East and South-East Asia

Cambodia • China • Democratic People's Republic of Korea • Indonesia • Japan • Lao People’s Democratic Republic • Malaysia • Mongolia • Myanmar • Philippines • Republic of Korea • Thailand • Viet Nam
At present, Cambodia has no specific policy regarding information and communication technologies (ICTs) in education. The Ministry of Education, Youth, and Sports (MOEYS) focuses its educational resources on basic education, with pre-primary and primary education accounting for nearly 70% of public expenditure on education.¹ In recent years, MOEYS has undertaken a reform process focused on developing a sector-wide approach to education. Part
of this process includes the revision of primary and secondary school curricula. There is little mention of ICTs in this process and no particular ICT subject in the curriculum.

Since 2000, however, the Government of Cambodia has taken several steps towards the development of a national ICT policy. On 23 August 2000, the government established the National Information Communications Technology Development Authority (NIDA), with Prime Minister Samdech Hun Sen as chairman. The main responsibilities of NIDA are (1) to formulate policies on information technology (IT) promotion and development, (2) to oversee implementation of IT policies to ensure economic growth, and (3) to monitor and evaluate all IT-related projects in the country.²

NIDA, in partnership with the United Nations Development Programme (UNDP) and UNESCO, organised the first national Information Technology Awareness Seminar in September 2001, which was attended by representatives from the national government, private sector, non-governmental organisations (NGOs), and international institutions. The prime minister opened the seminar by presenting the six elements critical to a long-term vision for IT in Cambodia:

- Developing telecommunication infrastructures through liberalisation, strengthening the regulatory framework and competition;
- Expanding Internet coverage by attracting private investment;
- Standardising the Khmer language for computer use and improving English language abilities;
- Increasing computer literacy by for example including it in the curriculum of every secondary school and university;
- Ensuring the private sector participates in IT development for the purpose of transferring technology and technical skills;
- Protecting intellectual capital and prevention of computer crimes.³

In February 2003, the MOEYS, with support of the UNESCO office in Cambodia, held a roundtable to formulate policies and strategies on ICT use in education. The following four policy approaches to ICTs resulted:

- ICTs as a need for all teachers and students;
- ICTs as a teaching and learning tool and as a subject itself;
- ICTs as a means to improve productivity, efficiency and effectiveness of education management;
- ICTs for the promotion of Education for All through distance education and self-learning.⁴

On 3 July 2003, the government held the National Meeting on the Formulation of National ICT Policies and Strategies to continue its work in this area.⁵

**Current level of ICT access and use**

According to an e-ASEAN (Association of Southeast Asian Nations) Readiness Assessment conducted in 2001, Cambodia ranked eighth out of the 10 ASEAN countries in terms of e-infrastructure, e-society, e-commerce and e-government. As such, it was classified as an “emerging” readiness country, characterised by the need to build basic ICT infrastructure.⁶

There is relatively little ICT use inside and outside of schools. Public access to computers and the Internet remain limited, despite various efforts to establish Internet cafes and centres. Urban dwellers fare much better in this regard, however, with approximately 100 Internet cafes in Phnom Penh and several in the Siem Reap tourist area.⁷ But with more than 80 per cent of the population living in rural areas, the majority has little or no access to the Internet.⁸

Although the Government of Cambodia partners with non-governmental and international organisations on the promotion of ICT use in education, it has no specific policies or major programmes of its own regarding ICT use in basic, vocational, non-formal or special needs education.

**Major initiatives**

While the Government of Cambodia has made progress towards the development of an ICT framework in recent years, the international community has been responsible for the key initiatives that introduced and expanded ICT into the country. The Open Forum of Cambodia, a non-governmental organisation (NGO), provided the first e-mail connectivity in 1994. Since then, it has provided e-mail access to individuals, government agencies and NGOs, with currently about 500 subscribers, and it has opened an Internet cafe.⁹ The International Development Research Centre (IDRC) of Canada helped Cambodia achieve full connectivity to the Internet in 1997 via a link to Singapore.¹⁰

Several more recent initiatives by the international community highlight various approaches to bringing ICTs to Cambodia:
**VillageLeap.com:** This project established three computer-equipped schools in Robib, a remote and inaccessible area of Cambodia, in 1999. Under the project, one of the schools received a permanent Internet connection, which is now being used to bring local silk handicraft products to the global market (see [www.villageleap.com]).

**CambodiaSchools.com:** This adopt-a-school project solicits donations to build schools in Cambodia through the CambodiaSchools.com website. Donated funds are matched by a World Bank credit through the Social Fund of Cambodia and go towards construction of the schools as well as supplementary salaries for teachers. Donors can also support the installation of solar panels so that these schools can generate energy for electricity and Internet connectivity. More than 200 schools have been built under this programme, several of which have solar panels and Internet connections.

**Digital Divide Data (DDD):** This company began operations in Cambodia in 2001 with the dual objectives of providing digitalisation services to international customers and providing IT training and well-paying jobs to Cambodian workers. Part business, part philanthropy, DDD works with local NGOs and the Asia Foundation to recruit and train disadvantaged Cambodians, such as landmine survivors, former victims of sexual trafficking, and those too poor to afford technical education. The DDD model has been so successful that the number of Cambodian staff has grown from 20 to more than 100, with a second office opened in Battambang. Plans for a third office to be based in Vientiane, Laos, are underway.

**Community Information Centers (CICs):** The Asia Foundation, through a grant from the U.S. Agency for International Development, and in partnership with Microsoft Corporation and 11 Cambodian NGOs, undertook a project in spring 2003 to establish 22 CICs around the country. The CICs, which are based in offices of local NGOs, provide local communities with access to e-mail, the Internet, a new Khmer web portal and other computer-based services. The purpose of the CIC network is to increase access to news and information for Cambodians outside of Phnom Penh and to create a network for information-sharing across the country.

**Women’s Media Centre Radio:** This non-formal education initiative aims to improve the participation and portrayal of women in the media. Through developing and running a daily radio broadcast, the primarily female staff receive practical experience in radio journalism and feature production, as well as in the use of radio, computer, and Internet technologies.

**Cisco Networking Academies:** The UNDP Asia Pacific Development Information Program (APDIP) and Cisco Systems, Inc., in partnership with NIDA, have established three Networking Academies in Cambodia. The Networking Academy Program teaches students to design and maintain computer networks. ASEAN and UNESCO have also launched regional ICT in education projects that include programmes in Cambodia. UNESCO and ASEAN, along with several development partners, have launched a regional project on strengthening ICT in schools and establishing a schoolnet. The general objectives of the project are to share practices on using ICTs in schools, to test various models of ICT-based teaching and to improve access to educational resources through the establishment of a schoolnet in ASEAN countries. Through its e-ASEAN initiative, ASEAN has also held a number of ICT programmes, workshops and seminars for representatives from member countries.

UNESCO has also been increasingly active in supporting ICT use for education in Cambodia. Through a project titled “Promoting the Effective Use of Information and Communication Technologies for Education,” it has been working with the Cambodian government to develop a national policy on ICT for education, to train teachers on skills and the use of ICTs to improve teaching and to establish a national ICT-based clearing-house. UNESCO has also contributed through pilot projects and computer donations. In 2002, UNESCO and the Open University of Hong Kong donated 350 phased-out personal computers to NIDA, MOEYS and the Cambodia Institute of Engineering. As part of a pilot project, MOEYS distributed 150 of the computers to five pedagogical institutions located around the country and held training for lecturers of these institutions on basic computer skills. Recently, UNESCO announced a new project on improving the management and delivery of technical and vocational education through the application of ICTs. UNESCO has also initiated an effort to create a non-formal education monitoring information system.

### Examples of training

Several small-scale training efforts are being undertaken by the Cambodian government and the international community. Most of these efforts focus on teacher training, with a few examples in the areas of non-formal education and distance learning. Training in ICT at the primary and secondary school levels is negligible.

Under the “Promoting the Effective Use of ICT in Education for All in Cambodia” project, UNESCO and the Teacher...
Training Department of MOEYS have begun training teachers, both at the pre-service and in-service stages, in ICT skills and the use of ICT to improve teaching and learning. In May 2003, training was provided to teacher trainers who already had basic ICT skills. In August, those trainers trained 400 additional teacher trainers in the use of ICTs for education. 18 To support increased teacher training, MOEYS now requires all students in teacher training colleges to attend at least two hours per week of ICT courses. MOEYS continues to supply the necessary hardware to support this training.

Another objective of the UNESCO project is to provide ICT access to 1,000 primary and secondary school teachers through teaching colleges and to at least 5,000 children and youth enrolled in formal and non-formal education programmes. The project will address geographical and gender-related digital divide issues by targeting teachers and students in deprived areas and by establishing a minimum percentage of female trainees. According to the project guidelines, 35 per cent of the teacher trainers, 40 per cent of the trained primary and secondary school teachers and 45 per cent of the trained children and youth must be female. 19

In 2000, the Sasakawa Peace Foundation of Japan funded two training programmes on distance education management and technology for educators and technicians from several Southeast Asian countries, including Cambodia. Thailand donated six sets of distance learning equipment to Cambodia following these two training programmes. 20

Training has also been provided to Cambodian representatives under the Southeast Asian Ministers of Education Organization (SEAMEO) INNOTECH programme. In 2002, for example, a course was held in the Philippines titled “Technology Applications in Education: Teachers and Teacher Trainers.” 21

### Constraints on the use of ICTs

There are numerous constraints on the use of ICT both within Cambodia in general and within the education sector specifically:

- **Weak telecommunications policies and infrastructure:** Restrictions, ambiguity and lack of transparency in telecommunications policies, laws and implementing regulations constrain the development of the telecommunications industry. 22 In addition, since only 26 per cent of the population has a fixed telephone line, the potential for dial-up Internet access is limited. 23 The use of ICT in Cambodia has also been affected by the country’s relatively late entry (1997) onto the Information Superhighway. According to the International Telecommunications Union, as of 2002 Cambodia had the lowest Internet penetration in Southeast Asia and the highest Internet prices. 24

- **Lack of basic education infrastructure:** In the education sector, the basic needs are substantial. Schools lack trained teachers, equipment, textbooks, electricity and water. Teachers are undereducated, underpaid and often have to wait months for their salaries. Many rural areas do not even have local schools. Faced with these challenges in improving the quality of and access to education, MOEYS may not have the necessary resources to venture into the relatively costly realm of ICTs. Even if they received donations of computer equipment, most public schools in Cambodia could not afford the electricity and telephone lines to use them. Universities and pedagogical schools also lack ICT equipment and access.

- **Lack of ICT human capital:** The brutal Khmer Rouge regime and decades of internal conflict have decimated the human resource base of Cambodia. Under the Khmer Rouge, an estimated 1 to 3 million lives were lost, including more than 75 per cent of the teaching force. The legacy is a Cambodian population both young and uneducated, without a vibrant academic community to support ICT development. The adult literacy rate is 68.7 per cent with combined primary, secondary and tertiary gross enrolment of only 55 per cent. 25 The quality of education is also affected by the lack of trained teachers and their regular absence in school due to income-generating activities outside the classroom. The government itself does not use ICT extensively and its personnel lack training on the skills and benefits of ICT.

- **Difficulty of computerising the Khmer script:** The Khmer script is highly complex, with 150 letters in the alphabet, no spaces between words, and consonants that have multiple forms depending on their position within a word. This makes text entry in Khmer extremely difficult. Moreover, though different Khmer font systems for computing have been developed, they are not compatible with each other. To solve this dilemma, several Khmer-to-Khmer translation systems have been developed, and the
UNICODE consortium is working on developing a uniform code for entering Khmer script on computers. Even with this problem solved, however, the low number of Cambodian Internet users and the lack of ICT training constrain the development of Khmer web content.

Analysis

With a lack of trained teachers and limited resources to improve educational quality and access to schooling, Cambodia’s challenges in the education sector are numerous. It may be argued, therefore, that the immediate needs of the education system render an ICT programme to be a low priority for the near future. On the other hand, it may be imperative that Cambodia takes additional measures now to bring ICTs into education so that the country does not fall further behind in the digital age. As a new member to ASEAN, and with its entry into the World Trade Organization, Cambodia can benefit from, and has a greater need to promote, its connectivity to the international community.

To reap those benefits, Cambodia must bring clarity and direction to its telecommunications policies and develop a co-ordinated national ICT plan. The government should also seek to foster a supportive climate for private sector ICT ventures such as the DDD company. In considering how best to integrate ICT into education, it will be important to find the appropriate balance between interventions at the basic education level and those in the area of continuing or non-formal education. Cambodia needs to develop an ICT human resource base both now and for the long term, so the government should support initiatives like the CambodiaSchools.com model as well as adult skills training programmes. One possible initiative may be to build upon the network of CICs located around the country. In addition to offering continuing education, these centres could be adapted to provide distance education, including teacher training materials, perhaps through a link with MOEYS or institutions of higher learning.

NOTES

8 See note 1 above. UNDP Human Development Indicators 2003.
10 “Khmer Internet: Cambodia Case Study,” (International Telecommunication Union, March 2002).
18 See www.unescobk.org/education/ict/.
20 Tong-In Wongsithorn, “Moving Towards Distance Education and Open Learning,” by Dr. Tong-In Wongsithorn, President, (Thailand: Sukhothai Thammathirat Open University), Thailand.
22 Per capita income measured in purchasing power parity (PPP) terms. UNDP Human Development Indicators 2003, see note 1 above.
27 See note 1 above. UNDP Human Development Indicators 2003.
China

ICT USE IN EDUCATION
Ms Chen Li, Ph.D

Policy goals and Implementations

The Chinese government believes that modernisation of education by applying information technology is essential in order to produce students who can be competitive in the information era. The process of introducing and integrating information and communication technology (ICT) application into the education system is referred to as educational “informationisation” – something the Chinese government is giving a great deal of attention to.
The actions being undertaken by the government and schools include the following:

- Constructing infrastructure needed for an information environment;
- Developing educational resources;
- Encouraging computer education;
- Supporting teacher professional development;
- Integrating ICT into traditional classrooms;
- Delivering good educational resources into rural areas using ICT-assisted distance education methods;
- Changing administration systems through ICT applications.

**Long-term Goals for Chinese Educational Informationisation**

The aim is to meet the following goals by 2010:

- ICT-based infrastructure which covers the whole country will be set up;
- ICT education will be popularised in the most places;
- The competence of ICT application for all Chinese citizens will be improved;
- There will be enough ICT specialists to meet social development needs;
- A lifelong education system will be in place;
- Software producing centres and ICT corporations will be operational;
- The general level of infrastructure development and ICT application in education will rank at the top level among developing countries;
- For universities, and for 85 per cent of the technical/vocational schools and primary and secondary schools in the developed area of China, the level of infrastructure development and ICT application will match that of developed countries.

**Main Tasks and Relative Policies**

To realise these goals, the Chinese government has developed policies and plans as follows:

- Increase the bandwidth of the main lines of China Education and Research Network (CERNET), extend coverage towards the West and include small cities;
- Enhance the province and city networks of CERNET in order to supply good quality service to all kinds of education institutes with 2.5 Gbps bandwidth;
- Construct a wide band satellite-based network (CEBsat) and combine that with Internet (CERNET) in order to supply multiple information transmission services for the entire country, particularly remote and rural areas;
- Enhance university campus network construction, particularly in the western part of China, and develop a digital information platform to support an e-library, an information management system and a distance education system;
- Enhance campus network construction in primary and secondary schools, particularly in village areas, launch the course ICT Education in most of schools and integrate ICT into the curriculum of middle technical/vocational schools;
- Improve education administration informationisation by constructing platforms for officials, resources and public information;
- Increase the number and quality of ICT specialists to spread ICT education in primary and secondary schools, to train teachers in information literacy and to provide inservice training about information literacy for adult and vocational students;
- Facilitate sharing of teaching resources in order to improve the quality of education by developing a distributed education resource platform;
- Launch research on second generation networks and conduct trials in selected central cities;
- Develop policies regarding education enterprises that will encourage more financial investment and support development of ICT corporations;
- Develop quality standards for education informationisation and use them to develop evaluation systems.

In 2000, the Teacher Education Department of the Ministry of Education published a very important document, “Training Guidance for Teacher Training about Information School,” which requested that all the teachers in primary and secondary schools learn how to use information technology by engaging in professional development activities.
In summary, the central government is attempting to enhance the application of ICT in different aspects of education in China through its national plan, by launching national-level projects and by encouraging local governments and local schools to be involved in and to invest in education informationisation.

Current level of ICT access and use

Main Achievements to Date

- The development of infrastructure for educational informationisation is proceeding. The CERNET and CEBsat system provides basic support for scientific research and modern distance education. CERNET covers 30 cities and has become the second largest network.
- Application of ICT in education is developing swiftly. About 70 per cent of all colleges have established campus networks. Good progress is being made in secondary vocational education and in primary and secondary schools. Support for education from social enterprises and the development of educational resources are assisting this process.
- Education resource development and the modern distance education experiment have made some progress. Recently, many education administration departments and schools have developed an educational resource warehouse for materials such as web-based courses and other courseware, grouped according to the subject specialties and instructional characteristics of the institutions.

The Main Forms by Which ICT Is Applied into Education

- The satellite network system with two digital channels provides the main method of delivering courses to rural areas.
- More schools have access to the CERNET system as bandwidth improves. CERNET is used to obtain learning resources and for distance education.
- Computers are being connected to form network classrooms that can be connected to CERNET or the Internet.
- Multimedia classrooms are being developed to enable the exchange of instructional information (audio, video, Word, etc.) between teachers and students for use in conventional classrooms.
- Teachers and students use personal computers at home or schools.
- Instructional platforms are becoming available to provide support to schools for networked learning based on local and wide area networks (LANs and WANs).
- Resource warehouses are being established to share learning resources among teachers and students in all subjects.

Classifying Access and Use in Education

Because of gaps in the economy, there are different levels of ICT access in education. These can be classified as follows:

- **Top level:** Some schools in central cities have very good ICT infrastructure. Teachers and students have access to the CERNET and all staff and students have a high level of ICT literacy. They understand how to change the teaching and learning model, how to develop curriculum content using ICT and how to improve the effectiveness and efficiency of administration through ICT applications.
- **Middle level:** Most schools at this level are trying to integrate ICT into courses and administration with a middle-level ICT environment. Only some of the staff are skilled in the use of ICT, but even though they are far from the top level, they are making a start at using ICT in the classroom.
- **Lower level:** Most schools in rural areas have no money to invest in ICT. Even with sponsorships from donors or governments, they cannot use ICT in effective ways. Few staff have received any training. They need more money, training and resources.

Major initiatives

National Government Projects

- **School Connection Project:** The purpose is to enable all primary and secondary schools to have access to the Internet and to encourage the application of ICT. The goal of the project set by the national government is for over 90 per cent of elementary schools to be connected to the Internet by 2010.
- **Modern Distance Education Project:** The purposes of this project are to increase the bandwidth of the China Education and Research Network, to convert two satellite TV channels from analogue to digital, to develop web-based teaching resources and
to support some universities to deliver distance courses by ICT on an experimental basis. The national government is providing the funding and the necessary authorisations.

**Computer Network Construction Project for Western University Campus:** In 2002, the national government invested CNY 900 million (US$ 108 million) to support 152 western universities to establish campus networks and have access to the China Education and Research Network (CERNET). The project improved the infrastructure for the rural areas of China, which may be useful for other levels of education in the future.

**Popularisation of ICT Education in Primary and Secondary Schools:** In 2000, the Ministry of Education launched a plan called Popularising ICT Education in Primary and Secondary Schools, and requested all primary and secondary schools to offer a course on ICT education during the following five to 10 years. The intent is to have all K-12 students learn to use a computer.

**Administration Informationisation Project:** This project aims at establishing a web-based support environment for educational administration to enhance the quality of public service education administration, to improve the efficiency of educational administration and to facilitate monitoring by the society.

