such as the faculty/tutors, learning centre co-ordinators and classmates) did not improve the academic performance of a Filipino distance learner, such interactions did contribute to the student staying the course, thereby reducing attrition rate. This observation was attributed to the culture of both the faculty members and students in initiating contact only when encountering problems or difficulties with studying. In most cases, students only contact their professors when they can't understand lessons or need to request special considerations such as getting an extension in the deadline for the submission of course requirements or taking special exams. Similarly, teachers only contact the students if the students are delinquent in submitting course requirements. If the student is performing well in the course, the only interaction would be that scheduled by the university.

The results of the study further showed that most of these interactions were online. It should be noted that two major factors affected the students' choice of communication technologies: cost and access. While it is true that the cost of a call using a landline is less, access to it is very hard to come by, especially in rural areas of the Philippines. The system of e-learning made possible student-teacher and student-student communication at a relatively low cost, when compared to travelling to a learning centre to meet with those concerned.

Garcia (2002), in his synthesis of experience as an online tutor of a course in management, showed the democratising effect of e-learning on learning and the student-tutor relationship. This observation supports the earlier report of Mantovani (1996) which focused on the promotion of equity in computer-mediated communication (CMC) in terms of the amount and length of contribution of each student, regardless of social status. Mantovani, referring to the work of Dubrovsky et al. (1991, as cited by Mantovani 1996), further explained:

> "[In]…a face-to-face communication, the first intervention which conditions the subsequent discussions and strongly influences the decisions taken by the group, is usually reserved for high status members. In CMC, first interventions are more equally distributed among group members."

Mantovani also added that in CMC "unless special rules are followed, there is no real turn-taking. Everyone can write their messages on their keyboards whenever they want without having to contend directly with other participants to gain audience."

Garcia (2002) also considered online learning a potential tool for collaborative learning. This was in view of the diversity of the perspectives shared by the students, which already allowed them to learn from each other. This observation can be attributed to what Valacich (1994, as cited by Mantovani 1996) termed "better temporal organisation of the passage connecting the emergence of an idea to its emergence." This was further explained as follows:

> "CMC seems to reduce the 'waiting time' between the generation and expression of the ideas and thus minimise the effects of 'production block', which in ordinary face-to-face conversation deters participants from expressing their ideas immediately as soon as they come to mind in order to avoid interrupting the speaker. While the person is waiting for his turn, he forgets or loses interest." (p. 97)

Garcia, however, also observed that the democratising effect also results in a tendency for the discussion to deviate from the original intent, thereby necessitating the presence and the skill of the online moderator. Garcia concluded that in e-learning, the absence of social cues and the asynchronous mode of communication call for a different approach. This observation also supports the earlier report of Mantovani (1996) that some participants in a CMC system tend to "express themselves in a more impulsive, rude or even irresponsible way." This he attributed to the absence or weakness of social rules in an electronic environment. Because of this, participants "ceased to be inhibited by consideration of status, either their own or that of other people, and by the fear of being criticised." This feeling of freedom to express oneself was also attributed to the ephemeral character of the computer. Arinto (2002), on the other hand, attributed the difference in student participation, in online discussion to course design and facilitation.

MOST COMMON PROBLEMS ENCOUNTERED BY STUDENTS IN E-LEARNING

The problems most commonly encountered by students in an e-learning environment can be classified as follows:

1. *Dispositional problems* are those personal ones of the students such as attitude, confidence and learning style. The following feedback from a student reflects a dispositional problem:

> "I don't have the skills to enter the virtual classroom. I'm having difficulties following instructions; can't we just use e-mail?"

In general, students have been observed to opt for the easier way out. Some students have been observed to send their discussions through e-mail, requesting that this be considered in lieu of participation in the discussion in the virtual classroom.

Garcia (2002) also observed that some students were not comfortable with Internet technology or even with the simple task of reading text on the computer screen. There were also students who needed more time to master navigation and make full use of the system. In the process, these students needed to catch up with the online discussion and probably felt pressured along the way.

2. *Circumstantial problems* are brought about by circumstances specific to the students, like geographical location, as exemplified by the expressed concerns of these students:

> "I don't have immediate access to the hardware. I still have to go to an Internet café, which means travelling for 2 hours…."

> "I don't have the time — with my work and my kids — I simply don't have the time to access my course site."