**Distance Education Project for Communist Party Members Training in the Countryside:** The government plans to build a distance education network, which will reach the Communist Party member learning centres in the countryside. This project will use distance education to facilitate the provision of education for country Communist Party members, schools and the general community to improve the cultural condition in the countryside.

**Modern Distance Education of Primary and Secondary Schools in the Countryside:** This project started in 2003 with CNY 10 billion (US$ 100 million) invested by the central government. The money was used to buy infrastructure equipment. The aim was to enable primary and secondary schools in the countryside to make use of distance education in order to share good educational resources with the schools in developed areas.

**Joint Projects Between Enterprises and The Education System**

**The Rural Area Distance Education Demonstration Project:** The Li Jiacheng Fund and the Ministry of Education will provide 5,000 sets of receiving equipment to primary and secondary schools in 12 provinces in rural areas, and set up 10,000 learning centres which can receive China satellite and broadband learning programmes. The aim of the project is to improve education quality by supplying good teaching and learning resources.

**China–U.S. e-Language Project:** This is by far the biggest educational co-operation project. Through the co-operation of experts in China and the United States, it uses advanced technologies such as multimedia and simulation, together with advanced educational ideas, to develop web-based learning courseware for English and Chinese instruction. The learning modes are portable media such as CD-Rom/DVD, web-based learning and combinations of the two. It is mainly aimed at high school students from 12 to 18 years who study English in China and Chinese in America.

**Wireless Network Instructional Demonstration Project Sponsored by Lenovo, Intel and the Affiliate School of Remin University:** The aim of this project is to use the Lenovo E360 notebook together with the campus wireless LAN to apply different kinds of instructional resources for daily learning, to enhance interactions among teachers and students and among students themselves, and to improve the learning efficiency of students.

**China–Europe Basic Education Project in Ganshu:** This project is the biggest of all the European Union–sponsored Ganshu projects. The fund is EUR 15 million. Begun at the end of 2001, it has provided tuition assistance to students, equipped sets of desks and tables and provided computers. It has helped 439 primary school teachers to take degree programmes, provided training for 1,200 junior school teachers and set up 86 teacher learning centres. The project has now spread to 41 rural villages in Ganshu province.

**Examples of training**

**Demonstrated Software College:** In 2002, the Ministry of Education and the Committee of Country Development authorised 35 universities to set up demonstration software colleges. The aim is to train information technology personnel to meet market demand.

**Training for Educational Technology Specialists:** About 150 universities provide training at the bachelor’s degree level in educational technology. Approximately 20 other universities have the right to award master’s degrees in educational technology and, among those, three universities (Beijing Normal
University, East China Normal University and South China Normal University), have the right to award a doctoral degree in educational technology, thus providing a multilevel system of professional training in educational technology.

**Intel Future Education Project:** In 2000, the Normal Department of the Ministry of Education and Intel Company set up the Intel Future Education project on an experimental basis in 10 provinces and central cities. The project delivers teacher professional development on how to integrate ICT and new teaching methodology in teaching and learning.

**Teacher Training for The New Century:** The aims of this project are to improve the quality of teachers in primary and secondary schools, strengthen professional development opportunities for key teachers, improve the structure of teacher teams and increase the numbers of teachers in rural areas.

**The Teacher Education Network Union:** In 2003 several universities, such as Beijing Normal University, Central Radio and TV University, and the China education TV station set up the Teacher Education Network Union. The union will work on supplying teacher professional development by distance education using ICT.

### Constraints on the use of ICT

- **The lack of a clear and shared understanding of informationisation:** The different levels of government and administrators, as well as students, teachers and parents, often lack a full understanding of educational informationisation. Thus local governments often fail in their efforts to direct and promote educational informationisation because of impracticable plans and measures.

- **The deficiency of the investment in educational informationisation and the imbalance of the development in different areas:** The eastern part of the country invests more money and manpower in infrastructure than the west does. The provision of ICT equipment in elementary schools in the middle west and the poor villages is falling behind and the computers and networks they do have are not satisfactory. According to 2001 statistics, in Shanghai the ratio of students owning computers is 16.7:1, but in Yunnan it is 186:1. It is not unusual for there to be no computers at all in the schools of the western villages.

- **The difficulty in integration of ICT into education:** The integration of ICT into traditional classrooms is a practical difficulty in Chinese schools because of the lack of education resources and sound application methodology. Research should be carried out to develop suitable models for China that embody best practices of ICT in daily instruction and administration.

- **The demand for the people who are skilled in ICT:** In order to integrate ICT into education, there needs to be many more people with specialised knowledge of educational technology – particularly on the part of the teachers and the administrators. Moreover, the insufficiency of the teachers and the resources in the west increases the gap between the western and the eastern parts of the country.

- **The constraints of the education informationisation facilities in elementary schools:** It is common for elementary schools to pay much more attention to the hardware than to its application and to teaching and software development. They also don’t have sufficient budgets for daily maintenance, which limits the efficiency of ICT application. It is also worth noting that the schools seldom have an overall plan when using ICT in teaching and administration.

- **The immaturity of the educational ICT industry:** There are many factors creating obstacles to the development of the educational ICT industry. These include the lack of ICT products in terms of both quantity and quality, which are needed to support the development of informationisation; the shortage of talented people; the lack of co-ordinating policies, competitive mechanisms, and evaluation of results; and the immature stage of the development of information criteria and success indicators.

### Analysis

Generally, China has made great progress in the application of ICT in education as a result of the sustaining effort of the national government. Most people in education realise that meeting the challenges of ICT is an important condition for moving forward. However, there is much to be done if the education system is to produce an information society with competitive citizens.

Educational informationisation can be classified into three steps for any country. The first is information infrastructure construction. The second is applying ICT into all aspects of education. The third and last is to change all aspects of the education system, particularly the education environment, educational content, pedagogy and administration methods. At this point, China has almost finished part of step one in
the central cities, but not in the villages. There are still two kinds of effort necessary for China: one is to support village schools to complete step one; the other is to push other schools to pass the second and third steps as soon as possible.

The following initiatives are suggested as ways of promoting the application of ICT in education:

- **Invest money on village information infrastructure and staff training.** Village information infrastructure level in China is very low. There are two problems: there are not enough facilities and few people can provide technical support.

- **Develop resources that are relevant to the application of ICT in education.** First, a national resource platform is needed to support the sharing of learning materials among regions and schools. Second, it is important to identify and spread ICT application models suitable to Chinese education. Last but not least, greater effort is needed to identify appropriate management and resource criteria to use as a basis for future development.

- **Supply staff training on ICT and new education philosophy.** In order to increase the application of ICT in education, it is necessary to help staff develop the requisite skills. Additionally, the ideas of relevant persons should be renewed to improve the efficiency and quality of ICT applications. The training of administration and decision-making staff is the most important task. So far there is no plan for this.

- **Promote development of modern e-government.** It is necessary to push forward the informationisation of educational government affairs and to build the perfect e-government system in order to improve the educational public services and administration. This will require the development of a wholesome e-government system and management mechanism, as well as e-government criteria.

Many domestic and overseas organisations and enterprises, such as UNESCO, Apple, IBM, Lenovo, TCL, overseas institutions and non-governmental organisations provide products, technology support, teacher training programmes and funding to enhance the development of ICT educational application in China. These joint projects have contributed a great deal to the application of ICT in education in China in terms of funds, new education philosophy and methodology, and administration system methods. Chinese education has benefited much from these collaborations and joint projects.

**NOTES**

3. See note 2 above.
12. See the home page of China State Ministry of Education website: www.moe.edu.cn.
13. See note 12 above.
14. See note 12 above.
15. See note 12 above.
Introduction

The Democratic People’s Republic of Korea is one of the world’s most closed and isolated countries. It faces desperate economic conditions and is in its ninth year of food and energy shortages. Massive international food aid deliveries have allowed the regime to escape mass starvation since 1995, but the population remains vulnerable to prolonged malnutrition and deteriorating living conditions.
Reporting on information and communication technology (ICT) use in education appears to be an odd assignment when students at primary schools need food and basic necessities such as books, pencils and notebooks. The government of Democratic People’s Republic of Korea does not reveal any official statistics about ICT, not even the number of people using computers. Thus this report is made with the absence of detailed information and statistics.

**Policy Goals and Action Plans**

The Democratic People’s Republic of Korea is led by a national founder, a person with overwhelming power and the only one who can decide almost everything. In 1988 a three-year plan for the promotion of science and technology began, and the government started massive funding for information science and industry. However, the amount of funding was not known. The second three-year plan (1991-1994) aimed to computerise all sectors of the nation by the year 2000 and to industrialise the production of IC chips.1

**Current Implementation Status**

ICT is used by a limited number of organisations. State organisations, factories, companies, colleges, computer research and development institutions, and some senior middle schools have access to computers. While the Internet is not used, the intranet is installed and used by those limited number of organisations and institutions.

**Budget and Sources of Funding**

Information about budget and sources of funding is not available. It is known, however, that Democratic People’s Republic of Korea is eager to develop the ICT industry, and will jointly venture with the Republic of Korea and the Hana Program Center (HPC) in Dandong, China.2 The initial capital is US$ 300,000. The South will own 60 per cent of the HPC and the Pyongyang Information Center (PIC) in Democratic People’s Republic of Korea will own the other 40 per cent. PIC is dispatching 40 of its top engineers to Dandong for three months of training from the Republic of Korean engineers.

**Gaps, limitations and needs**

Exposure to computers and ICT is limited to those students who excel in the class. This select group of students is given access to computers and the intranet.3 This situation widens the already existing gap between the outstanding academic students and the average and below-average students.

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**Current level of ICT access and use**

**Summary of Technologies Being Used**

In Democratic People’s Republic of Korea, there are 16 AM radio stations, 14 FM radio stations and 38 TV stations.4 The four major TV stations are Korea Central TV, Mansoodae TV, Pyongyang TV and Science & Education TV.5 These stations air from 5:10 p.m. to 10:00 p.m. during the weekdays and from 9:00 a.m. to 10:30 p.m. on Sundays (Science & Education TV airs from noon to 10:30 p.m. on Sundays).

Korea Central TV airs a children’s programme for 30 minutes per day,6 but as most families do not own a TV receiver, most children cannot watch this programme. Children can watch television at school, but it is not generally used in the teaching-learning process.

Since 1998, Democratic People’s Republic of Korea has conducted compulsory computer education two hours per week from the fourth grade to the sixth grade of senior middle schools.7 Recently, the hours and the target students of the computer education have been extended to the study of mathematics. Some schools have specially designed programmes for gifted and talented students to train them as computer programmers or software engineers, but mainly the focus of computer education has been on teaching computer literacy to all students. Recently, the importance of ICT use has been realised and has started to be taught.

**Digital Divide Issues**

Computer hardware and computer education are provided to a limited number of schools and students. Schools in the major cities and students who are identified as talented and gifted are given priority. This causes a digital divide between the city and the rural dwellers and between the gifted and average students.

**Nature and Roles of Partnerships**

Due to the devastating economic situation in the country, the partnerships involved in the development of ICT are characterised not with the industries in Democratic People’s Republic of Korea, but rather with corporations in the Republic of Korea and organisations in the US. For example, Democratic People’s Republic of Korea has requested the Institute for Strategic Reconciliation (ISR, www.isr2020.org) to conduct computer education for students as well as teachers.8 (ISR is a non-profit organisation whose members are Koreans residing in the United States.) In the first stage ISR installed two computer classrooms with 25 PCs at Morhanbong high middle school.
and Osan high middle school. In the second stage ISR will install computer classrooms in 15 different cities. By 2004 ISR will open a computer education research centre and will conduct systematic training and research on computer use and its application in education.

Other examples are partnerships with corporations in the Republic of Korea such as the Hana Program Center (HPC), a new South-North joint venture established in Dandong, China, and the Korea Computer - Samsung Software Joint Co-operative Development Center between Samsung Electronics and the KCC, which opened in Beijing in March 2000.

**Major initiatives**

The leader of the country, Jong-il Kim realised that to build an infrastructure and to develop hardware would require a huge amount of capital. He knew his country could not afford it and he also realised that building the necessary infrastructure could not be accomplished in the current situation. Therefore, the leader changed his plan and shifted the emphasis from the development of hardware to software, which requires only knowledge workers who share intellectual and scientific minds, and creativity. The major organisations in software development are KCC (Korea Computer Center), PIC (Pyongyang Information Center) and the Department of Computer Science under the Academy of Science.

Kim started computer education for talented and gifted students beginning in high middle school. He also restructured several universities to put more emphasis on computer science and opened new science and technology universities in several cities. As well, he opened a research centre to educate more engineers and scientists. The specially trained graduates from high middle schools attend the best universities, such as Kim Il Sung University, Pyongyang Computer University, Pyongyang Program Center, Korea Computer Center and Chosun Computer Center.

Annual software competitions have been held since 1990 to encourage interest in ICT and to promote the software industry. The participants who enter these competitions are scientists, engineers, teachers and students. The award winners receive various benefits such as being able to enter the college of their choice.

Democratic People’s Republic of Korea has already reached the top level of software techniques in several fields. Various research and development institutions are developing computer software ranging from computer games, character and voice recognition programmes, translation software and fingerprint recognition systems. Computer games developed by Democratic People’s Republic of Koreans are exported and used in the Republic of Korea. The country is gradually shifting its focus from computer software to programmes necessary for each industry.

Recently Jong-il Kim re-emphasised the importance of science and technology and announced a road map to adapt the educational system and educational contents to the information age. He also announced that a plan to produce computer engineers and programmers had been very successful due to the curriculum revision introducing ICT.

**Examples of training**

There is no evidence of training in ICT use in education. Any training that does occur is focused on achieving specific goals. For example, Democratic People’s Republic of Korean military authorities are especially interested in computer security technology that protects against the destruction of computer hardware and software, physical loss of data or the invasion of databases by unauthorised individuals. The College of Automation University, a military academy for information, selects the 100 most talented students per year, trains them in intensive courses for five years, and then appoints all of them as officers. Ten out of 100 talented students take charge of only searching and hacking matters.

There are two training centres: the Computer Training Center at Kim Chaek Engineering University and the National Training School for Programming in Pyongyang.

**Constraints on the use of ICT**

There are many constraints pertaining to the use of ICT in the country. In Democratic People’s Republic of Korea, the most obvious constraint is the economic situation. Another constraint is the inability to access the Internet directly or surf and search for external information freely. Although the Internet country code “kp” has been assigned to Democratic People’s Republic of Korea, no one has yet registered a domain. Instead of using the “kp” domain, Democratic People’s Republic of Korea operates some Internet sites indirectly for the purpose of self-advertising.

Democratic People’s Republic of Korea Infobank (www.dprkorea.com) opened in 1999 and is operated by the Hong Kong-based Pan Pacific Economic Development Association of Korean Nationals and is said to be sponsored by the Democratic People’s Republic of Korea.

As of August 2003, there was just one Internet service provider (ISP). Democratic People’s Republic of Korea has just started to use the Internet to announce its policies and Kim’s instructions via the website at www.uriminjokkiri.com. Democratic People’s Republic of Korea, however, still connects to the Internet via Chinese or Japanese networks;
it is through these networks that the Democratic People’s Republic of Korea receive external information and post information outside the nation.

The Kwangmyung intranet was installed in 2002 and is being used by major organisations and institutions.  

Analysis

Jong-il Kim uses India and Ireland as his models and attributes their success to their reliance on the many well-trained people they can draw on from the pool of human resources. Democratic People’s Republic of Korea has a well-organised educational system, and Kim relies on it heavily to accomplish his goals. Through the education system for very gifted children, Democratic People’s Republic of Korea is actively cultivating talent in computer-related fields. Programmers who are in their twenties and thirties are playing leading roles in software development, and the majority of them have come from the gifted student programmes. Kim is successful in educating talented young people to be outstanding programmers; however, the knowledge-based society does not rely on a handful of intelligent citizens.

The Democratic People’s Republic of Korean ICT model could be characterised as intranet-oriented with a national innovation system under government initiative. In the Democratic People’s Republic of Korea, people cannot access the Internet to get information freely. The information gathered through the Internet is filtered and is circulated among the people. This is due to the juche (the theory of self-reliance) – an ideology that dominates all the fields in the Democratic People’s Republic of Korea. The Democratic People’s Republic of Korea may need to choose between ideology and technology in order to achieve prosperity.

NOTES

1 Sung-Wook Nam, The Strategy of IT Industry Development and Building of Strong State in North Korea (Seoul: Hanul Academy, 2002).
7 See note 1 above.
12 See note 1 above.
13 See note 9 above.
14 See note 4 above.
15 The North Korea Trends (Seoul: Ministry of Unification, 2003), 38.
As other countries, Indonesia is determined to harness the use of information and communication technologies (ICTs) for increasing the country’s national competitiveness. The initial step in doing so was the establishment of the Indonesian Telematics Coordinating Team (known as TKTI) in 2000, consisting of all cabinet ministers and chaired by Vice President Megawati Soekarnoputri, who is now the president of Indonesia. In 2001, the ICT national plan was formulated by Presidential Decree No. 6/2001 (‘Guidelines for the Development and Implementation of ICT in Indonesia’), which states the government’s general policy towards ICT and calls on TKTI to take an active role to drive ICT implementation in Indonesia.
The decree is supplemented by a detailed five-year action plan, which specifically sets out an ICT plan for education that includes the following areas as priorities:2

- Collaboration between the ICT industry and ICT educational institutions (2001-2005);
- Development and implementation of ICT curricula (2001-2004);
- Use of ICT as an essential part of the curricula and learning tools in schools, universities and training centres (2001-2005);
- Establishment of distance education programmes. Facilitation of the use of Internet for more efficient teaching and learning (e.g. School 2000 or SMU 2000, which started in 1999).

Unfortunately, those priorities have not yet been fully implemented because of unrest in the country.

**Current level of ICT access and use in education**

Indonesia is one the largest of the ASEAN countries with a population of over 210 million. The area of the country is mostly water (81 per cent with the land divided into 33 provinces, 268 regencies, 73 municipalities, 2,004 subdistricts and 69,065 villages).3 Despite the economic crisis which started in 1997, Indonesia has progressively increased its telecommunication network over the last decade.

Indonesia ranks number 21 within the top 25 countries of Internet users.4 However, the percentage of Internet users to the total population is less than two per cent, which is much lower than the Internet penetration in other ASEAN countries such as Malaysia.5

The growth of ICT users in Indonesia within the last two years has been phenomenal, increasing from around two million in 2000 to over four million in 2002. The Indonesia Internet Service Provider Association (APJII) expects this number to increase up to 7,550,000 by the end of 2003 due to the expansion of Internet access points provided by Internet kiosks (known as WARNET), which are mostly owned by private business enterprises. A survey conducted by APJII showed that about 43 per cent of users access Internet from WARNET (APJII cited in International Telecommunication Union, 2002). The rest access the Internet from offices (41 per cent), homes (12 per cent), and schools/universities (four per cent).

The cost of Internet access varies depending on the type of connection. Subscription to ISP ranges from IDR 45,000 (US$ 5) to IDR 500,000 (US$ 60) per month depending on the options (number of hours, application, etc.) and connection lines (telephone, cable, fibre optic, etc.). Internet access from homes and offices can also be accomplished through the nationwide telecommunication corporations (Telkoms) direct Internet line (known as Telkomnet Instant), which costs around IDR 160 (US$ 0.02) per minute. Due to high competition among WARNET access sites, the cost of Internet access is relatively affordable, ranging from a low of IDR 5,000 (US$ 0.05) to IDR 9,000 (US$ 0.09) per hour.

In educational practice, ICT use in Indonesia is still in the initial stages. It is estimated that in 2002, about 2,500 educational institutions were Internet users of some kind, 80 per cent of which were secondary schools and the other 20 per cent higher education institutions.6

Although data on the actual use of ICT in schools have never been comprehensively surveyed, the use of computers (i.e., PCs) is primarily for administrative purposes. Several schools, especially private ones and those in large cities, have developed school websites that are used for promotion and communication between students, teachers and parents. However, the application of ICT to teaching-learning activities is prevalent in few schools, usually only international schools or franchised branches of foreign school systems.

A survey conducted by the Centre for Information and Communication Technology in Education (PUSTEKKOM) of 10 senior secondary schools in Jakarta found that all the schools had a policy to add computer studies to the curriculum. The main purpose was to encourage students to use computers and the Internet to search, gather and process information to support their learning. The content of the course included MS Word, MS Excel and MS PowerPoint, Photoshop, Coreldraw Office, and Internet (search engines, e-mail and mailing-lists).

In the non-formal education sector, ICT as a subject is very popular. Anywhere in the country, it is easy to find private training centres that offer short courses in various ICT-related subjects. These training centres, however, are usually not accredited nationally or internationally. Subjects taught include basic computer operation such as MS Office, programming, web-designing, graphics design, animation, etc.

As is the case in most ASEAN countries, statistics on gender use of ICTs in Indonesia are sparse. In the few studies reported, the number of women users is much smaller than that of men.7 A survey on the use of ICTs by women’s organizations in select countries of Asia and the Pacific, including Indonesia,8 found that women and men have not benefited equally. Women in particular have to contend with ideological, systemic and institutional barriers to accessing ICTs.
Highlights of the survey findings include the following:

Women’s groups that have been able to tap into the potential of ICTs have experienced benefits and increased opportunities to conduct research and gain access to news and information; improve organization, knowledge, and skills; monitor and participate in global women’s initiatives; disseminate information and publicise materials; lobby development causes at local and regional levels; exchange information and experience; co-ordinate activities both in country and abroad; contribute to civil society and local communities; identify new contacts and development partners; and apply for donor funding and other forms of technical support.

The dominant use of ICTs is for e-mail, which is primarily used for administrative purposes and for correspondence with donors and regional and international partners. The Internet, on the other hand, was found to be useful for networking, information access and advocacy.

**Major initiatives**

The Ministry of National Education (MONE) has conducted several initiatives and programmes to enhance the use of ICT in primary and secondary education, including the following:

- **Education Radio Broadcast for Primary School Students** (Siaran Radio Pendidikan untuk Murid Sekolah Dasar or SRPM-SD): One of the first projects to utilise ICT was radio broadcasting for primary education; it was started in 1991/1992. The radio programmes were based on the national curriculum by PUSTEKKOM and were intended to enrich the learning-teaching process. By 2003, about 508 radio programmes (in Science, Social Science, Mathematics, Bahasa Indonesia and Civics) had been produced and used in about 20 provinces by 170 primary schools. The schools that participated in this project were also equipped with a radio/audio cassette player, teacher manuals, and workbooks for the students.

- **IT programme:** The Directorate of Technical and Vocational Education (DTVE) and the MONE launched this programme in vocational secondary schools (VSSs) in 1999. It introduced information technology as a compulsory subject across all skill competence programmes. VSS students are taught basic knowledge on computers, as well as web designing. This project has led to the establishment of a communication forum known as School Information Network or Jaringan Informasi Sekolah (SIN or JIS) among VSSs in every region utilising a mailing-list application. It has been reported that more than 500 VSSs and about 800 individual members subscribe to the mailing list. The forum also conducts regular face-to-face meetings, which attract memberships from general secondary schools, junior secondary schools, primary schools, and local representatives of APJII.10

- **WANKota (Wide Area Network - CITY):** This was initiated by members of SIN10 with the objective of connecting school LANs within and between cities, using a wireless connection. The project, which included eight cities (Malang, Surakarta, Yogyakarta, Wonosari, Bandung, Cibinong, Tangerang and Makasar), is predominately funded and supported by participating schools and local district governments. The pilot project for 2003 plans to include another 30 cities. The DTVE injected a small incentive for schools (through a school/VSS block grant of US$ 10,000 per city) to leverage-related parties to contribute either financially and/or conceptually through regulations. Among other things, WANKota serves as a distance-library, a medium for teleconferencing and as an access to the Internet through which all the schools will have a space for developing and hosting their own websites.

- **ICT block grants for secondary schools:** The Directorate of General Secondary Education (DGSE) and MONE initiated a system of block grants of aboutUS$D 4,179 per school to procure computer facilities. The project, during 2002 and 2003, has allocated grants to about 174 schools throughout the country.11

- **“SMU2000” or School 2000:** This project was initiated through collaboration between the Directorate General of Primary and Secondary Education, MONE and APJII, and was intended to connect 2000 high schools to the Internet by the year 2000 through the development of an educational portal. However, although APJII has brought various partners to the project, it was only able to connect about 1,180 schools by the end of 2000.12 Later data show that by March 2002, about 1,800 high schools had been provided with Internet connection. No further data are available on the progress of this project.

- **“E-dukasi” or E-ducation project of PUSTEKKOM:** In co-operation with the Directorate of Vocational Education, this project was started in 2002.13 The objective is to improve the quality of education in high and vocational schools through the use of Internet-based learning materials (termed e-learning). The first subjects developed were Mathematics, Physics, Chemistry, Biology, Electronics, and Information Technology. They are now available for use by teachers (see www.edukasi.net/).

ICT-related activities are also being conducted by various institutions, and these are mostly intended to raise greater awareness of ICT and its advantages, encourage a larger community to use ICT for their benefit, develop content...
through ICT, enhance collaboration among different agencies on ICT-related educational programmes and activities and provide training on ICT-related skills. APJII and The Southeast Asian Ministers of Education Organization for Open and Distance Learning (SEAMOLEC) are among the organizations that have been intensively conducting ICT-related programmes.

APJII has developed a website to raise awareness of the benefits of ICT (see http://ti.apjii.or.id/), which contains general information on ICT and how to use it for various purposes. It is easy to understand and is designed using simple technologies to allow maximum access. Information contained in the website is also available in CD format for wider dissemination. 

### Examples of training

In addition to the various and sporadic teacher training provided by individual schools, there are several national efforts:

The Directorate General of Primary and Secondary Education (DGPSE), in collaboration with MONE’s PUSTEKKOM, MONE, has trained some 800 high school teachers on computer-assisted learning. 

As part of the information technology programme for VSSs, the DTVE has provided training to teachers and students since 2001. Both groups are trained in using ICT (i.e., Internet) and teachers receive training in graphic design, sound, video, storyboard and the tools and peripherals for multimedia acquisition, presentation and production. Internet equipment has been supplied and connections made in over 550 locations. It was expected that after the training, teachers would have the competencies to produce multimedia-learning packages on CD-ROM. However, it seems that this goal has not been realised yet. Servers of WANKota are still filled with materials produced by PUSTEKKOM rather than by those created by the trained teachers. 

Basic computer training for about 98 teachers from 49 schools (including JSSs, GSSs, and VSSs, both public and private) was provided by the APEC Cyber Education Network (ACEN) in 2001. This programme was followed in 2002 by the National Office for Educational Research and Development (known as Balitbang) providing other training related to web design, home page development, web database and e-learning application.

SEAMOLEC (www.seamolec.or.id/) has conducted many non-formal ICT-related training programmes such as Production of Web and CD-based Interactive Multimedia Learning Programs for Online Access, Utilization of Internet for Instruction and Training Purposes, Virtual Library to Support Distance Learning, and The Utilization of Internet in Teaching and Training Instruction. SEAMOLEC training programmes are attended by participants from Southeast Asian countries, and are conducted through regional face-to-face workshops.

Unfortunately, there are no further data available on the impact of these initiatives in terms of the number of teachers trained or on the actual application of the skills in instructional practice in school classrooms.

### Constraints on the use of ICT

The initiatives undertaken have significantly increased awareness of the potential use of ICT for education among both the general public and school communities. However, the use of ICT as an integral part of the teaching-learning process in schools, as well as a subject matter in primary and secondary schools, has not yet been widely implemented. The most common use of ICT is limited to the use of stand-alone PCs for administration purposes, even in the more advantaged schools. The use of ICT to facilitate learning and e-learning at basic education levels remains more as a seminar topic rather than an implemented programme.

This situation is due to multiple factors:

There is no national strategic plan for implementing ICT in education. All the initiatives have been conducted as project-based activities, which tend to be ad hoc, unsustainable and without long-term goals.

Since the multidimensional crisis, which was started with economic events in mid-1997, the Indonesian government has pushed its priorities to more fundamental issues such as political stabilisation and basic welfare for the people. This has caused delays in the development of ICT infrastructure. As a result, Internet access through Internet kiosks is limited to urban areas, especially in Java and Bali. Furthermore, the locations of the Internet kiosks are not associated with school locations; they are usually located in the business areas, while most primary and secondary schools are located in rural and residential areas.

Due to financial difficulties, government priority in basic education has been put on the rehabilitation of school buildings, teacher training on the pedagogical aspects of teaching and on teachers’ welfare. ICT for education has, therefore, not yet been considered a priority. Hence, even though some teachers have been trained to use ICT in their teaching activities, they cannot use their new skills because of the lack of facilities (hardware). Moreover, the number of teachers who have been trained is very small in relation to the total number of primary and secondary school teachers in the country.

The availability of relevant content in the national language (Bahasa Indonesia) is limited. So far, the only development of
that make decisions and policies. Ensure that gender is mainstreamed in ICT policies and plans. Specifically, it should implement the recommendations put forward by Cabrera-Balleza.\textsuperscript{20}

Ensure that gender is mainstreamed in ICT policies and programmes and that women are represented in the bodies that make decisions and policies.

Make the technology accessible, relevant and useful to Asia-Pacific women by developing holistic state policies on ICT that take women’s needs and gender issues into consideration as well as address related issues such as the urban-rural bias.

Promote the enrolment of girls in ICT programmes by providing incentives such as scholarships and awareness-raising activities.

Provide additional funding support to promote ICT use among women’s groups in the Asia-Pacific region.

Conduct continuing training on the potential and use of ICT which should also include the basic technical aspects such as simple data exchange, searching, processing and storage.

Conduct awareness-raising workshops on the benefits of ICTs particularly as an effective means of communication.

Disseminate, in both print and electronic formats, results of research on women and ICT, especially those that provide examples of successful use of ICTs by women’s organizations.

\textbf{NOTES}


3 Daftar Wilayah Pemerintahan: (Ministry of Home Affairs, 2003), www.depdagri.go.id.


5 JII cited in ITU. See note 1 above.


11 H. Yuhetty, ICT and Education in Indonesia, presentation at the UNESCO High Level Policy-Makers Workshop, Bangkok, 18-21 February 2003.

12 See note 1 above.


14 See APJII website, www.apjii.or.id.

15 See note 11 above.

16 See note 11 above.

17 See note 10 above.

18 SEAMOLEC, www.seamolec.or.id.

19 ‘Status of Information and Communication Technology (ICT) Development in Indonesia’ (in English) (GIPi (Global Internet Policy Initiative), 2003), www.gipi.or.id/page.php.

20 See note 8 above.
It was 1994 when Japan took serious steps to promote a national ICT policy. The first step was the formation of the Advanced Information and Telecommunications Society Promotion Headquarters, headed by the prime minister and composed of the full cabinet. In 2001, this Headquarters was reformed as the Strategic Headquarters for the Promotion of an Advanced Information and Telecommunications Network Society, followed by the announcement
of the e-Japan Strategy.¹ Now, in 2003, the creation of basic ICT infrastructure that was the goal of e-Japan is almost complete and the e-Japan Priority Policy Program–2003 based on the second phase of the e-Japan Strategy has been decided. In this second phase, “human resources development and education/promotion of training” is identified as one of five key areas.²

The involvement of the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in ICT promotion began with the (100) Hundred Schools Project in 1994³ in co-operation with what was then still the Ministry of Trade and Industry. Approximately 100 schools from all over Japan were selected for assistance in using networks that would enable classroom teachers to provide variety in instruction. In 1999, this project was followed by implementation of the Information Technology in Education Project (ITEP),⁴ the goal of which was to use computers in teaching in all elementary and secondary schools by 2005. Specifics of the plan included:

- Installation of computers with Internet access in all ordinary classrooms by 2005;
- Creation of training opportunities for teachers to improve their computer skills and enable them to use computers in teaching their subjects;
- Development of visual and video contents appropriate for teaching the use of computers;
- R&D on teaching methods that use high-speed networks;
- Creation of a teaching materials portal site at the National Institute for Educational Policy Research.

### Current level of ICT access and use

#### Table 1: Computer installations and Internet access

<table>
<thead>
<tr>
<th>Type of school</th>
<th>Students per educational computer (individuals)</th>
<th>Internet access rate (%)</th>
<th>High-speed (400 kbps or faster) Internet access rate (%)</th>
<th>Ordinary classrooms with LAN connections (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>12.6 (22.2)</td>
<td>99.4 (48.7)</td>
<td>52.8 (11.7)</td>
<td>23.2 (6.5)</td>
</tr>
<tr>
<td>Junior high</td>
<td>8.4 (11.2)</td>
<td>99.8 (67.8)</td>
<td>57.9 (15.9)</td>
<td>24.3 (7.1)</td>
</tr>
<tr>
<td>High school</td>
<td>7.4 (10.3)</td>
<td>99.9 (80.1)</td>
<td>75.7 (11.5)</td>
<td>51.8 (14.6)</td>
</tr>
<tr>
<td>Schools for the disabled</td>
<td>4.0 (7.7)</td>
<td>99.8 (59.9)</td>
<td>70.2 (10.4)</td>
<td>45.6 (12.0)</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses are 1999 data, except for those on high-speed Internet access, which are 2000 data.

The degree to which ITEP has been implemented in education is shown in Table 1. The table presents computer installation and Internet access data as of fiscal 2002. There are on average approximately ten students per educational computer over all schools, except for schools for the disabled, where the ratio is lower. Virtually all schools have Internet access; however, high-speed Internet access, although increased over 1999 figures, remains lower in elementary and junior high schools than in high schools. Only 20 per cent of ordinary classrooms have LAN connections in elementary and junior high schools: that figure rises to around 50 per cent for high schools and schools for the disabled. Compared, however, to 1999 (or 2000), Internet access has become much more common, and the last couple of years have seen high-speed Internet access spreading at an accelerating rate.

Table 2 indicates the level of ICT skills in the teacher population. While 90 per cent of teachers know how to

#### Table 2: Teacher ICT skills

<table>
<thead>
<tr>
<th>Type of school</th>
<th>Can operate a computer (%)</th>
<th>Can use computers in teaching (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>88.0 (63.0)</td>
<td>66.3 (36.5)</td>
</tr>
<tr>
<td>Junior high</td>
<td>87.1 (67.2)</td>
<td>46.1 (29.7)</td>
</tr>
<tr>
<td>High school</td>
<td>89.0 (73.8)</td>
<td>38.1 (28.1)</td>
</tr>
<tr>
<td>Schools for the disabled</td>
<td>82.3 (54.2)</td>
<td>37.4 (20.5)</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses are 2000 data.
Japan

Table 3: Teacher ICT use

<table>
<thead>
<tr>
<th>Type of school</th>
<th>3-plus time/week (%)</th>
<th>1-plus time/week (%)</th>
<th>1-plus time/month (%)</th>
<th>1-plus time/semester (%)</th>
<th>Less than 1 time/semester (%)</th>
<th>Virtually never (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>24.3</td>
<td>30.3</td>
<td>19.3</td>
<td>6.3</td>
<td>3.8</td>
<td>16.0</td>
</tr>
<tr>
<td>Junior high</td>
<td>35.4</td>
<td>24.3</td>
<td>10.7</td>
<td>3.8</td>
<td>2.5</td>
<td>23.3</td>
</tr>
<tr>
<td>High school</td>
<td>43.0</td>
<td>22.9</td>
<td>9.2</td>
<td>2.1</td>
<td>1.6</td>
<td>21.3</td>
</tr>
<tr>
<td>Schools for the disabled</td>
<td>35.4</td>
<td>25.8</td>
<td>10.2</td>
<td>3.1</td>
<td>2.4</td>
<td>23.1</td>
</tr>
</tbody>
</table>


operate a computer, the proportion of teachers able to use computers in teaching falls to 66 per cent for elementary schools, and much lower for other types of schools. In elementary schools, the same teacher teaches almost all subjects, but in secondary schools, different teachers teach different subjects. In junior high schools, those who use computers are concentrated in the sciences. In high schools and schools for the disabled, teachers using computers are concentrated in vocational training classes. Relatively few teachers in other areas have the skills required to use computers in teaching and, thus, the proportion of all teachers using computers in teaching is relatively low.

Table 3 shows the frequency with which teachers use ICT. At all levels, around 60 per cent of teachers use ICT one or more times per week. Around 20 per cent virtually never use it.

Table 4 shows that elementary school students are most likely to be the most frequent users. Compared to elementary school students, those in other schools do not often use computers. This result appears to be related to data on teachers reported in Table 2, with teachers in secondary schools lacking the ICT skills for teaching purposes.

Data are available on the use of broadcast (TV and radio) technologies in education. Nippon Hoso Kyokai, Japan Broadcasting Corporation (NHK) has radio and TV channels that are used for education. Educational radio started in 1931 with programmes specifically for schools begun in 1935. Educational TV was initiated in 1959 and there is now a variety of school education programmes, such as national language, foreign languages, math, science, social sciences and so on.

All schools, from elementary to high school, have 15 TV monitors on average. Table 5 shows the use of broadcasting technology in schools. TV is pre-eminent over radio, particularly in elementary schools. An interesting statistic is that the use of these media has declined year by year since the 1980s. Broadcasting is being replaced by the new ICTs such as recorded videos and computers.

School completion from elementary to junior high is almost 100 per cent and 97 per cent by the end of high school. There seems to be, then, no niche for non-formal education in the system. Cram schools, however, might be regarded as a kind of non-formal education. However, there are no data on ICT use in these schools. Some university

Table 3: Student ICT use

<table>
<thead>
<tr>
<th>Type of school</th>
<th>3-plus time/week (%)</th>
<th>1-plus time/week (%)</th>
<th>1-plus time/month (%)</th>
<th>1-plus time/semester (%)</th>
<th>Less than 1 time/semester (%)</th>
<th>Virtually never (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>11.6</td>
<td>20.9</td>
<td>16.7</td>
<td>22.6</td>
<td>4.6</td>
<td>23.6</td>
</tr>
<tr>
<td>Junior high</td>
<td>6.5</td>
<td>4.5</td>
<td>3.7</td>
<td>10.6</td>
<td>7.9</td>
<td>66.9</td>
</tr>
<tr>
<td>High school</td>
<td>13.2</td>
<td>2.4</td>
<td>2.0</td>
<td>3.6</td>
<td>3.8</td>
<td>75.0</td>
</tr>
<tr>
<td>Schools for the disabled</td>
<td>13.5</td>
<td>6.4</td>
<td>6.1</td>
<td>9.7</td>
<td>4.0</td>
<td>60.3</td>
</tr>
</tbody>
</table>

preparatory schools use satellite to deliver classes taught by prominent lecturers, and some of these schools use personal computers with cameras for question-and-answer sessions between students at home and the lecturers. Other language schools employ web-based training.

In Japan, there is no digital divide in ICT infrastructure or in access. Differences due to gender, cultural background or place of residence are not an issue either in accessing ICTs.

### Major initiatives

Important examples of initiatives to promote use of ICT in education include the Japan Association for Promotion of Educational Technology’s Computer Education Practical Idea Award,2 started in 1997, and the MEXT Internet Utilization Concours (NETCON),4 started in 1999. The former aims to broaden the use of computers, while the latter is more narrowly focused on the use of the Internet in education.5

Awards vary widely depending on the level of the schools and the particular classes involved, but they can be roughly divided into five patterns:

- The first pattern uses the Internet as a source of information. When investigating a particular topic, an Internet search engine can lead to unexpected discoveries and acquisition of information not found in textbooks. One elementary school used the Internet to investigate local history, with a focus on historical figures that played important roles in constructing local levees. Information posted on the web was gathered and organised via the Internet and then shared with others. This proved to be an effective way to promote a deeper understanding than is possible by orally describing the images and sounds. It showed how environmental experiences could be recorded and shared with others via the Internet.