Another problem commonly encountered by students, particularly in areas where the Internet bandwidth is low, was the slow process of navigating the course site.

3. *Technical problems* are those that are hardware and software related. The following are examples:

> "My session always expires and I'm always told to log on again even if I've just logged on…."

> "What happened to my postings? I can't see them!"

4. *Consequential problems.* These problems can be considered a consequence of the technologies being used.

In Garcia's (2002) study, he observed that while e-learning has its set of advantages in terms of providing "more space and greater voice" to the students, the technology brought about other concerns. These include the sheer volume of information uploaded when a student posted his or her reactions in a threaded discussion. This sometimes results in information overload and even in increased time needed to go through all the postings. Moreover, since discussion is asynchronous, the students have more time to prepare, edit, refine and even enrich postings by doing additional research or readings. The consequence is that other students feel intimidated by their classmates' postings. Some even feel inadequate.

UPOU students also encountered problems in discussing lessons online because of the absence of social cues, as in the case of non-verbal cues. There were cases where misunderstandings arose between classmates because of this.

LESSONS LEARNED

The close monitoring and periodic evaluation of the UPOU e-learning system brought to the surface several concerns that should be given consideration for e-learning to be an effective tool for education.

1. Converge technology and pedagogy

As mentioned, e-learning is not just a case of using technology because it is available anyway. Mechanics of e-learning emphasise the convergence of technology and pedagogy. This could be achieved through the following:

Development of effective study guides. This would fully integrate all the components of the course. It would also necessitate giving the students clear instructions on what to do, why they need to do it, and how they are going to do what is required from them. It would also help the students, if minimum expectations to receive full credit are explained to them.

For example, instructions might include:

> "You are expected to post a reaction (not more than 200 words) to the issue under discussion and react to the postings of at least five of your classmates."

> "Participation in online discussion will account for 10% of your final grade in this course."

> "To request your password or obtain instructions on accessing the course site, e-mail this office."

It also helped to specify the period of participation per discussion issue, if there were several discussion issues set for the term. For instance, in one course there were four discussion issues set for the whole term, one of which included "Introduction of the members of the class." In the set of instructions, it was stated that this discussion board would be up during the first month of the semester. This implied that (1) students should access this specific discussion board and introduce themselves during the specific period, and (2) students need not go back to this discussion board for new postings after the specified period.

This guided the students and helped them manage their time effectively so that they would only be accessing one discussion board at a time. Furthermore, it also cut the download time for students, thereby reducing Internet cost.

It should also be made clear to the students that participation in these discussions is not just busy work, but integral to the learning process.

Effective design of virtual course site. Just like the traditional classroom, the coming together of the students and the mentor has a purpose: teaching and learning through intellectual discussions and academic interaction and in the process stimulating critical thinking. In addition, the socialisation aspect aids in other forms of learning and personality development.

Detractors of distance education claim that the "low quality of education" afforded by this mode of instructional delivery is due to lack of interaction among learners and mentors, which prevents the development of critical thinking — an unforgivable situation, especially in the case of graduate students. In view of this, each course site must be designed and developed with the pedagogical concerns in mind — that is, of delivering instructional content and support mechanisms to achieve course objectives. Moreover, each feature of the software must be explored to provide a learning environment that not only simulates conventional classroom instruction, but exceeds it as well, considering the vast resources presented by the clickable hyperlinks.

Just like in the conventional setting, the teacher has the responsibility for directing discussions that will build a thorough understanding of the lessons covered in the course as well as related issues. Issues posted for discussion should be relevant to the lesson and should contribute to the efforts to achieve course objectives. The learners are more motivated to participate if they can link their discussions with other course requirements such as exams and assignments. Discussion boards should be designed and discussion topics for each board selected such that skills developed using the technology and the academic interactions made possible by the medium contribute to building competencies expected from those who have completed the course or programme.

Motivation of student participation. Experience shows that just like in the classroom discussion, it is the teacher's responsibility to motivate students to participate in online activities and discussions. In the initial stage of the shift to online tutorial mode, wherein the main consideration was to provide students with a venue to clarify lessons and discuss course requirements, it was observed that only few students took advantage of this support service. Considering that the online course sites were designed and developed in support of the learning process and to complement the print-based learning package, motivating student participation should be done right at the start of the course to help students understand the benefits that they derive from online participation. The increase in the level of student participation could be attributed to the general disposition

of anticipating rewards for jobs well done. It should be noted that distance education students, mature as they are, still aspire for good grades and any activity that contributes to this goal is welcome.