- The second pattern creates multimedia presentations combining text, still images, video and audio, and posts them on the web. One elementary school used its period for integrated study for a project that added environmental sounds in the school’s neighbourhood. Sounds were recorded and digital photographs were taken of the sites where the sounds were located. Presentation tools were used to combine sounds and images and add observations to them. The finished project was then uploaded on to the web. The project took advantage of the computer’s ability to combine different media and, in addition, it used the Internet to communicate the information created. This proved to be an effective way to promote a deeper understanding than is possible by orally describing the images and sounds. It showed how environmental experiences could be recorded and shared with others via the Internet.

- The third pattern uses the Internet to exchange information. For example, in one experiment, around 200 schools planted seeds from the same plants at the same time on the same day. E-mail and a web-based bulletin board were used to post information about the plants’ growth and student activities. Data were collected, organised and distributed to everyone. The experiment’s objective was to test the effectiveness of the Internet as a means of stimulating exchange concerning a shared topic. One of the outcomes was spreading awareness of the regional variation in Japan’s climate and topography.

- The fourth pattern uses the Internet for distance learning. With assistance from participating companies, some industrial high schools used an Internet-based video conferencing system for an internship programme in which students received remote instruction on how to build simple equipment. Web-based groupware was used to assemble reports on each day’s progress. Equipment manufacturing internships had not been easy for companies because it was difficult to put students on their regular assembly lines. As well, combining academic and practical work experience was a problem for the schools. Distance learning, delivered via the Internet, provided a solution for both issues.

- The fifth pattern involves programmes that provide information to an unlimited number of people. For example, some elementary schools create virtual companies on the web allowing students to experiment with virtual sales of locally produced products, or local volunteers and junior high school students start virtual companies and incorporate their own ideas to compete for sales with web-voting used to simulate purchases. As purchases vary day by day, the companies must modify their products in response to orders or change their prices to compete more

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### Table 5: The use of broadcast technologies

<table>
<thead>
<tr>
<th>Type of school</th>
<th>TV (%)</th>
<th>Radio (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>95.2</td>
<td>94.9</td>
</tr>
<tr>
<td>Junior high</td>
<td>39.2</td>
<td>31.7</td>
</tr>
<tr>
<td>High school</td>
<td>50.9</td>
<td>45.5</td>
</tr>
</tbody>
</table>

effectively. Allowing unlimited numbers of individuals to participate in a virtual reality creates an experience impossible in the classroom setting without access to the Internet.

These are but a few examples of the ways that ICT is being used in Japanese education.

**Examples of training**

It is accepted that training and instruction are required to promote the use of information technology in education. Accordingly, beginning in 2002, elementary schools began introducing ICT training into individual subjects or into their periods of integrated study. Also, starting in fiscal 2002, use of ICT became a requirement in technical and home economics classes in junior high schools. As of 2003, information technology became a required subject in high schools.

In connection with these efforts, training is being provided to teachers with the goal of equipping them with the necessary ICT skills. One example of a programme is “Training to Foster Instructors in Educational Use of IT.” This national programme aims to educate leaders at the prefecture level and is offered for three-to-five day periods during school summer vacations. Approximately 2,000 individuals receive this training each year. Another example is a programme called “Basic Computer Training” by prefecture boards of education. This training is provided for all teachers who have several years of teaching experience. Between 30,000 and 35,000 teachers receive this training annually.

Table 6 shows the percentage of teachers who received some form of training during 2002. The highest proportion was found in elementary schools. The percentage of teachers receiving training declines up the school hierarchy. Virtually all of the training was provided either by schools or at the national or prefecture level. Not included in the table is the handful of cases in which training was received in university courses open to the public or at training seminars organised by private businesses. Overall, the amount of training provided has increased slightly since 1999. The proportion provided at the national or prefecture level has declined, while the level of training provided by schools stayed fairly constant. Since there is no national standard for training, there are dramatic differences from one board of education to another and from one school to another.

In 2003 an online e-learning training system called the e-Teacher Project was developed. Instead of a conventional classroom-based approach, this project encourages teachers to acquire ICT skills during their free periods by using the courses available through the e-Teacher Project. This inservice training is important because information technology courses are now a required part of the curriculum that teachers need to be able to teach, and university teacher training programmes are still not producing teachers with the necessary qualifications. As a result, providing training to teachers already in the labour force has become the biggest challenge confronting educational use of ICT in the country.

In 2001, the Japan Association for Promotion of Educational Technology began offering a certification examination for “educational information technology co-ordinators,” who would then be well versed in ICT and provide support for other teachers in its use. The objectives of the certification examination are to establish a new position and to provide ICT training for teachers so they might take the position. To date only a few have received this certification and, since it is still very new, it is not yet widely recognised. Still, providing this kind of support by ICT specialists instead of depending entirely on teachers’ self-study may become increasingly important.

**Table 6: Percentage of teachers receiving training**

<table>
<thead>
<tr>
<th>Type of school</th>
<th>Within the fiscal year (%)</th>
<th>National or Prefecture training (%)</th>
<th>School-provided training (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>105.9 (68.1)</td>
<td>20.9 (41.0)</td>
<td>70.5 (56.4)</td>
</tr>
<tr>
<td>Junior high</td>
<td>67.5 (56.2)</td>
<td>12.6 (39.4)</td>
<td>46.9 (48.7)</td>
</tr>
<tr>
<td>High school</td>
<td>44.6 (41.4)</td>
<td>8.0 (36.6)</td>
<td>31.9 (49.6)</td>
</tr>
<tr>
<td>Schools for the disabled</td>
<td>55.7 (54.9)</td>
<td>8.9 (32.2)</td>
<td>41.1 (59.8)</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses are data from fiscal 2000.


“Training to Foster Instructors in Educational Use of IT.” This national programme aims to educate leaders at the prefecture level and is offered for three-to-five day periods during school summer vacations. Approximately 2,000 individuals receive this training each year. Another example is a programme called “Basic Computer Training” by prefecture boards of education. This training is provided for all teachers who have several years of teaching experience. Between 30,000 and 35,000 teachers receive this training annually.

**Constraints on the use of ICTs**

When elementary and junior high school teachers were asked to identify barriers to the use of ICT in classrooms,
their most frequent answers were as follows:

- Insufficient number of computers (40.6%)
- Greater preparation time required for classes using computers (38.6%)
- No free time for training (37.7%)
- Lack of software usable by teachers and students (33.3%)

While highlighting the lack of both hardware and software, these answers also reveal the plight of teachers who have insufficient time to acquire computer skills and prepare classes in which ICT is to be used. The combination of lack of skills and time is a fact of teacher life. But the shortage of computers is one problem that can be readily solved. Also, as ICT use becomes more pervasive, the lack of basic knowledge of how to operate equipment will become less pressing.

The real issue, then, is the amount of preparation time required. Case studies reveal that ICT use most often is a special event in a lesson. It is not easy for teachers to make frequent use of ICT in everyday teaching without adequate preparation. Teachers lack the know-how of why, when and how to use the technology. This problem cannot be solved by time alone. Research, training and repeated practice are essential.

### Analysis

As indicated, the last few years have seen fulfillment of most national policy targets for ICT use in classrooms. The infrastructure is largely in place. As of 2001, the penetration rate of household Internet access had reached 61 per cent. It is no longer unusual for a student to access the Internet at home as well as at school.

The critical question is no longer that of knowing how to operate a computer or browse the Internet for information. The issue now is how to successfully incorporate ICT into the teaching process. Specific methods for achieving this aim are not yet in place. High-school teacher training programmes to meet the demand for teacher-experts in information technology have only just been started, and most schools must still rely on retraining those teachers currently in the classroom. It is not at all easy for teachers to obtain the training they need. In addition to providing training opportunities, it is vital to build environments that facilitate such training.

Although experience is being accumulated in the use of ICT as part of the teaching process, more academic research in this area is required. What is the effect of ICT on the educational experience? What are the successful factors in using ICT in classrooms? How are cost and the effectiveness of ICT use balanced?

### NOTES

1. For more information on national level steps to promote ICT, see the home page of the Strategic Headquarters for the Promotion of an Advanced Information and Telecommunications Network Society, [www.kantei.go.jp/jp/singi/it2/index.html](http://www.kantei.go.jp/jp/singi/it2/index.html/).
3. The 100 School Project finished in 1998. The history of the project can be found at [www.edu.ipa.go.jp/100school/](http://www.edu.ipa.go.jp/100school/).
4. The Information Technology in Education Project was one of a series of four projects entrusted to a government ministry and agency task force reporting directly to the prime minister and cabinet. Between 1998 and 2000 approximately 9,100,000,000 yen was invested in this project ([www.mext.go.jp/a_menu/shotou/zyouhou/index.htm](http://www.mext.go.jp/a_menu/shotou/zyouhou/index.htm)).
5. The Japan Association for Promotion of Educational Technology’s Computer Education Practical Idea Award has collected approximately 700 case studies, of which 10 to 15 have been chosen for the award ([www.japet.or.jp/idea/index.cfm](http://www.japet.or.jp/idea/index.cfm)).
6. The MEXT Internet Utilization Concours (NETCON) has been the subject of presentations to MEXT, the cabinet, the Prime Minister’s Office, METI, and the Asahi Shimbun. Ten prizes are awarded each year ([www.netcon.gr.jp](http://www.netcon.gr.jp)).
7. Additional case studies can be found at [http://thinkquest.gr.jp/index.html](http://thinkquest.gr.jp/index.html), the WeBsite for the international ThinkQuest contest managed in Japan by the School Internet Promotion Association and [www.nicer.go.jp/itnavi](http://www.nicer.go.jp/itnavi), the “IT Teaching Practice Navi” WeBsite of the National Center for Educational Information at the National Institute for Educational Policy Research.
8. “IT Contributions to Learning Ability: Realities and Perspectives” (Committee to Promote IT Use in Primary and Secondary Education, 2002), [www.mext.go.jp/a_menu/shotou/zyouhou/index.htm](http://www.mext.go.jp/a_menu/shotou/zyouhou/index.htm).
9. See note 8 above.
Several government agencies are involved in the development of information and communication technology (ICT) policies and programmes in Laos. The Ministry of Communication, Transport, Post, and Construction (MCTPC) is responsible for national telecommunications policies and regulation. The Science, Technology, and Environment Agency (STEA) has the authority to administer policies and programmes that fall under those three subject matters. The government has also established the Lao
National Internet Committee (LANIC) to formulate and regulate national Internet policies. The following government bodies comprise the LANIC: the MCTPC, the Ministry of Information and Culture (MOIC), the Ministry of Interior, the Ministry of Foreign Affairs (MOFA), and the STEA. The MOIC is also technically responsible for regulating Internet content, though there are few Laotian sites for it to monitor.

In 1996, the STEA was given the mandate to develop a national plan for information technology (IT). The resulting “Lao National Plan on Information Technology: Master Plan up to Year 2000” outlined three main projects: the creation of a Lao code page, software standards and a government intranet. Unfortunately, the plan ended in 2000 without realising these goals.1

Currently, the MCTPC, with support from the Japanese International Cooperation Agency (JICA), is developing a Telecommunications Master Plan for the period 2003-2015. According to the MCTPC, this plan will outline the responsibilities within the government regarding IT and clarify that MCTPC has authority over all ICT policies.2

The Ministry of Education (MOE) has developed a three-phase master plan for IT development in education. The focus of each phase is as follows:

- The establishment of a ministerial intranet system with links to provincial offices and the National University of Laos (NUOL);
- The incorporation of ICT content into the secondary and tertiary curriculum;
- The promotion of distance learning and e-learning through ICT.

In 2000, the ministry requested international assistance in developing an IT curriculum under phase 2 for the NUOL.3 The emphasis of the MOE, however, continues to be on basic education, with 47.3 per cent of public expenditure on education dedicated to pre-primary and primary schooling.4

**Current level of ICT access and use**

Overall, use of ICT in Laos is limited. Government agencies have little experience in using ICT, and the few officials who use the Internet do so primarily for exchanging e-mail. Likewise, the business sector has not been active in developing Internet-related applications. Few Laotians have access to computers or the Internet, and less than 2 per cent of Laotian households have a telephone. Although there are approximately 60 Internet cafes in Laos, most of them are in Vientiane.5 Thus, the 80 per cent of the population living in rural areas have even less access to ICT than Laotians in the capital or tourist areas.6 According to an e-ASEAN (Association of Southeast Asian Nations) Readiness Assessment conducted in 2001, Laos ranked last out of the 10 ASEAN countries in terms of e-infrastructure, e-society, e-commerce and e-government. As such, it was classified as an “emerging” readiness country, characterised by the need to build basic ICT infrastructure.7

The MOE has received computer equipment and technical assistance from the World Bank, the Asian Development Bank, l'Agence de la Francophonie, and other development partners. As a result, it has a relatively high ICT penetration. As of 2002, the MOE and 11 provincial offices share roughly 150 computers, 40 of which are Internet-compatible and have a basic intranet system. This ICT presence within the ministry, however, does not indicate a high level of ICT awareness or planning for the school system. Rather, it reflects the MOE’s “top-to-bottom” approach toward IT development. Under this approach, the MOE will focus first on ICT development within itself, then within the NUOL and then on the integration of ICT into secondary schools.8

At present, almost no public primary or secondary schools in Laos have access to the Internet, and formal education in ICT or computer science is not available below the tertiary level. Although the MOE reportedly has plans to provide computers and Internet access to two secondary schools in each province by 2005, these computers will be primarily for use by the administrative staff. The MOE has also indicated that it plans to support basic computer courses at the secondary level.9 However, given that ICT is not incorporated into the national curriculum at the primary or secondary levels, such computer studies may be restricted to after-school hours, which may not be feasible for either students or teachers.

One reason for the limited use of ICT in Laos is the relatively late introduction and development of mass media and Internet technologies within the country. Radio and television broadcasting in Laos did not begin until 1960 and 1993, respectively. In addition, Laos did not have sustained Internet connectivity until 1996, making it one of the last Southeast Asian countries to be online.10

Likewise, the NUOL was not established until 1995 and has not been active in the development of ICT. The NUOL has a computer lab, funded by the Japanese government, of approximately 20 computers with LAN and Internet connectivity. Although the facility is primarily for use by the engineering faculty, fee courses are also held there, and the NUOL now offers an undergraduate computer science programme.

One promising trend is the rise in demand for the Internet among young educated and urban Laotians. This trend stems from a unique paradox in the higher education system in
Laos. Prior to the opening of the NUOL, most students receiving college degrees studied outside of Laos and were exposed to the Internet during that time. Upon their return to Laos, they sought to remain electronically connected to the outside world. In this way, the absence of a national university seems to have contributed to an increase in ICT awareness among this population. Private training institutions for computer, typing and English skills are also in demand among urban youth.

Radio and television usage in Laos is also on the rise. Radio, in particular, is a critical media outlet, with more than 50 per cent of Laotian households owning a radio. The absence of local cinemas and the availability of video technology across the border in Thailand may have contributed to the rise in video use. In 1997, 20 per cent of Laotian households had a video recorder, a relatively high percentage given the average level of income. Laotians living close to the Thai border have also developed an increased awareness of Internet technology through Thai television broadcasts and advertising.11

**Major initiatives**

The Jhai Foundation and Schools Online established the first Internet Learning Center (ILC) in Laos in the rural Phonmee secondary school. Computers were set up in a renovated classroom, and approximately 40 teachers and students received computer training. The Center also serves the needs of the community by opening for public and business use after school hours. The Phonmee ILC project received the Stockholm Challenge award for education in 2001. The Jhai Foundation and Schools Online have now set up three new ILCs in other parts of the country.12 The World Links for Development Program is also working with the Jhai Foundation to provide wireless connectivity and refurbished computers to schools in seven sites across the country. Similar to the Phonmee model, the schools will also be used as community telecentres.

ASEAN and UNESCO have launched regional ICT in education projects that include programmes in Laos. ASEAN, along with several development partners, is implementing a project on strengthening ICT in schools and establishing a schoolnet. The general objectives of the project are to share practices on using ICT in schools, to test various models of ICT-based teaching and to improve access to educational resources through the establishment of a schoolnet in ASEAN countries. ASEAN has also held a number of ICT programmes, workshops and seminars for representatives from member countries.13 Regional UNESCO projects that encompass Laos include a project on improving the management and delivery of technical and vocational education through the application of ICT and a project on promoting successful policy models and strategies of integration within Asia and the Pacific region.14

The European Commission has also begun a project in Laos under its Asia IT&C (Information Technology and Communication) Program. The objective is to apply European Union developments in digital media technologies to improve the quality of education administration and delivery in Asia with a focus on vocational, technical and general education.15

In recent years, CISCO Systems, Inc. and the United Nations Development Programme (UNDP) held discussions with the Lao government to explore the establishment of a CISCO Networking Academy Program in Laos. However, it is unclear whether any agreement was reached.

**Examples of training**

In 2000, the STEA, with assistance from UNESCO and the Center of International Cooperation and Computerization of Japan, established an IT Training Center. Located within STEA, the Center provides system administration and advanced IT courses to Laotian engineers, basic IT skills development training to STEA branch officers, and general training in IT utilisation to government officials (see www.stea.gov.la/English.STEAWeb.htm).

Training has also been provided to participants from Laos under the Southeast Asian Ministers of Education Organization (SEAMEO) INNOTECH programme. In 2002, for example, a course was held in the Philippines titled “Technology Applications in Education: Teachers and Teacher Trainers” (see www.seameoinnotech.org). SEAMEO INNOTECH has also undertaken a project on using ICT for HIV/AIDS preventive education in schools in the high-risk border areas of the Greater Mekong Subregion.

In Laos, there is a rising demand for ICT training. The public sector lacks the capacity and human resources to meet this demand. Therefore, the private sector has played an increasing role in providing ICT-related training. In a 2000 survey of six top business administration institutes and computer retailers in Laos, UNDP found that they offered ICT-related courses in the following categories: general computing, typing, Internet introduction, computer hardware, database, programming and computer-aided design.16

**Constraints on the use of ICT**

There are numerous constraints on the use of ICT both within Laos in general and within the education sector specifically:
Lack of a co-ordinated ICT master plan: Although several government agencies have developed ICT plans and projects, there is a lack of co-ordination among these groups, which has created uncertainty about the roles of these agencies and about which agency is in charge of overall ICT planning. In particular, the hierarchy between STEA and MCTPC on ICT matters is unclear. Such a lack of co-ordination results in numerous independent initiatives without a clear prioritisation of the government’s ICT needs.

Lack of ICT infrastructure: The current telecommunications infrastructure does not allow for high-speed information access, and telecommunications access is lacking outside urban areas. There is also an insufficient legal framework for e-commerce and related ICT laws. In addition, there is a lack of Laotian web-based content, and the domestic standard for the Lao font does not meet international standards.

Lack of knowledge base for ICT: The government of Laos, including the MOE, lacks the necessary ICT expertise to formulate and implement a co-ordinated national ICT policy. Among the general population, there is also a considerable lack of ICT awareness and practical experience. UNDP Human Development Indicators (2003) show that educational attainment overall is low in Laos with an adult literacy rate of only 65.6 per cent and a combined gross enrolment rate of 57 per cent. In addition, Laos lacks local ICT training facilities and manpower. Most ICT personnel from the government and private sector received their training abroad. Those who get training within Laos do so through private colleges and companies. In 1998, the NUOL began offering a computer science degree programme; however, both NUOL and private training institutions suffer from a shortage of ICT reference and training materials.

Lack of financial resources: Laos is one of the least-developed countries in the world, ranking 135th out of 175 countries in the UNDP 2003 Human Development Index. Gross domestic product (GDP) per capita in Laos is roughly US$ 1,620, with approximately 39 per cent of the population living in poverty. Therefore, most Laotians cannot afford computer equipment and Internet access. The government also lacks the financial resources to implement a large-scale ICT in education project, since it already relies heavily on donor assistance to fund its poverty alleviation and development programmes. In 1997, for example, foreign aid made up 38 per cent of the government’s budget.

Lack of awareness: The potential benefits and applications of ICT are not well understood in Laos, with the local media presenting scant information on ICT. Even within the government, there is not a clear awareness of how ICT could benefit the population beyond the use of the Internet for e-mail purposes. As a result, there is little public incentive to improve ICT planning and access.

Analysis

Laos faces substantial challenges in developing an ICT infrastructure and integrating ICT into education. The first priority should be to clarify the roles and responsibilities of the various agencies involved in ICT planning, including the MOE. At present, the MOE appears disconnected from other national ICT actions, so bringing the MOE into the process may create beneficial linkages and reduce initiative redundancies.

In terms of achieving increased ICT use in the short term, one potential area for government action is in vocational, technical and continuing education. The rising demand for private ICT training institutions indicates that public sector training programmes may be ineffective in meeting the demands of today’s job seekers. In order to build the necessary ICT base for Laos, the MOE may need to strengthen its incorporation of ICT in these programmes. Alternatively, the government could provide a supportive climate for the further growth of private sector training institutes. One step in this direction would be to reduce the high import tariffs that currently exist on computer hardware.

Some factors that could benefit Laos in its ICT development are the presence of young Laotians with ICT experience, the interconnectedness of the country with Thailand, and the Laotian diaspora. The interest in ICT among young urban Laotians and the presence of those trained abroad in ICT indicates that there is both a demand for ICT and a supply, if limited, of those who can provide training and awareness. In addition, Laos may be able to profit from the ICT development work that Thailand has already undertaken. Thailand is the largest foreign investor in Laos, and that includes the telecommunications sector. Given the absence of Lao-language Internet-based content and the fact that many Laotians understand Thai, there may be opportunity to capitalise on Thailand’s achievements in ICT. Lastly, the Laotian diaspora could also play a role in promoting the benefits of ICT and launching Internet or other ICT-related ventures.

NOTES
2 “Internet on the Mekong: Lao PDR Case Study” (Vientiane, Lao PDR: UNDP/UNV).
3 See note 1 above.
5 See note 2 above.
6 See note 4 above.
8 See note 1 above.
9 See note 2 above.
10 See note 2 above.
11 See note 2 above.
16 See note 1 above.
17 See note 1 above.
18 See note 1 above.
19 Per capita income measured in purchasing power parity (PPP) terms. UNDP Human Development Indicators 2003, see note 4 above.
21 See note 2 above.
The Mongolian information and communication technology (ICT) sector has had a lengthy period of development, which received a boost in 1994 with the establishment of the first Internet service provider (ISP) in the country, Datacom Co. Ltd. Then, after a period of relative inactivity, the next serious attempt to address ICT policy was undertaken in 1999, when the First National ICT Summit was organised and the “ICT Vision-2010” policy document developed with contributions from representatives of government organisations, the business sector and civil society. The Parliament of Mongolia
adopted the ICT Vision-2010 in 2000 as a blueprint for ICT development in the country. According to the Vision document, the mission is to develop a knowledge-based society and to improve the quality of people’s lives.

ICT Vision-2010 has three major components: a government-legislation framework, a business-economy framework and a people-society framework. Within the people-society framework, the goal is to “create a favourable environment for Mongolian citizens to communicate freely among themselves and with the world community, ensure opportunities for their equal and active participation in social life and improve quality of people’s lives.”

In January 2002, representatives of government, the private sector and non-governmental organisations (NGOs) sat together to develop a mid-term strategy and action plan to implement ICT Vision-2010. Both strategy and action plan had three major components, each outlining activities, specified time lines, an organisation responsible for implementation and the donor or national support required to achieve the objectives. Although the mid-term strategy, action plan and ministerial policy document are in place, there has been no money allocated in the state budget for its implementation.

Meanwhile, the Ministry of Education, Culture and Science (MOECS) has used Vision-2010 as a model to implement ICTs in the education sector, developing an action plan which was approved in 2001. MOECS’s vision for ICT in education has four major components:

- Training (to utilise all possible resources to introduce ICT in all levels of education);
- Hardware (to provide hardware and software necessary for training in ICT);
- Teaching staff (to provide support for highly motivated staff);
- Information ware (to develop a sectoral information and database to improve conditions for better information services).

The limiting factor in integrating ICT into education is that the focus has been on the teaching of ICT as a subject rather than the way in which it can be integrated into the teaching/learning process.

Mongolia has taken steps to create or amend laws concerned with the development and use of ICTs. The telecommunications law of 1995 was amended in 2001, there is a law on radio frequency, and minor amendments have been made to the patent laws, Civil Code and technology transfer law. Recently, the Ministry of Infrastructure (MOI) developed draft ICT laws after securing input and recommendations from stakeholders. A working group of 15 members (representatives of NGOs, government, business and others) was established to revise the law. According to the MOI, the revised draft law was originally planned for presentation to Parliament in September 2003. Representatives of the working group and donor organisations approached the Minister requesting a delay in submitting the draft law stating a need for broader public discussion with NGOs, government organisations, members of Parliament, media and business as well as expressing a need for consulting with international experts.

### Current level of ICT access and use

#### Basic Education (Primary/Secondary)

According to statistics of the MOECS published in April 2003, there are 2,041 computers in 518 schools, or four PCs per school in average. Most of the computers are used for teaching Informatics in grades 8 to 10 with a limited number of computers available for use by staff and teachers. Within the Informatics curriculum, the pupils are taught logistics, programming languages and applications of Microsoft Office. The use of computer-assisted instruction in other secondary subjects is quite limited. In urban areas there are a number of projects evaluating the deployment of ICT in basic education. One of these projects addresses utilisation of open source standard applications and software, such as Linux.

#### Vocational Education

Vocational education is currently in a revival phase after near abandonment in the 1990s. At present, the greatest activity is in fee-based, short- or long-term computer-based training courses offered by individuals, private sector or private institutions.

#### Teacher Training

This aspect of the plan is being addressed in two ways: pre-service and inservice. The pre-service teacher training is offered mostly at the Pedagogical University, the leading institution for training secondary school teachers. There are two curricula: one for Informatics teachers and another for non-Informatics teachers. They, of course, differ in course content, the intended use of the computers, as well as application to the course.

The Informatics teacher-training curriculum involves instruction in the use of logistics, programming languages and applications such as Microsoft Word, Excel, PowerPoint, and web design. Recently, a limited number of classes have been offered to provide training on basic hardware maintenance and troubleshooting.
The non-Informatics teacher training curriculum is limited to instruction in office applications with future extension likely to the other subjects. Recently, the Computer and Information Technology School of the Mongolian State Pedagogical University has been involved in the development of a curriculum for non-Informatics teachers as part of the Teacher-2005 project of MFOS.

Inservice teacher training appears to have been abandoned with no new, upgrading, or retraining courses offered. According to a recent survey, teachers state there is a lack of hands-on opportunities for practice using computers and there are a limited number of computers for use in classes and for after school work.

Non-formal Education

In past years the non-formal education sector has used TV or radio almost exclusively because there was little penetration of computers in the rural areas where most recipients of non-formal education were residing. However, recently the number of computers in aimag centres has increased and there is greater access to the Internet, enabling non-formal education to become involved in distance education offerings.

According to some surveys and research, two types of digital divide exist in Mongolia: that between urban and rural areas, and that between the downtown and suburbs. The digital divide has increased dramatically lately with the introduction of PC game rooms and centres dominated by male-oriented action games which has resulted in boys becoming increasingly interested in computers.

The Telecommunication and Information Technology School of Mongolian University of Science and Technology and Post and Telecommunications authority will provide retraining for public servants. Training is to be delivered in 12 aimags and Ulaanbaatar using distance education techniques and technologies.

The recently developed and introduced education portal, www.mongoleducation.mn, is an example of a tool used for sharing experience and knowledge among teachers on any subject or policy issue.

Major initiatives

- www.knowledge.mn: A project was initiated in 1998 by the Internet and Information Centre, an NGO, and supported by IDRC of Canada with the aim of providing web-based information for teachers and students.

- www.mongoleducation.mn: This project of the Mongolian Foundation for Open Society (Soros Foundation) provides a web portal for secondary school teachers. Its purpose is to supply a forum for public discussion, sharing knowledge and experience in the development of curriculum materials, teaching methodologies, etc.

- Internet for Schools of MFOS: In 1999, following implementation of the Education Sector Development programme of ADB, the Internet for Schools project was developed and supported by MFOS (Soros Foundation). MFOS supplied 10 PCs to each aimag school while Soros allowed local area networking between computers to occur at each school and enabled access to the World Wide Web.

- iEARN* and ThinkQuest: Projects were implemented by MFOS (Soros Foundation) to provide access to already developed content and to assist in content development by Mongolian pupils and students.

- Education Sector Development Program of ADB: In 1998, this programme was launched with the purpose of: furnishing over 90 secondary schools in rural and urban areas with computers, providing training for Informatics subject teachers and providing technical support for the equipment supplied.

- Academic Network – Erdemnet: As an initiative within the Education Sector Development Program of ADB, in 1999, a network of academic institutions and schools established an ISP, Erdemnet. It was set up at the Computer Science and Management School of the Mongolian University of Science and Technology.

- Sakura Project of JICA: This project provides secondhand computers using open source software (Linux-based operating system), the Star Office package and access to an e-mail system to some schools. The connection to the Internet was made available through Erdemnet. Within the framework of the project, manuals were developed using Linux OS and the Star Office package and training was provided to teachers and students on their use.

- MIDAS Project: The Mongolian Information Development Application Scheme (MIDAS) project, supported by MFOS (Soros Foundation) and UNDP/APDIP, has assisted in the development of a variety of Mongolian language education software packages, such as the Library for University software (LIB4U), RENOR 2 (an application for teaching Math and the alphabet to primary school pupils), online and offline dictionaries, online Math applications, Mongolian-language typing tutor (Fast Type) and others. (See www.ict.mn/midas.)
**E-learning:** This project of IDRC of Canada will pilot distance learning course packages that have been developed by Infocon, ESPI, Datacom and others to address English language, gender, online Math and ICT education issues. (See www.elearning.mn.)

**Cyber Aimag Project:** As part of this project of MFOS, three secondary schools of three aimag centres were connected to the Internet via wireless radio-modem connection, enabling access to the World Wide Web. This access has now broadened training on both basic computer and application skills and web page development for teachers and pupils.

**Parliament members’ projects:** As part of their election agenda, most members of Parliament included support for computer supplies in schools. At present no specific data is available on how many computers were supplied and to which regions and schools.

**Rotary Club Project:** The Rotary Club of Mongolia and its branches have developed initiatives to furnish secondary schools with computers and equipment. At present, over 20 schools have been supplied with at least five computers each. (See www.rotarymongolia.mn.)

**Project of the Mongolian Association of Cooperation with Oceania Countries:** The association, in cooperation with Oceania countries, has supplied 64 secondhand computers to 17 rural schools.

**Indian government project:** The Indian government committed support of US$ 1 million for ICT in Mongolia. A teleconferencing facility with computer labs was established in the Communications School of the Mongolian University of Science and Technology. In addition, five Internet centres with five computers were established in five aimags.

**Japan-Mongolian Centre:** The Japan-Mongolian Centre, established in 2002, provides professional training for Mongolian ICT professionals. A number of scholarships and fellowships were offered to Mongolian ICT professionals to study in Japan for a period of six months or more.

**Private School Initiatives:** To be competitive in the market-driven situation in Mongolia, private schools and institutions are offering short and long computer degrees and ICT courses.

Most of the initiatives described are recent projects that face the challenge of sustainability upon completion, since secondary schools have limited budgets for ICT development and staff. The major partners for ICT in education are the Mongolian Foundation for Open Society (Soros Foundation), ADB, UNDP and JICA.

### Examples of training

Following are some examples of training being provided:

- **Education Sector Development Programme of ADB:** Training workshops were conducted on the MIS, computer training for staff of educational and cultural centres, teachers of informatics, pupils and others.

- **Cyber Aimag Project of MFOS (Soros Foundation):** Training on computer use, access to the Internet, development and update of websites, hosting websites, online chats and discussions, troubleshooting and technical support were conducted.

- **Internet for Schools Project of MFOS (Soros Foundation):** Training was conducted on use of computers, applications, accessing the World Wide Web, using an e-mail system, etc.

- **Joint pilot project of MIDAS, MFOS and Khuree ICT Institute:** Training was conducted for non-Informatics teachers of Darkhan-Uul aimag on computer use. Laptop computers were utilised in the sessions to demonstrate their mobile capability. A needs assessment on computer availability was conducted with participants. At the end of the week, ICT companies and institutions showcased their software and their application(s).

- **Joint project of MIDAS, UNV-JTF and Khuree ICT Institute:** Pilot training was conducted in the Khentii aimag (east of Mongolia), the training was conducted for secondary school teachers and administrators of the local governor’s office on the use of computers for everyday activities and troubleshooting.

- **E-learning:** Training on use of online content in English, Gender, Math and ICT was conducted for teachers to assist them in using computer-aided learning.

- **Mongolian Development Gateway:** Pilot training was conducted in the Umnugobi aimag on the use of the Internet and development of websites. (See www.gateway.mn.)

- **CISCO Academy Project of UNDP/APDIP and CSMS:** Established in 1997, the Cisco Academy offers courses on CCNA with online access to the
Cisco Academy website. Over 100 people have been trained.

**Project of the Indian Government:** The staff and teachers of the Communications School of the Mongolian University of Science and Technology have attended short- and long-term specialised training in India.

**Sakura Project of JICA:** Training was conducted among teachers and pupils on the use of computers, followed by training on the use of Linux, StarOffice packages and mailing software, prior to the distribution of computers.

**E-learning Center:** The goal of the E-learning Center, which was established with the support of the Center for International Cooperation for Computerization of Japan (CICC) at the Computer Science and Management School of MUST in October 2003, is to develop e-content for distance education. The Center is equipped with two servers, four host machines and CULTIVA-2 software.

**Open Web Centre Project of MFOS (Soros Foundation):** The goals of this project are to provide access to computers and the Internet for civic organisations, to develop training materials and to provide online and off-line support for development and update of websites. (See www.owc.org.mn.)

**UNV-JTF Project for Disabled Children and Teachers of the Pedagogical University:** The purpose of this project was to introduce a new communication tool to children who are deaf and mute. With the support of a sign language teacher, 29 students from a special school were trained in the use of computers and development of websites.

Even though extensive training and courses have been conducted, there is still a considerable demand and need for basic to advanced levels of ICT training for Informatics and non-Informatics teachers, students, NGOs and others. Although the comprehensive ICT education strategy was developed and adopted by the Government of Mongolia, almost all projects lack sustainability, action plans and activities to achieve set goals.

### Constraints on the use of ICT

There are a number of constraints on ICT development in the country, each of which need to be addressed within the framework of policy, infrastructure, human development and capacity-building, and content and learning materials.

### Policy

There is a need for a thorough policy approach that addresses issues such as the choice of operating systems, the development of software and training materials, staff training and the way that ICT is applied in education.

### Infrastructure

**Connectivity:** The connectivity situation in Ulaanbaatar and some of the relatively developed aimags is no longer an issue, although the provision of certain bandwidth for education purposes should be negotiated with the Internet providers.

**Hardware:** In the last two years, the hardware situation has improved drastically in aimag levels. However, there is a need to address the issue of supplying computers to some schools. Moreover, the number of students per computer, maintenance, troubleshooting and use of computers by teachers still require attention.

**Affordability:** As mentioned above, the budget of secondary schools is limited for maintenance, troubleshooting, telecommunications and Internet connections, which affects maximum utilisation of hardware and software.

### Human Development and Capacity-building

There is a need for total revision of staffing in schools and development of pre- and inservice ICT training for all teachers and administration of schools because of low computer penetration, lack of professionally trained Informatics teachers in rural schools and households and lack of training materials and curriculum.

### Content and Learning Materials

The curriculum for prospective Informatics and non-Informatics teachers should be revised and include compulsory ICT training for all. The lack of off-line training, teaching materials and curriculum (CD-ROMs, DVDs, manuals, guides, etc.) has affected the computer knowledge and skills of secondary school graduates, and they are therefore penalised upon entering post-secondary institutions.

The increasing number of Internet cafés and game centres provides favourable conditions to introduce touch-typing software in the form of games, which alleviates the problem somewhat.
Analysis

The following issues need to be addressed in order to enable wide-scale ICT application in education in Mongolia:

- A specific action plan is needed to introduce ICT in education rather than ICT education itself. Policy documents need to be developed with a legal and regulatory framework favourable for the involvement of business. The approach should cover ICT use in distance and classroom education. To develop a sound policy document on ICT in education, a number of stakeholder meetings should be held. Stakeholders should not be limited to educational experts, but should include ICT businesses and companies, NGOs, representatives of parents, students, media and governmental officials. The meetings should develop recommendations on policies to attract businesses which would support education and encourage institutions to develop content and training packages as well as materials that can be delivered through schools by teachers, advanced students, clubs, etc.

- There is a need to introduce a nationwide pro-computer literacy programme for teachers, pupils, school staff and parents that has a management information system component which is user friendly. Further, there is a need to address the copyright issues around software and its application to education.

- The development of manuals, guidelines and textbooks (including e-textbooks and e-contents) needs to be addressed.

- ICT training should be integrated into all school subjects where possible. For example, computers can be used for writing essays, reports and presentations, or for analysing data in Physics, etc. This can be done with minor adjustments to the curriculum of Informatics and non-Informatics subjects.

- There is a need for online and off-line Mongolian language content of manuals, guides, teacher and student books, course materials, help and support desks, etc. Special attention should be paid to the development of computer-based teaching materials on specific subjects of the curriculum.

Appendix 1

Glossary of acronyms

ADB: Asian Development Bank
APDIP: Asia-Pacific Development Information Programme
CCNA: Certified Cisco Network Associate
CICC: Center for International Cooperation for Computerization, Japan
CSMS: Computer Science and Management School
ESPI: English for Special Purposes Institute
iEARN: International Educational and Research Network
ICT: information and communication technology
IDRC: International Development Research Centre
JICA: Japanese International Cooperation Agency
MFOS: Mongolian Foundation for Open Society (Soros Foundation)
MIDAS: Mongolian Information Development Association
MIDAS: Mongolian Information Development Application Scheme
MIS: management information system
MOECS: Ministry of Education, Culture and Science
MOI: Ministry of Infrastructure
MSPU: Mongolian State Pedagogical University
MUST: Mongolian University of Science and Technology
NGO: non-governmental organisation
UNDP: United Nations Development Programme
UNV-JTF: United Nations Volunteer-Japanese Trust Fund

NOTES

1 Decree No. 151 of Minister of Science, Technology, Education and Culture, Ulaanbaatar 2000.
2 Choijoovanchig, “Curriculum of Informatics Subject for Non-informatics Students” (Ulaanbaatar, 2003).
3 “Teacher-2005” project of MFOS (Soros Foundation), starting from 2003.
4 Aimag is a second by size administrative unit of Mongolia. There are 21 aimags in Mongolia with a population of 15,000 to 45,000 each.
6 iEARN is a global network to enable young people to use the Internet and new technologies to engage in collaborative educational projects, www.iearn.org.
7 ThinkQuest is an international contest where teams of students are engaged in the development of educational Websites, www.thinkquest.org.
8 “Report of Education Sector Development Program of ADB and MOECS” (Ulaanbaatar: 2002).
11 Report among schools and teachers in Darkhan-Uul aimag, joint project of MFOS, MIDAS, Khuree ICT Institute.
National policy

The Malaysian government has introduced various initiatives to facilitate greater integration of information and communication technology (ICT) to enhance the effectiveness of education and training programmes. This was outlined in the country’s ICT Master Plan, finalised in 2001. The long-term vision of the plan, Vision 2020, calls for sustained, productivity-driven growth, possible only with a technologically literate, critically thinking workforce, prepared to participate fully in the global economy of the 21st century. At the same time, Malaysia’s National Philosophy of Education calls for “developing the potential of individuals in a
holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious.”