These two considerations highlight the important role of the teacher as what Forsyth (2001) called "coordinators of the learning experience," which is not in any way different from the face-to-face/residential mode of the learner-centred paradigm of teaching.

2. Provide back-up means of communication

Print instructions, e-mail, telephone and text messaging are all the type of back-up communication that will enable the students to stay in contact with the university even if they cannot access the online course site. Similarly, students can be contacted, if necessary, as part of the monitoring process.

3. Make available immediate technical support

The UPOU technical support group can be accessed through e-mail or through the clickable helpdesk on the course site. Assistance is made available within 24 hours.

4. Monitor students' progress

The provision of counselling and advising is an important part of student support services.

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EPILOGUE: EDUCATIONAL MEDIA IN ASIA

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We began this survey of educational media in Asia in the belief that periodic environmental scans of a discipline are necessary if we are to understand the extent and kind of innovative applications of both traditional and current information and technologies. It has been done with a recognition that we have to know the past to understand the future directions in which media applications are likely to move. The lessons learned from past experiences can well serve as pointers, as more countries and donor and funding agencies are increasingly charmed by the potential of both old media (radio and television) and new media (computer- and Web-based technologies) to reach the unreached and to deliver education to the disadvantaged.

We started with the intention of covering all the developing countries of the Asian region. The idea was to capture the diversity of experience, and to describe how each country has dealt with its broader environmental context. For instance, there has to be a difference in approach and application for a land mass such as India, a dispersed nation such as Malaysia, or an island state such as Indonesia or the Maldives. The different levels of development, coupled with the ethnography of the countries, would, we believed, provide a fascinating tapestry, while also recording, for scholars and practitioners, the lessons that emerged from the differences. For various reasons, we did not succeed in getting a complete picture and it will be our ongoing effort to capture the experience of the countries yet left uncovered.

The five country studies, three research reviews and six cases presented in this volume highlight the richness of the Asian experience. Each of the experiences is unique and one could well argue that there appears to be no common ground. A closer look, however, will show that there is a great deal in common among the various experiences and there are lessons to be learned. In bringing this volume to a close, it will be our endeavour to string these commonalities together in a coherent framework.

Underpinning all the contributions has been the fundamental premise that media do have a role to play in education. The nature of the role varies from one country to another and from one institutional experience to another. All the authors, in one way or another, have drawn attention to the importance of the need for a coherent and cohesive approach; and it can be concluded that the successful use of communication technologies for education requires the optimal deployment of sufficient resources in support of policy, structures, funding, human resources, production, research/evaluation and future planning.

Access. In the introductory section, we provided an overview of electronic media in terms of medium, content, and audience effects. A precondition to any of these effects is access. Across the board, in all the country profiles, case studies and research reviews, the problem

of access has emerged as the single most important predictor of educational media use. Whether it is because of poor teledensity, the absence or inadequacy of learner support, or the social context of learning, all studies have pointed to the problem of reaching and accessing the learner. Limited access to the Internet has enabled fewer students to use the online facility of Universitas Terbuka, yet the university, believing it to be the way of the future, is persisting with the technology. And if access is a precondition to use, then systems must be developed to enable access. Also pointed out by authors was the fact that the technologies chosen may have an inherent propensity to widen rather than narrow the digital divide. For instance, the use of satellite to cable and KU-band systems instead of the widely accessible terrestrial systems of broadcasting may result in denying access to those most in need, and the use of broadband may deprive those without access to such technology, especially in rural hinterlands.

Policy. To examine policy in each of the experiences recorded here, one has to go beyond stated government goals of "using information and communication technologies for development," and the acceptance of the belief that such goals translate essentially to a government or public responsibility and role in developing systems and infrastructures for such use. On the one hand, we find that in Malaysia and Singapore there has been both a stated policy for the use of media in education and a parallel investment by the government in pilot testing and implementing initiatives for the sustained use of technology in education. We find a similar involvement of the Indian government in educational applications of media, which have led the way for the growth of the country's huge educational media system and infrastructure. Coherence in policy, in system design, in the preparation and delivery of content, and in the development of collaborative partnerships has followed the technology. In other words, technology availability has dictated, to some extent, India's applications in this field.