The Ministry of Education sees ICT as a tool to revolutionise learning, to produce richer curricula, to enhance pedagogies, to lead to more effective organisational structures in schools, to produce stronger links between schools and society and to empower learners. The ministry’s articulation of the vision for ICT in education focuses on three major areas:

- ICT provided to all students so that it is used as an enabler to reduce the digital gap between schools;
- ICT used in education as a teaching and learning tool, as part of a subject and as a subject by itself;
- ICT used to increase productivity, efficiency and effectiveness of the management system.

As a result, the Malaysian education system is being transformed to create a new generation who are adept with the new technologies and are able to access and manage the information explosion. Malaysia’s ICT developmental plan for the next 10 years aims to:

- Intensify the development of ICT infrastructure;
- Expand access to and equity for ICT facilities;
- Improve assessment and evaluation systems using ICT;
- Emphasise ICT integration in teaching and learning processes;
- Improve the ICT knowledge and skills of students, teachers and other personnel;
- Intensify ICT usage in education management;
- Improve the management and maintenance of ICT equipment;
- Increase research and development efforts in ICT;
- Increase co-operation between educational institutions and the community towards expansion of ICT in education.

Current level of ICT access and use in education

Malaysia ranks 17th in the top 25 countries of Internet users. The growth of ICT users in Malaysia over the last two years was over 50 per cent increasing the number from around 3.7 million to 5.7 million users. The percentage of the total number of Internet users to the total population (23,396,700 people) is around 24 per cent This is much higher than Internet penetration in other ASEAN countries such as Indonesia (two per cent) that ranks 21st and Thailand (5.7 per cent) that ranks 25th. One likely factor that contributes to the greater Internet use in Malaysia is the high fixed telephone connection with 66 per cent of Malaysian households having phones.

As of 2001, Malaysia had the second-lowest dial-up Internet cost among the ASEAN countries: Singapore ranked first without any charge for an Internet service provider (ISP) subscription. According to the International Telecommunication Union (ITU), the average cost for accessing 30 hours of Internet in Malaysia was less than US$ 20 (including costs for ISP subscription, telephone usage and rental). The cost for the ISP subscription itself was only around US$ 5, which was much lower than in Thailand and the Philippines with an average of around US$ 19, and Indonesia with an average of about US$ 25. According to Harvard (www.cid.harvard.edu), the annual cost of 20 hours of monthly Internet access in Malaysia is approximately 4.85 per cent of the country’s GDP per capita.

As of 2000, 31 per cent of Malaysia’s 7,217 primary schools and 54 per cent of its 1,641 secondary schools had PC facilities: 10 per cent of primary schools and 34 per cent of secondary schools had Internet access. However, the distribution of Internet services among schools is still uneven. With 100 per cent Internet connectivity of schools in the Klang Valley (the region around Kuala Lumpur), but few schools in rural areas connected, a national digital divide definitely exists. Outside the Valley, it is estimated that around 1,000 schools (approximately 12 per cent) do not

Table 1: School access to ICT (2000)

<table>
<thead>
<tr>
<th>Level of schools</th>
<th>Number of schools</th>
<th>Number of students</th>
<th>Number of teachers</th>
<th>Number of schools with PC</th>
<th>Number of schools with Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>7,217</td>
<td>2,870,667</td>
<td>247,204</td>
<td>2,202</td>
<td>739</td>
</tr>
<tr>
<td>Secondary</td>
<td>1,641</td>
<td>1,794,515</td>
<td>150,681</td>
<td>883</td>
<td>559</td>
</tr>
<tr>
<td>Total</td>
<td>8,858</td>
<td>4,665,182</td>
<td>96,523</td>
<td>3,085</td>
<td>1,298</td>
</tr>
</tbody>
</table>

even have telephone lines. Table 1 shows the condition of school access to ICT in 2000.

The need to integrate ICT in teaching and learning at all levels of education is deemed essential. Therefore, the Ministry of Education has earmarked 30 per cent of its annual budget (approximately MYR 4.2 billion) to connect another 230 rural schools to the Internet: 120 will be connected with ISDN lines, 100 with PSTN lines and 10 with VSAT connection. As a result, more recent data from the Malaysian Ministry of Education indicate improvement in ICT use over the 2000 figures. As of early 2003, almost all educational institutions had at least one computer laboratory equipped with Pentium class PCs. Specifically, about 75 per cent to 90 per cent of schools and 100 per cent of universities have access to the Internet through either dial-up, broadband, leased line or cable-broadband connection. With these facilities, it is expected that the usage of ICT in teaching and learning as well as in education management will be increased. Furthermore, to prove the Ministry of Education’s commitment to ICT in learning, computer literacy elements are included in the National Preschool Curriculum, which started to be implemented in 2002.

**Major initiatives**

Beginning in 1999, Malaysia began to establish ICT-enabled “smart schools” (www.moe.edu.my/smartschool/), through a contract with Malaysian TELEKOM under the Telecom Smart School Sdn Bhd (TSS) project. To date, there are 90 such schools. Smart schools are designed to introduce technology and deliver education in a better way. The pilot applications developed teaching/learning materials (first step was for four subjects: Bahasa Melayu, English, Science and Mathematics), a more accurate assessment system and an integrated management system. The government envisions that all schools will be converted into smart schools by the year 2010.

There are three categories of smart schools, A, B and B+:

- **Smart schools type A (Model Bilik Darjah Penuh):** Each classroom within the school will be equipped with six PCs. Every school will also be supplied with at least five notebook computers, six support service units, equipment for networking, A3-size laser printer, color printer, multimedia software, video presentation equipment and a leased line connection to the national ICT superhighway. The government will supply at least 390 PCs for primary schools and 520 PCs for secondary schools in this category.

- **Smart schools type B (Model Makmal):** Each classroom within the school will be equipped with 20 PCs. Every school will have at least 37 PCs and will also be supplied with at least two notebook computers, six support service units, equipment for networking, an A3-size laser printer, an A4-size laser printer, color printer, multimedia software, video presentation equipment and a leased line connection to the national ICT superhighway.

- **Smart schools type B+ (Model Bilik Darjah Terhad):** 15 selected classrooms within the school will be equipped with five PCs. Every school will have at least 81 PCs and will also be supplied with at least two notebook computers, six support service units, equipment for networking, an A3-size laser printer, an A4-size laser printer, color printer, multimedia software, video presentation equipment and a leased line connection to the national ICT superhighway.

In addition, a number of non-governmental agencies are very much involved in the drive to introduce ICT into schools. For example, the Chinese Smart Schools project aims at setting up computer laboratories in more than 100 selected Chinese stream primary schools throughout the country. To date, there are an estimated 250 schools, primary as well as secondary, that have their own websites (see, for example, www.jaring/my/teke/right.html, or www.homestead.com/SSKPASIRPUTEH/UIJI.html).

Other portals extending the use of ICT in education have been developed by the private sector. Educational portals such as “my-e-tutor” (www.myetutor.com) and “e-tuisyen” (www.e-tuisyen.com) allow those people with Internet the option of expanding or acquiring knowledge online, of accessing interactive multimedia tutorials and of developing personalised learning programmes. However, accessing those online courses, which follow the Ministry of Education’s curriculum, requires a subscription fee of MYR 38 for primary courses and MYR 48 for secondary courses.

**Examples of training**

In an effort to increase ICT use within classrooms, the Malaysian government requires all teachers to take basic informatics courses in teachers’ college. As well it provides intensive and continuous ICT training for teachers. Between 1996–2000, it is reported that about 30 per cent of the teachers received some form of ICT training.

As well, school principals, administrators and other support staff within the education system have also been targeted for ICT training. Topics include education management information systems, an information literacy course for principals and administrators, and a computer management course for principals.

In the non-formal education sector, women in Sabah, including single mothers, will now benefit from free ICT training courses jointly offered by the federal Ministry of Women and Family Development and Sabah Skills and...
Technology Centre (SSTC). The courses began in January 2003 with a targeted enrolment of around 320 women by year-end. Participation in the courses is open to Malaysian women in three categories: working women, non-working women and women entrepreneurs. The objective is to ensure that women are given the opportunity to develop their skills in the ICT field.10

Constraints on the use of ICT

The major factors perceived to inhibit the growth of ICT use in Malaysian education is described by Lee Huei Min, Senior Analyst with IDC Malaysia, are “the cost of Internet access, which includes the cost of hardware, access and knowledge [and the stagnant] Internet experience…as broadband Internet applications are yet to be deployed.”

Another constraint that seems to hinder the actual use of ICT in classrooms is the lack of teachers’ ability to integrate ICT-related skills they have learned into their teaching activities.

Analysis

Although Internet access is not a barrier and the cost for it in Malaysia is one of the lowest in ASEAN countries, the growth of Internet access is still perceived to be slow. The data shows that the distribution of Internet services among schools is still uneven. There is still a national digital divide with 100 per cent Internet connectivity of schools concentrated within the region around Kuala Lumpur. Outside this area, around 1,000 schools (approximately 12 per cent) do not even have telephone lines.

The Malaysian Ministry of Education regards the need to integrate ICT into the teaching and learning at all levels of education as a high priority. In this regard, as part of the smart schools project, the government conducts training that includes pre-service and inservice training of teachers, training of school administrators and other school staff, fosters the use of electronic books and sets up a pilot project on e-learning. Nevertheless, between 1996 and 2000, only 30 per cent of teachers received some form of ICT training, only a small number were able to integrate it into their teaching and few have the expertise to build courseware. Therefore, the number of teachers who incorporate ICT in their lessons to develop interesting and effective teaching and learning remains low.

In summary, although the Malaysian government has concentrated its efforts to enhance the use of ICT in schools, the impact of it on the actual practice of teaching and learning has not yet been significant. It is still a challenge for the Malaysian Ministry of Education to convince teachers who still use traditional methods of teaching and learning and are less inclined to embrace change to incorporate ICT into their instruction.

Malaysia also faces problems related to the digital divide. The inequality between the haves and have-nots is shown creating websites by students in more advantaged schools who have acquired computer/ICT skills beyond the basic, while others in less advantaged schools have never even used a PC.

NOTES

4 Michael Minges, “Measuring the Internet in South East Asia” (2001), www.itu.int/ITU-D/ict/cs/Malaysi./
5 See note 3 above.
6 See note 3 above.
7 Statistics as provided in response of Ministry of Education to survey questionnaire.
9 See note 3 above.
National policies, strategies and programmes

The Government of Myanmar has developed a 30-year long-term education development plan that incorporates the vision of creating “an education system that will generate a learning society capable of facing the challenges of the Knowledge Age.” Information and communication technology (ICT), through e-education, appears to be recognised under this plan. The Myanmar Education Research Bureau, the agency responsible for non-formal education, has indicated that the following ICT in non-formal education objectives
are included in the national plan: increasing education opportunities through the use of ICT in schools and community learning centres (CLCs), increasing the production of audiovisual and multimedia teaching materials for schools and CLCs, and retraining instructors for effective use of ICT.²

In addition to the Ministry of Education, which is responsible for the development and management of the education system, the Government of Myanmar has established the Myanmar Naing-Ngan Education Committee to co-ordinate education activities at the national level and to serve as the highest-level decision-making body for the education sector.³ Myanmar is also a party to the e-ASEAN (Association of Southeast Asian Nations) Framework Agreement, and accordingly, the government has formed a Myanmar e-National Task Force to promote ICT. The government also established the Myanmar Information and Communication Technology Park in 2001 to promote private sector ICT development (see www.mict-park.com.mm).

**Current level of ICT access and use**

ICT access and use in Myanmar is limited. Telephone density is one of the lowest in the world at roughly 0.6 per cent and it is estimated that there are only 50,000 personal computers in use in the country. In addition, until recently, all telecommunications services were provided and controlled by one organization: the Myanmar Post and Telecommunications (MPT), a division of the Ministry of Communications, Posts, and Telegraphs (MCPT). Although a second telecommunications provider, Bagan Cybertech – a partly state-owned enterprise – was granted authority to operate, the ICT base from which to engage in education programming remains weak.

Within the education sector, distance education seems to have the longest experience with ICTs. Distance education in Myanmar began in 1970 with a correspondence course for inservice teachers at the Institute of Education. Today, there are two universities for distance education: the Yangon University of Distance Education (for upper Myanmar) and the Mandalay University of Distance Education (for lower Myanmar). These universities use several delivery systems, including radio lessons, cassettes, TV programmes and – the latest initiative – lessons through e-education learning centres.⁴

**Major initiatives**

In recent years, the Government of Myanmar has launched several programmes to increase the role of ICT in education. The Ministry of Education has installed multimedia classrooms in more than 400 primary, middle and high schools across the country. These multimedia classrooms contain print and electronic media, computers and language laboratories. The government also introduced an e-education initiative that uses satellite communication and an electronic data broadcasting system to relay education programming to more than 500 e-education learning centres that offer language training and undergraduate studies. E-learning centres, e-resource centres and computer training centres have also been set up at several institutes of higher education. It is not clear whether overlap exists in the multimedia, e-education and e-learning centre initiatives.⁵

In the area of non-formal education, the government has established an estimated 480 CLCs across the country. The main purpose of the CLCs is to provide non-formal education, continuing education and skills training in response to needs of the local communities. These programmes typically include basic literacy, post-literacy and non-formal primary education for out-of-school youths, and skills training for the community. Videos, puppet shows and other printed materials are used to disseminate information and learning. The Myanmar Literacy Resource Center also uses mass media and video technology to provide continuing education.⁶

The government has also opened at least two New Century Resource Centers (NCRCs) in upper and lower Myanmar to provide continuing learning and research opportunities and to provide access to e-education for the public. The centres are equipped with computer training rooms, language laboratories, e-learning centres and e-education resource facilities. ICT-related courses available at the NCRCs include computerised accounting, Windows 2000, software engineering, network engineering, hardware engineering, a postgraduate diploma in multimedia arts and a diploma in information technologies. The centres also utilise video, audiotapes and compact discs.⁷

Malaysia has provided assistance to Myanmar to launch a Smart School pilot project. Under the project, Malaysia has supplied computers to three primary and high schools in Yangon. Bagan Cybertech provided Internet connectivity to the schools and has announced plans to sponsor the connectivity for an additional 100 schools with multimedia classrooms.⁸

ASEAN and UNESCO are undertaking regional ICT in education projects that include Myanmar. ASEAN, along with several development partners, is implementing a regional project on strengthening ICT in schools and establishing a schoolnet. The general objectives of the project are to share practices on using ICT in schools, to test various models of ICT-based teaching and to improve access to educational resources through the establishment of a schoolnet in ASEAN countries. ASEAN has also held a number of ICT programmes, workshops and seminars for representatives from member countries.⁹ Regional
UNESCO projects that cover Myanmar include improving the management and delivery of technical and vocational education through the application of ICTs, promoting successful policy models and strategies of integration within Asia and the Pacific region, and using ICT for non-formal education.10

Examples of training

To support the multimedia classroom initiative, training for teachers on the use of multimedia equipment is being offered at the Central Institute of Civil Service for basic education teachers, and a post-graduate diploma in multimedia arts is now available at the Institute of Education (see www.myanmar.com/information/computer/IT_Edu/IT_Edu.html).

The Sasakawa Peace Foundation of Japan has also funded training programmes on ICT in education for educators and technicians from Myanmar. In 2002, for example, the Foundation sponsored two training programmes on distance education management and technology representatives from the “CLMV bloc” – Cambodia, Laos, Myanmar and Vietnam. Thailand donated six sets of distance learning equipment to each country following these two training programmes.11

Training has also been provided to participants from Myanmar under the Southeast Asian Ministers of Education Organization (SEAMEO) INNOTECH programme. In 2002, for example, a course was held in the Philippines titled “Technology Applications in Education: Teachers and Teacher Trainers” (see www.seameoinnotech.org). SEAMEO INNOTECH has also undertaken a project on using ICT for HIV/AIDS preventive education in schools in the high-risk border areas of the Greater Mekong Subregion.

The private sector has played an increasingly active role in education activities, in particular in ICT, language and business training. Private ICT training institutes typically offer computer courses such as word processing, computer programming, desktop publishing and graphic design.12

Constraints on the use of ICT

There are numerous constraints on the use of ICT within Myanmar generally and within the education sector specifically:

- **Lack of infrastructure**: According to an e-ASEAN Readiness Assessment conducted in 2001, Myanmar ranked ninth out of the 10 ASEAN countries in terms of e-infrastructure, e-society, e-commerce and e-government. As such, it was classified as an “emerging” readiness country, characterised by the need to build basic ICT infrastructure.13

- **Lack of financial resources for ICT education**: Myanmar is one of the least developed countries in the world, ranked 131st out of 175 countries in the UNDP 2003 Human Development Index. Gross domestic product (GDP) per capita in Myanmar is roughly US$ 1,027. While international isolation and donor country sanctions restrict the government of Myanmar’s access to foreign aid, the government’s main spending priority is its military. Public expenditure on the military is roughly five times greater than spending on education.14

- **Limited access to and awareness of ICT**: According to the non-governmental organization Reporters Without Borders, Myanmar is one of the countries most shut off from the Internet. According to the United Nations Development Programme (UNDP) Human Development Indicators (2003), the country has less than 10,000 Internet users out of a population of 50 million. In addition, the government reportedly restricts access to a local Internet substitute, the Myanmar Wide Web (MWW), which functions as a national intranet with links to only a few dozen government-approved sites. The government also allegedly controls the establishment of e-mail accounts and websites, with government agencies monitoring e-mail traffic and website content.15

Analysis

Objective information on the current state of ICT in education in Myanmar is limited. The majority of data on education planning and programming come from government sources, and the reliability of the information is difficult to verify. At the same time, sources of information on conditions tend to be subjective as well.

Based on the limited information available, there appears to be a mixed outlook for the incorporation of ICT in education in Myanmar. On the one hand, the government is reportedly making progress in incorporating ICT into its education policies and programmes. The relatively high level of literacy may also prove to be an advantage in building an ICT human resource base, although literacy in English, arguably the language of the Internet, is quite low.

On the other hand, Myanmar is still a developing country with limited financial resources and numerous development challenges. However, due to the prevailing political climate in the country, the United States, the European Union and other potential donors have sanctions in place that prohibit the provision of non-humanitarian assistance to the Government of Myanmar. In addition, multilateral
institutions, such as the World Bank and the Asian Development Bank, have generally been restricted from operating in Myanmar. Therefore, the country is currently unable to tap into most pools of international development assistance to implement ICT in education vision.

In sum, the government’s alleged restrictions on using the World Wide Web, control over the MWW, monitoring of e-mail and intranet usage and punishment for ICT usage violations likely inhibit the development of Internet-related programmes. Not only might such policies have a chilling effect on interest in the Internet, but they may also impede individual and private sector ICT ventures.

NOTES

2 U. Myint Han, “Myanmar Country Report, ” ACCU-APPEAL Joint Planning Meetings on Regional NFE Programs in Asia and the Pacific (Tokyo, Japan: 2002), www.accu.or.jp/litdbase.
4 See note 1 above.
6 See note 1 above.
7 See note 1 above.
8 See note 1 above.
12 See note 1 above.
National policy

The Philippine government believes that to foster lifelong learning skills in learners, educational development with a principal focus on quality and access should form the core of its information and communication technology (ICT) programme. The Philippines’ Information and Communication Technology Plan sets forth the following objectives:
UNESCO Meta-survey on the Use of Technologies in Education

- To provide physical infrastructure and technical support that makes ICT accessible and useful to students, teachers, administrators and support staff;
- To develop competence in using technology, in designing, producing, and using ICT-based instructional materials;
- To ensure access to the latest developments in ICT and to support research and development;
- To undertake a curriculum improvement programme focused on the integration of technology;
- To promote the use of appropriate and innovative technologies in education and training.

For the population of almost 80 million, the targets to reach by 2009 are:

- Seventy-five per cent of the public secondary schools and 50 per cent of the elementary schools will have a computer lab equipped with basic multimedia equipment;
- All public science-oriented secondary schools will be connected to the Internet;
- All public schools will have an electronic library system;
- Seventy-five per cent of the public school teachers will have been trained in basic computer skills and in the use of the Internet and computer-aided instruction (CAI);
- All public schools will be provided with appropriate educational technology equipment packages.

Current level of ICT access and use

According to Internet World Stats, the number of Internet users in the Philippines is around two million people (1.1 per cent of its population). Further, a Department of Science and Technology (DOST) survey showed that among the 16 regions in the country, access to information technology at the secondary school level varies from a low of 34 per cent to a high of 98 per cent. Metro Manila, as the centre of commerce and industry in the country, has the greatest access to computers, while the Visayas and Mindanao have the least. More specifically, the International Telecommunication Union (ITU) reported that, in 2000 to 2001, only about 17 per cent of 7,509 secondary schools were equipped with PCs, and about 1.16 per cent of this group had access to the Internet.

Furthermore, the 1996 General Appropriations Act (GAA) laid the groundwork for procurement of hardware and software, teacher training and courseware development. For fiscal year 2002 alone, PHP 155,000 (US$ 2,800) was allocated to cover the following: 87.5 per cent for the provision of computers (Windows-based with provisions for networking) and printers; 1.7 per cent for the procurement of courseware and 10.8 per cent for staff development. Six hundred and sixty-six public secondary schools and more than 7,000 secondary school teachers and principals have benefited from this project. An additional 258 schools across the country are expected to benefit as well.

The use of ICT in education varies from school to school. A recent report shows that:

- In the majority of private elementary schools, familiarisation with the computer starts in grade 2, while in the public elementary schools, where the technology may be available, introduction to basic computer operations starts in grade 4 as an area of study in Home Economics and Livelihood Education (HELE).
- At high school, computer applications for further skills enhancement are introduced as an area of study in Technology and Home Economics (THE). This includes word processing, spreadsheet, database management, creating PowerPoint presentations and using the Internet. In some private schools, the study of computers extends to more complex operations such as programming and website development. The complexity of skills development depends on the availability of ICT resources in schools.
- Computers are used mainly in THE for formal study of the technology, with relatively limited application to other learning areas. The integration of technology across the curriculum has been constrained by the lack of ICT resources.
- In non-formal education, there is very limited use of information technology because out-of-school youth and adults participating in non-formal education programmes generally do not have access to computers.

Knowledge of gender issues in ICTs is hampered by the lack of reliable statistics. Few studies have kept gender statistics on users of public access facilities. However, in virtually all that have, the number of women users is much smaller than that of men. A survey on the use of ICTs by women’s organisations in selected countries of Asia and the Pacific, including the Philippines, indicated that women and men have not benefited equally. Women in particular have to contend with ideological, systemic and institutional barriers to accessing ICTs.
Highlights of the survey findings include the following:

- Women’s groups that have been able to tap into the potential of ICTs have experienced benefits and increased opportunities to conduct research and gain access to news and information, improve organisational and personal knowledge skills, monitor and participate in global women’s initiatives, disseminate information and publicise materials, lobby development causes at local and regional levels, exchange information and experience, coordinate activities both in country and abroad, contribute to civil society and local communities, identify new contacts and development partners and apply for donor funding and other forms of technical support;

- The dominant use of ICTs is for e-mail, which is primarily used for administrative purposes and correspondence with donors and regional and international partners. The Internet, on the other hand, was found to be useful for networking, information access and advocacy.

**Major initiatives**

Major initiatives of ICT use in education include the following:

- The “DepEd Modernization Programme”, which began in 1996, involves the introduction and use of modern technology to improve teaching and learning, educational management and support operations in the educational system.

- The **Act of 1998** (R.A. 8525) was passed to generate private sector participation in the upgrading and modernisation of public schools, especially those in underserved provinces. The project has four components: curriculum improvement, teacher training, courseware development and procurement of hardware and software. Recipient schools were selected based on the criteria adopted under the Computerisation Program. In all, 110 public high schools received computers in 1996 under the DOST Engineering Science Education Project (ESEP) and an additional 68 public high schools were recipients under the DOST Computer Literacy Program. DOST continues to allocate some PHP 20,000,000 to 30,000,000 (US$ 400,000 to 600,000) annually to support computer acquisition in schools. In 2002 and 2003, 125 public high schools were to be provided with 10 to 15 computers along with the corresponding teacher training programmes (see Appendix).

- The **Science Education Institute (SEI) initiatives** include the provision of Mobile IT Classrooms (MITCs), ICT Mediated Science & Technology Learning Programs, Mini Computer Laboratories, and development of Computer-based Teaching (CBT) modules. The MITC is a classroom housed in an air-conditioned bus, which is custom made to accommodate 32 students and a teacher. It is equipped with 17 laptop computers, two multimedia projectors, a television set, two VHS players, a public address system, two power surge protectors, a vacuum cleaner and two fire extinguishers. The ICT Mediated S&T Learning Program is for a selected number of elementary and secondary schools which are provided with one to three computers, one printer and one microscope that can be linked to the computer. These facilities are intended for teaching purposes and for limited hands-on activities for students. The Mini Computer Laboratory, installed in selected public schools, consists of four or five computers, a printer and software for Science and Mathematics. The mini-laboratory is used for demonstration and teaching, but may also be used by students for research-related activities. Some 164 schools were expected to benefit from the programme in 2002. Finally, the CBT modules are CD-ROMs, developed by SEI, to facilitate teaching and learning in General Science, Biology, Chemistry, Physics and Mathematics I-IV at the secondary level. The modules have been distributed to 110 S&T-oriented high schools, 1,145 recipients of the computer literacy programme of DepEd, 122 school recipients of the PCs for Public High Schools Project and 100 other school recipients in the different regions of the country.

- The **Bridgeit Programme**, locally called “text2teach,” is part of the global Bridgeit Programme, which delivers digital learning materials to schools using mobile technology. Each school is equipped with a satellite dish, 29-inch television set with rack, a 40-gigabyte digital video server/recorder to record and store video clips and two to three mobile phones. The Philippines is the only Asian country in the Bridgeit Programme which enables grade 5 and 6 students from selected public and private schools to view educational science videos downloaded with the help of mobile phones and satellite communication systems right into their classrooms. It is expected that more than 13,000 pupils will experience this teaching approach.

Other initiatives undertaken by the Department of Education (as parts of the Adopt-A-School Act) at the elementary level include the following:

- **Development of multimedia packages with ABS-CBN Foundation Inc**: To date 56 videotapes profiling outstanding instructional practices in
English, Science and Mathematics have been produced.

- **Computer Education for Elementary Schools (CEDES):** A computer education curriculum for grades 1 to 6 that has been developed and piloted in 10 divisions. A training programme in basic computer education supplemented the project for 24 teachers from six regions in August 2000.

- **TV-Assisted Instruction Project:** Launched by the Department and the ABS-CBN Foundation in 1994, this project aimed to introduce innovative technological approaches to upgrade instruction using tele-lessons. The 30-minute television shows such as Sineskuela, Hiraya Manawari, Bayani, Math-Tinik and Epol/Apple were aired from Monday to Friday.

- **Eskuela ng Bayan Project:** Proposes to standardise basic education by providing public elementary schools access to educational materials in English, Filipino, Mathematics and Science. It also provides access to the Internet and makes available information on non-formal education through an educational cable channel. The project includes a website for potential and currently participating schools which is also accessible to students and out-of-school groups. The website has teaching aids for teachers to use in enrichment programmes, e-mail services, chats and links to other sites for online education.

- **In collaboration with University of the Philippines National Institute for Science and Mathematics Education (UP-NISMED):** A project to integrate ICT in the 2002 Basic Education Curriculum (BEC). A framework for ICT integration in Science and Mathematics for K to grade 10 was developed. Similar frameworks for other learning areas are now being developed.

- **Information Technology Centers:** These centres of excellence in information technology, crossing traditional boundaries, were established in order to focus on the needs of a greater number of learners. There will be three IT Centers: two elementary and one secondary, in each of the 15 regions. Each will be provided with a laboratory equipped with computers, printers, peripherals, a multimedia projector, an air-conditioning unit and software programmes. Teacher training will also be a component. For the first year of operation, operating funds are provided by the Department, and the Local Government Unit (LGU) will supply funds for the maintenance and continuous operation of the facilities.

At the secondary level these initiatives have taken place:

- **DepEd Computerization Program (DECS):** In 1999 and 2000 undertook to provide networking among schools, access to the Internet and capability for electronic instruction. Three hundred and twenty-five public secondary schools have benefited from the programme.

- **Project LINK:** Scheduled to be operational in 2003. It has two components: technology access and development and teacher training. The former involves upgrading computer facilities to ensure connectivity that will provide access to the information highway. The latter involves the teachers of recipient schools, who will receive instruction on the use of the Internet for research and distance learning.

- **Continuing Studies Via Television (CONSTEL):** The first educational TV programme in the country to make use of the latest broadcast satellite technology combined with well-researched and carefully produced tele-lessons. The project aims to train elementary and secondary school teachers to become more competent in teaching English, Science and Mathematics. The project is being implemented in co-ordination with UP-ISMED and NBN. Telecourses in English and Science have already been developed.

- **Sci-DaMath Competition:** An annual Sci-DaMath competition which is a collaborative endeavour in sustaining the Science and Mathematics education through drama activities, which intend to increase the awareness of the learner and the public in Science and Mathematics.

- **e-MAGE 2000 (Math Games for Excellence):** A collaborative intervention with the private sector to enhance the teaching skills of math trainers through the use of information technology. Teacher training on using indigenous games in instruction and teacher-made computer-aided instructional materials in Mathematics were to be developed.

- **PCs for Public Schools Project (PCPS):** funded through a grant of PHP 600,000 (US$ 12 million) from the Government of Japan, secured largely through the initiative of the Department of Trade and Industry. The grant has benefited 996 public secondary schools across the country through the provision of 20 desktop computers, two printers, one fax/data/voice external modem with cable, one software package and teacher training to each of recipient-schools.
In the non-formal education sector, a network of 25 community-based radio stations has been set up under the Tambuli (horn) project. It was set up in 1993 as part of Aklan College’s agricultural extension work, and was designed to promote community radio. To become part of the Tambuli Aklan network, a radio station needs to use a community participatory model of operation, which has to be managed by a community media council (CMC) that ensures local participation through representation from a variety of sectors of the local community to which it is broadcasting. The media council includes representatives from the local church, government, market vendors, police, health authorities, taxi drivers, farmers, senior citizens, rural women, youth and business. One example of a member radio station is DYMT-FM, which broadcasts from the premises of the Aklan State College of Agriculture (ASCA).

Examples of training

Starting in 2000, the Philippine Department of Education has given preference in hiring teacher-applicants who were computer literate. In most teacher training institutions, computer education is now a required course. For those who are already employed as teachers, inservice is provided in several ways:

- Intensive training on electronics and assembly of computers for THE teachers of 110 S&T-oriented high schools and other special science high schools is offered. The objective of this training is to ensure that teachers in schools with special S&T programmes have the appropriate technology skills. The Science Education Institute (SEI) allows recipient schools to keep the computers assembled by their teachers after the completion of their training.

- Training using computers in classroom management and instruction started in 1997 as a component of the Department’s computerisation programme. It has reached about 7,500 teachers of English, Science, Mathematics and THE (including those in elementary schools) and 691 school administrators.

- The PCs for Public High Schools Project is aiming to train 20,000 teachers over a period of two years under the Intel Teach to the Future Training Program. The training was initially for 1,000 teachers of the recipient schools. Each one of these 1,000 teachers is expected to train 20 additional teachers to reach the goal of 20,000 teachers trained by the end of the project.

- Training is provided by SEI of DOST on robotics and the use of advanced ICT facilities in Physics. The Physics teachers of the Philippine Science High School acted as trainers for Physics teachers of other public science high schools being supervised by the DepEd. Robotics facilities were given to the participating schools in the programme.

- Training programmes have been developed on the use of graphic calculators for Mathematics and Calculus for Science and Mathematics teachers in public schools. The Mathematics Association of Teacher Education Institutions (MATHTED) was tapped to handle the teacher training programme participated in by Mathematics teachers from 110 S&T-oriented high schools and other public science high schools.

- Distance training through CONSTEL is available for teachers who are unable to partake in face-to-face training in English and Science. The project has three components: development of instructional materials for teachers; production and distribution; and teacher training. The materials that have been produced and distributed to more than 2,000 schools nationwide include videotapes for English and Science teaching. Fifty-eight teachers of English and 91 teachers of Physics have been trained in the use of the materials. Videotapes in Mathematics will be produced and distributed by the Foundation for Upgrading the Standard of Education (FUSE).

- Training and capacity-building of women’s non-governmental organisations (NGOs) and grassroots groups on various ICT skills is available. Some examples are the Women’s Electronic Networking Training (WENT) series by AWORC and Wired Fridays, a grassroots women’s training project on ICTs by Isis International-Manila.

Constraints on the use of ICT

Even though the Philippine government has initiated several programmes and projects for the use of ICT in education, real implementation in day-to-day learning is still limited. Teachers’ fear of technology still hinders the optimal use of ICT-related skills in their teaching activities. Other constraints include the traditional mindset of the school principals, inadequacy of ICT facilities, the lack of adequate maintenance of the available/existing ICT resources, dependence for financial investment on the central government and dependence on ICT service providers for software/courseware.

Despite various training programmes having been provided to teachers, there is still a need to embark on a comprehensive and sustained inservice training for teachers. Likewise, a systematic development programme for education managers needs also to be implemented to change the mindset of principals so they appreciate the value of ICT in education.
Although almost all initiatives involve some allowance for procuring ICT hardware and software, equipping schools with ICT facilities is still a problem. Therefore, given the budgetary constraints, the participation of other stakeholders like local government units, parent-teacher-community associations (PTCAs), NGOs, and the private sector needs to be encouraged to provide the education technology packages. Considering the lack of technical staff for maintaining computers and computer networks, as well as providing user support for Internet-related activities, lease arrangements rather than procurement should be explored as an alternative.

Another constraint that has had a significant impact on the use of ICT in classrooms is the availability of courseware. Applications and courseware currently available are predominantly productivity tools provided by ICT service providers. Schools, therefore, are limited to teaching the tools rather than using the tools to teach and learn. Without a variety of subject-specific applications, the curricular usefulness of the technology will not be fully realised. It is therefore necessary to develop a system to produce ICT-based education, including the development of ICT-based materials in teacher training.

Analysis

Data and information available show that the Philippines have eagerly embraced ICT in education. With facilitation by the Department of Education, and collaboration with the private sector, several initiatives have successfully equipped a number of schools with ICT facilities. Nevertheless, the initiatives have not insured that teachers fully use the facilities for teaching purposes.

A survey of 4,310 secondary schools (both public and private), conducted by DOST, showed that 84.1 per cent of the computers in schools are being used for instruction while only 38.9 per cent have telephones. Among schools that have telephone lines, the majority (81.1 per cent) do not have an Internet connection.

The Survey of Information and Communication Technology Utilization in Philippine Public Schools, conducted by the Foundation for Information Technology Education and Development (FIT-ED) in the latter part of 2001, revealed that student-computer and teacher-computer ratios are still considered poor and need to be improved. Furthermore, it was revealed that institutionalisation of technology integration in the curriculum has not been realised. One hundred recipient-schools under the 1996 DECS Computerization Program were included in the study.

In summary, it is fair to state that the use of ICT in teaching practice in Philippine schools is still not widely implemented because of uneven access to ICT facilities and the Internet, poor ratios of students to computers and teachers to computers, and the low levels of technology integration in the school curriculum.

NOTES

5 See note 3 above.
8 See note 3 above.
11 See note 3 above.
### APPENDIX

#### The Adopt-a-School Partners

<table>
<thead>
<tr>
<th>Company/Organisation/ Institution</th>
<th>Recipient school</th>
<th>Name of project</th>
<th>Support/Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS-CBN Foundation, Inc.</td>
<td>Multimedia Project</td>
<td>56 educational videotapes comprising Hiraya Manawari, Bayani, Apol Epol, Math Tinik and other ABS-CBN produced shows for viewing by public school children</td>
<td></td>
</tr>
<tr>
<td>Aboitiz Foundation</td>
<td>17 schools in Cebu</td>
<td>Aboitiz Adopt-A-School Project</td>
<td>20 computers and printers for teacher and student use</td>
</tr>
<tr>
<td>Ayala Foundation Inc.</td>
<td>CENTEX Mla. and CENTEX Batangas</td>
<td>Center of Excellence (CENTEX)</td>
<td>Funds for the establishment of a computer laboratory, with 11 PCs and 2 printers for each school; access to the Internet for high schools</td>
</tr>
<tr>
<td>AMA Foundation</td>
<td>100 schools under the PCPS project</td>
<td>Computer training programmes</td>
<td>Series of computer training programmes for teachers</td>
</tr>
<tr>
<td>A. Andes (author and publisher)</td>
<td>80 public high schools</td>
<td>Book Donation Project</td>
<td>Computer application books</td>
</tr>
<tr>
<td>Books for the Barrios Foundation</td>
<td>36 public elementary schools</td>
<td>Model of Excellence Project</td>
<td>Computer hardware</td>
</tr>
<tr>
<td>Citibank</td>
<td>Mandaluyong High School</td>
<td>Computer donation</td>
<td>21 computers</td>
</tr>
<tr>
<td>Coca-Cola Export Foundation Corp.</td>
<td>15 high schools in Metro Manila and the Visayas</td>
<td>Ed. Venture Project</td>
<td>Internet connectivity for schools; teacher training in the use of the Internet; telecollaboration among schools</td>
</tr>
<tr>
<td>Intel Phils.</td>
<td>755 high schools (1st batch) 500 high schools (2nd batch)</td>
<td>Intel Teach to the Future Training Program</td>
<td>Funding support for the conduct and monitoring of the school-based training for high school teachers</td>
</tr>
<tr>
<td>Japanese government</td>
<td>1,000 public high schools</td>
<td>PCs for Public High Schools Project</td>
<td>Curriculum development; procurement of hardware; training of teachers; courseware development</td>
</tr>
<tr>
<td>Makati Business Club</td>
<td>100 high schools</td>
<td>Connect ed. ph</td>
<td>Computer laboratories; software; training; Internet connections</td>
</tr>
<tr>
<td>Metrobank Foundation</td>
<td>6 special science elementary schools 16 RSHS</td>
<td>Computer donations; lab equipment donation</td>
<td>60 computers (486 model) Around 2.5M-worth of lab equipment and PCs</td>
</tr>
<tr>
<td>Philips Electronics and Lighting Co.</td>
<td>Manila Science High School P. Burgos Elementary School</td>
<td>Philips Educational Room (PER) Project</td>
<td>10 PERs, each PER serving as a one-stop electronic Library for learning and data gathering</td>
</tr>
<tr>
<td>STI</td>
<td>4,500 public high school teachers</td>
<td>Teacher training programme</td>
<td>Hands-on training in basic information technology</td>
</tr>
</tbody>
</table>
National policies, strategies and programmes

Introduction

Entering the 21st century meant different things to different countries. To the Republic of Korea, it meant a paradigm shift from an information-based society to a knowledge-based society. The new paradigm requires changes in the social and economic environment, in social and cultural behaviour and in human resources. The knowledge-based society needs workers who are efficient and
effective using information and communication technology (ICT) and education; therefore, should be adapted to the needs of the society.

**Policy Goals and Action Plans**

The goal adapting education to the knowledge-based society is when to educate competent people who are knowledge providers, problem-solvers, good communicators and self-disciplined lifelong learners. To foster such competent people, the Ministry of Education and Human Resources Development (MOE & HRD) announced the Comprehensive Plan for Developing ICT use in Education. The plan was to be carried out in two stages: the first from 1995 - 2000 and the second from 2001 - 2005. The second stage education reform includes standardising ICT skills and revising curricula, maintaining financial subsidies, narrowing digitally divided nations and people, monitoring progress and usage and operating e-governance in education.