On the other hand, in both Bangladesh and Sri Lanka, the absence of policy frameworks and the essential government control and operation of electronic media has precluded innovative applications of these media for education. To some extent, the high cost of acquiring and deploying independent systems may have been responsible. But the experience of both countries demonstrates that, if there is an understanding between government-run media and educational institutions, it is possible to deliver content, especially for basic, non- formal, and school education.

In policy, there has to be synergy between the broad educational agenda, the economic, social and cultural context, and a clear-cut commitment backed by political will to implement policy. In such circumstances, efforts to integrate media into the mainstream educational agenda pay rich dividends.

Policy is a dimension reflected not only at the governmental level but also by institutions. In both case studies of the use of educational television and teleconferencing for meeting distance education needs, India's Indira Gandhi National Open University and the Dr. B.R. Ambedkar Open University have proactive policy backed by institutional will and design, enabling a more efficient and effective delivery of course content and learner support. Similarly, in the Indonesian experience, the Universitas Terbuka, a conscious decision to enhance the quality of learning materials led the university to develop multimedia learning packages. To date, 112 courses have been covered and, since 2002, video on demand is provided through the Internet. Radio has also been revisited as a technology by these open universities.

Infrastructure and Funding. Two issues that determine both the extent and the range of use of media in education are infrastructure and funding. Economies of scale have enabled India to develop vast infrastructure. Malaysia and Singapore have seen an investment in education

as a key driver for economic growth and have therefore invested in the infrastructure needed. Countries such as Bangladesh and Sri Lanka have had difficulty in marshalling the resources needed for developing high-cost infrastructures. In Sri Lanka, with its high levels of literacy and school enrolments, the educational imperative is not as great as in Bangladesh, where all sectors of civil society need substantial input of public funds. Obviously, in the absence of available funding support for infrastructure, education is among the first sectors where funding is cut.

All countries face challenges when choosing technologies and appropriate hardware and courseware. However, successful integration of the media technologies depends on other factors, and among these is the importance of management.

Management. Another common theme that emerges from the various country and case studies relates to the management of the various educational media initiatives in the region. Many of these initiatives have emerged as a result of the leadership of a few committed individuals and institutions. There is no doubt that the Indian experience is the result of the leadership role played by the Indian Space Research Organisation at critical times in the country's developmental growth. Similarly, the efforts of the Indian Institute of Technology should be recognised in its attempt to harness teleconferencing for technical education, and also the efforts in the Philippines and in Malaysia to offer teacher training through distance education initiative. It is the leadership that will enable any institution to bridge the objectives of educators and media technologists, and to effectively integrate media into the educational system. It is leadership that will produce motivation, and that will persuade educators to "buy in" to the potential of the media and to integrate the same in the teaching-learning process.

Research and Evaluation. The problems of research into the use of educational media emerged in these chapters as one of the major common themes that need to be addressed more rigorously. At one level, authors and editors found that the paucity of research and documentation of experiences (beyond glossy descriptions) in the application of education media prevented a more complete understanding of what works and what does not. What research existed, authors found, is one-off and of a summative kind. Studies looked largely at short-term learning gains from tests or interviews conducted immediately after the experimentation was over. There were no longitudinal studies, and rarely was any evidence found of research as an ongoing process or as an input into the process of content development or delivery. There was also little or no strategic research into policy or the management of technology-enabled systems of learning, or into emerging areas of educational media applications.

Most of the research into audio, radio and television comes from India, but the quality of research is patchy — and it is difficult to determine whether it has been the content, format, medium or project management that has affected learning gains. At another level, there is an ongoing problem of micro-level research and the difficulty of generalising findings across countries and the region. While research and evaluation in all the case studies formed part of the experimentation with different technologies, there remains a nagging doubt as to whether such research is replicable in the same country and across the region.

The lack of documentation of experiences in Asia seems to be resulting in many institutions "reinventing the wheel" and repeating the same mistakes. There are commonalities across the region that could be shared by others. It is possible to learn from the experiences of using the older technologies of radio and television in education in several Asian countries, before advising a jump to the bandwagon of the new emerging technologies. This first examination, as presented in this volume, sheds light on all of these concerns.

The topic, however, is by no means complete or exhausted. There are many countries left out and equally as many experiences unexplored. Many issues are yet left for future study. A regular environmental scan of educational media applications, documenting both the old and the new, will offer an effective way of creating a body of research, theory, best practices and useful lessons.