**Current Implementation Status**

The second stage of the plan targets four major groups: elementary and secondary education, research institutions and universities, lifelong education and educational administration.

- ICT use in elementary and secondary education involves revamping curricula - developing and disseminating educational content, developing ICT utilisation skills of teachers and creating infrastructure conducive to ICT.

- The promotion of ICT use in universities includes constructing ICT infrastructure, promoting ICT use in science and research, using ICT in the teaching-learning process, digitising the library collections and promoting ICT use in academic administration. There are four cyber campus consortiums and 17 cyber universities. Among the cyber campus consortiums, Korea Cyber University (KCU) consortium (www.con.kcu.or.kr) and Seoul Digital University consortium (www.sdu.ac.kr) have the largest member universities, the former with 38 and the latter with 42.

- There have been a variety of services in lifelong education: a comprehensive lifelong education information system, a lifelong learning network, a guidance counselling network, a comprehensive information system of national human resources development, a comprehensive credit bank information system, a lifelong contents development and the cyber-learning systems of broadcast and correspondence high schools.

- In the area of the educational administration, adapting to the knowledge-based society has two goals: one is to develop the National Education Information System (NEIS – see www.keris.or.kr), and the other is to improve the efficiency of education administration through computerisation in the MOE & HRD. NEIS is an electronic system that connects all educational administration services of schools, other educational institutions and offices through the Internet. It is designed to improve the quality of education by reducing the workload of teachers, allowing students and parents access to student information, and to increase the productivity of educational administrative institutions by sharing information. NEIS started its services in March 2003, and it is currently used by 96.9 per cent of schools. The MOE and HRD is computerising educational administration within the ministry to improve its efficiency using an electronic document processing system.

**Budget and Sources of Funding**

The MOE and HRD secured KRW 158 billion (about US$ 130 million) for the use of ICT in education in 2002, KRW 139 billion (US$ 115 million) for 2003 and KRW 100 billion (US$ 85 million) for 2004 respectively. The funds are strictly public schools and national colleges and universities excluding private schools and universities. The MOE and HRD amended the enforcement rules to subsidise local education in 2001 and secured a budget of KRW 300 billion (US$ 250 million) in 2002. Private sectors have also participated in sharing costs by donating PCs and providing free training.

**Gaps, Limitations and Needs**

There are several gaps, limitations and needs in the system. First, there is not enough software available to meet the demands of the hardware in use at schools. It also has been difficult to develop and utilise educational information and materials due to the lack of standardisation. Several issues - copyright, privacy and negative use of Internet - remain unresolved. As well, the digital divide is a problem between the haves and the have-nots.

**Current level of ICT access and use**

**Summary of Technologies Being Used**

The major technologies being used in schools are radio, television, computer and the Internet. The two representative organizations are the Educational Broadcasting System (EBS) (www.ebs.co.kr) and KERIS (www.keris.or.kr).

EBS provides educational programmes for early childhood education, pre-school education, primary/secondary education, teacher training and lifelong education through five channels: one FM radio channel, VHF and UHF
television channels, and two cable and satellite television channels (Plus 1 and Plus 2). Each channel airs programmes for the specific target groups with focused content. VHF television airs the lifelong educational programmes, and the Plus 1 satellite channel airs curriculum instructional programmes for high school students. Plus 2 broadcasts curriculum instructional programmes for primary and secondary school students, for vocational education and for foreign languages. FM radio specialises in cultural, educational information and foreign-language learning programmes.

EBS also produces vocational education programmes in conjunction with the Korea Research Institute for Vocational Education and Training (KRIVET – www.krivet.re.kr). Vocational programmes are supported by MOE and HRD and by the Ministry of Labor. EBS also airs the Korea National Open University (KNOU – www.know.ac.kr) programmes as well as Air and Correspondence High School programmes. They have also begun a service in Internet job broadcasting, and provide the audio-on-demand (AOD) and the video-on-demand (VOD) services of all the aired programmes except copyrighted foreign-made motion pictures. EBS is internationally recognised for its documentary programmes. Fifty-five per cent of the televised programmes of EBS are for lifelong education and 45 per cent are for curriculum instruction; 88 per cent of the FM programmes are for lifelong education and 12 per cent are for curriculum instruction (see Appendix 1).

KERIS, which was established in April 1999 as a government-funded institution under the educational research information law, is the leading educational and research organisation in Korea. KERIS provides service via the educational network (EDUNET – www.edunet.net), operating Research Information Service System (RISS – www.riss4u.net). KERIS has been at the forefront of enhancing the quality of national education and has made significant contributions.

Digital Divide Issues

To narrow the gaps between the haves and the have-nots, MOE & HRD established a plan for promoting ICT use and distributing PCs to children from low-income families in April 2001. Half a million children were selected and given the opportunity to take lessons on computer use and to practice online communication. Among those who have taken the courses, 50,000 students will receive free PCs and money for communication fees for five years. Despite this programme, however, a recent survey showed that the Internet users of low-income families has dropped from 38.7 per cent in 2001 to 22.9 per cent in 2002.

Due to budget allocations, there also exists a gap between various cities and provinces in the use and promotion of ICT, and there is a need to clarify the responsibilities between the national and local governments in order to narrow this information gap. Article 8 of the Framework Act on Information Promotion describes the responsibilities of different levels of government.

Another gap is between males and females. The KERIS study on elementary and secondary school students shows that male pupils use computers longer and are more familiar with them than their female counterparts. The research concluded that the gap in exposure and familiarity to computer is related to parents’ attitudes towards computer usage. More female respondents said that their parents give priority to boys in the family when it comes to using computers.

Nature and Role of Partnerships

Partnerships for ICT use in education exist in a variety of forms in several government agencies, government-funded organisations and the private sector. The central government ministries, such as MOE and HRD, the Ministry of Labor, the Ministry of Information and Communication, the Ministry of Commerce and the Ministry of Industry and Energy develop and disseminate ICTs, digital content and training and education for educators, students and citizens. Local government agencies co-operate with private sector organisations in establishing computer labs and offering training sessions. Several government-funded and non-profit organisations are also actively involved in ICT use in education (see Appendix 2).

Major initiatives

The government, private sector, research organisations, schools and universities are all co-operating to fulfill the nation’s ultimate goal of constructing a knowledge-based society. The government has enacted and implemented the Comprehensive Plan, enforced necessary regulations, acts and laws, and restructured the research and academic organisations adding new functions for ICT dissemination (see Appendix 3).

Upon the completion of the first stage of the Comprehensive Plan for Developing ICT Use in Education (1995 - 2000), Republic of Korea was evaluated as having the best educational infrastructure in the world. Certainly, the advanced ICTs, the full coverage of high-speed communication networks in the nation and the best ICT industries laid a solid foundation for making ICT use feasible in education.

During the first stage of the Comprehensive Plan, the focus was on computer literacy for educators, students, workers and citizens. Education for ICT literacy has been undertaken to provide equal access to information and to reduce the information gap within the public education. The government has required mandatory ICT education for elementary school students from grades 1 to 6. For secondary school students, ICT education is an elective, but in 1999, an ICT skills recognition system was implemented, requiring all high
school graduates to take either ICT courses or an ICT skills test. In addition, in every subject more than 10 per cent of classroom activities are supposed to make use of ICTs.

In the second stage the focus shifted from literacy to utilisation, not as a special subject or a technical education, but as something to be integrated with all subjects. Therefore, teaching-learning process plans for ICT use are now constructed and implemented in the teacher training programmes. The Seventh School Curriculum emphasises ICT utilisation and the integration of ICT knowledge and skills into the curriculum.

The most noticeable aspect of ICT education in the Republic of Korea is the definition of the target learner, which has not been limited to educators, students or government workers, but instead includes individuals regardless of age, income, social status, education or gender. Universities, several government-funded organisations and industries offer the necessary training for ICT users for free or with minimum tuition fees. During this second stage, to diagnose the progress of ICT use in education, the government, in co-operation with research institutions, is developing the standardised educational indicators of ICT use in education that, up to the present time, have been used for elementary, secondary and higher education. Indicators for special education and for lifelong and vocational education are underway and will be completed by 2003 and 2004 respectively. In addition, ICT Skills Standards for Teachers (ISST) and its curriculum were developed during 2002 and 2003.

It was recognised that to use ICT effectively, the proper environment is needed, including the necessary computer hardware, basic peripherals and software. The government has funded these needs for universities, research organisations and elementary and secondary schools, and the Classroom Advancement Plan (1997-1999) standardised the provision per class as one PC, television, beam projector and printer.

During the implementation of the plan, several needs were identified: training, good quality educational content and utilisation plans. This led to the revised Classroom Advancement Plan being enacted at the end of 1999. It reduced the PC distribution, but enhanced the utilisation rate. It also focused on building school intranets. In 2002, the Comprehensive e-Learning Plan announced that connectivity would be provided to all schools.

Educators, organisations and private vendors are helping to develop the necessary software, books and training materials, and these are evaluated and certified by KERIS. As well, organisations such as the Education Software Promotion Association, the Korea IT Industry Promotion Agency and the Korea Software Industry Association are actively involved in developing and promoting good quality software. Each year, there are several educational software contests for different levels of participants. Since 1998, educational exhibitions have been held to show new software to educators and to provide opportunities to software developers to advertise their products. The Sixth Education Information Expo (EDUEXPO) in 2003 toured four major cities and drew about half a million people.

It was also determined that for easy and quick access to a wide variety of educational content, a collective database was needed. To meet the need, EDUNET (www.edunet.net), operated by KERIS, was launched in 1996. As of June 2003, EDUNET had 5.3 million subscribers and 3.8 million monthly users. Fifty-four per cent of the subscribers are elementary and secondary school students and six per cent are teachers. (Eighty per cent of all teachers in the nation are subscribers.)

To meet the needs of higher educational institutions and research organisations that require fast and accurate sharing of information and research results, KERIS operates Research Information Service System (RISS), a portal site. It is connected to all the university libraries in the nation as well as to major international databases such as OCLC in the United States, the British Library in the United Kingdom, KINETCA in Australia and NII in Japan. It is also connected to the National Library of Korea (www.nl.go.kr), the Korean Social Science Data Center (KSD C – www.ksdcc.re.kr), the Korea Social Science Library (KSSL – www.kssl.or.kr) and LG Sangnam Library (www.lg.or.kr). The most widely used comprehensive databases are Nationwide Resource Sharing of RISS and the National Assembly Library (www.nanet.go.kr).

KERIS also operates the APEC Youth Internet Volunteer (AYIV) programme and the APEC Cyber Education Network (ACEN – www.acen.or.kr) project. These two projects were launched in 2001 as a result of the APEC Forum in Seoul in March 2000 and the suggestion at the Seventh Meeting of APEC in Auckland, New Zealand, by President Kim Dae-Jung, Republic of Korea, for an “e-education project.” The purpose is to alleviate social and economic disparities by developing human resources among member economies through educational co-operation.

In 2002 the Digital Data Support Center was installed in a selected Office of Education. KERIS has implemented a metadata system and is preparing to implement e-learning contents standardisation. The Korea Association of Cyber Education (KAOCE – www.kaoce.org) is actively involved in promoting e-learning and building a cyber education community. KAOCE, one of the leading e-learning research and development organisations, also conducts seminars and workshops and is pursuing e-learning contents standardisation.

Examples of training

Effective ICT utilisation depends heavily on the abilities of the teachers. Various pre-service and in service teacher training...
programmes are offered. In the pre-service training, students are required to take from six to 20 credits of ICT courses.\textsuperscript{16} Teacher colleges and colleges of education are offering new courses on information and ICT use, updating teaching learning methods and integrating ICT use in all classes. A significant amount of funding has been allocated to teachers’ colleges to install the necessary hardware and software and to provide a proper learning environment.

At the inservice training level, one-third of the teachers have received training every year since 2002.\textsuperscript{17} The training is divided into five target groups: inservice teachers, principals or vice-principals, professional instructors, ICT specialists and excellent teachers. The content of the training includes information literacy, multimedia courseware development and use of ICT in the teaching-learning process.

As teachers have shown more interest in learning how to integrate ICT in their classroom teaching than in learning how to develop courseware, a Plan for ICT Use: Training Program Development by Subjects was undertaken in 2002 as a two-year project. The plan seeks to document the teaching-learning goals of the 10 basic subjects from the Seventh School Curriculum. Under the plan a teaching-learning model is to be developed for ICT use in each subject and implemented in the classroom teaching. The process of implementation is meant to be documented and then adapted to the teacher training programmes. A total of 11 subject training programmes were developed and 20 teaching-learning models in five subjects for ICT use were completed.\textsuperscript{18}

KERIS has been the main organisation for providing teacher training; however, 46 institutions are now certified as distance education institutions for teacher training. They include teacher colleges, colleges of education, private sector organisations and city and province training institutions. As well, on their own teachers have shown the initiative to learn more about ICT use in education. Many have organised study groups on each subject by city or by province and have met for lectures, seminars, workshops, symposiums and to develop educational materials.

**Constraints on the use of ICT**

In an effort to address the constraints on the use of ICT, in January 2001 the government enacted the Act on Solutions for the Digital Divide.\textsuperscript{19} This act seeks to promote a higher quality of life and the balanced development of the economy by guaranteeing free access and free use of information networks to people who have difficulties with access due to economic, regional, physical or social barriers, such as people with low incomes, residents of farms or fishing villages, people with handicaps, the elderly and women. According to a survey conducted by the Korea Institute of Special Education (www.kise.go.kr), income level and residential region are important factors in predicting ICT use. The government should be more active in reducing the digital divide and developing substantial long-term support for these students.

Students in special education also need support. Special education is categorised into two major fields: students with disabilities and gifted students. Several organisations support and provide training for ICT use in special education. For example, the Korea Institute for Special Education has installed eight distance special education broadcasting systems and is conducting distance special education training and counselling for teachers and parents. KERIS is also active in this area, as are some private industries with the support of the Ministry of Health and Welfare, the Ministry of Labor and the Offices of Education in the cities and provinces.

**Analysis**

Just as students cannot learn from a pencil, they cannot learn from ICT. A good quality pencil cannot improve a student’s learning, but it can, however, help that student write easily and comfortably. Similarly, ICT does not guarantee that a student will learn, but it can help a student find information quickly and easily.

Educators should think carefully about what effectiveness of ICT use in education really means. Further, they should think how students’ learning should be evaluated. Students learn from thinking, and thinking mediates learning. Thinking is engaged by activities. Simply using ICT in the teaching-learning process does not improve students’ thinking, unless the ICT is used in a way to improve thinking. Training programmes for educators and students are focused on computer literacy and ICT utilisation, but none of them cover critical thinking, problem-solving, communication, interpersonal skills or how to further construct one’s knowledge based on the collected information via ICT.

New approaches and methods should be designed to teach these basic skills. ICT should be used to create different activities that engage different kinds of thinking. The important factor is that the role of teachers and the contributions of technologies in learning are indirect. They can stimulate and support activities that engage learners in thinking, which may result in learning. In the future, policies and action plans should be designed to promote thinking skills, and ICT should be used as the useful and convenient tool for helping students to think.

Clearly, the Republic of Korea has developed the best educational infrastructure in the world. The current problems, however, are determining how to maintain that infrastructure, how the infrastructure should best be used and what should be transmitted on the information superhighway. Recent surveys gave grim reports of the negative use of ICT by elementary and secondary students. Students are consuming...
too much time chatting and playing games, and in accessing pornographic sites. Recently the information and communication ethics education has been started by the educational offices in cities and provinces. In order to be effective, ethics training programmes for teachers and parents should also be provided. Moreover, parents’ abilities to use ICT is critical to oversee their children’s computer use and Internet access.

As a result of the research that KERIS has done on SCORM (Sharable Content Object Reference Model), a methodology for developing educational contents works has been developed. When the methodology is applied to all subject matters, adaptive learning, which makes it possible to tailor instruction to individual needs, will be exercised. More research should be conducted and effort placed on developing better quality educational programmes, applying e-learning contents standardization, studying new ways of using ICT and integrating ICT in daily learning activities. In the 21st century, teachers should also recognise their new roles as facilitators, coaches, advisors and guides who can diagnose students’ needs and meet those needs at the right time with the right amount of assistance.

APPENDIX 1

Ratio of educational programmes of the Educational Broadcasting System (EBS)

<table>
<thead>
<tr>
<th>Medium</th>
<th>Total broadcasting (hours)</th>
<th>Curriculum instruction (hours/%)</th>
<th>Lifelong education (hours/%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terrestrial TV</td>
<td>6,980</td>
<td>770</td>
<td>11.1%</td>
</tr>
<tr>
<td>VHF/UHF</td>
<td></td>
<td></td>
<td>6,210 88.9%</td>
</tr>
<tr>
<td>Satellite TV (Plus 1)</td>
<td>7,750</td>
<td>7,748</td>
<td>96.15% 3.95%</td>
</tr>
<tr>
<td>Satellite TV (Plus 2)</td>
<td>8,330</td>
<td>2,291</td>
<td>27.5% 72.5%</td>
</tr>
<tr>
<td>Sum</td>
<td>23,060</td>
<td>11,509</td>
<td>44.9% 55.1%</td>
</tr>
<tr>
<td>Radio FM</td>
<td>8,400</td>
<td>1,020</td>
<td>12.1% 87.9%</td>
</tr>
<tr>
<td>Total</td>
<td>31,460</td>
<td>12,529</td>
<td>39.8% 63.3%</td>
</tr>
</tbody>
</table>

APPENDIX 2

Government Agencies and Non-profit Organizations in ICT

<table>
<thead>
<tr>
<th>Organization</th>
<th>Website</th>
<th>Services/Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air and Correspondence High School</td>
<td>achs.kedi.re.kr</td>
<td>• 39 Air and Correspondence High Schools in the nation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provides high school education for students who missed school to attend regular high schools</td>
</tr>
<tr>
<td>Educational Broadcasting System</td>
<td><a href="http://www.ebs.co.kr">www.ebs.co.kr</a></td>
<td>• EBS is dedicated for public broadcasting and education</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Broadcasts educational programmes for all ages from kindergarten to adult</td>
</tr>
<tr>
<td>Education Software Promotion Association</td>
<td><a href="http://www.espa.or.kr">www.espa.or.kr</a></td>
<td>• Conducts R&amp;D in promoting educational S/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Develops databases for educational S/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Conducts S/W analysis and management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provides technical assistance and dissemination of new techniques</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sets up the training centers in cities and provinces</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Conducts and provides certification of computer skills</td>
</tr>
<tr>
<td>Institution</td>
<td>Website</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>--------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>The Federation of Korean Information Industries</td>
<td><a href="http://www.fkii.or.kr">www.fkii.or.kr</a></td>
<td>• Promotes information technologies in Republic of Korea as a national non-profit organisation</td>
</tr>
</tbody>
</table>
| Korea Agency for Digital Opportunity & Promotion                          | www.kado.or.kr                 | • Provides Internet access environment where needed  
• Promotes international cooperation to narrow digital gaps within nation and among nations  
• Initiates national information education for public  
• Educates for proper use of information to limit abuse                                                                         |
| Korea Association of Cyber Education                                      | www.kaoce.org                  | • Builds cyber education communities to promote and activate e-learning  
• Exports educational content and promotes knowledge industry  
• Resolves educational problems                                                                                                    |
| Korea Association of Educational Information & Broadcasting               | www.kaeb.or.kr                 | • Conducts research on educational information and broadcasting                                                                                                                                           |
| Korea Database Promotion Center                                          | www.dpc.or.kr                  | • Central organisation of databases and digital contents for 21st century  
• Builds a foundation for digital content dissemination and activation  
• Builds cooperative network and conducts research                                                                             |
| Korea Educational Development Institute                                   | www.kedi.or.kr                 | • World class national centre for education policy and research                                                                                                                                           |
| Korea Educational Development Institute                                   | www.kedi.or.kr                 | • World class national centre for education policy and research                                                                                                                                           |
| Korea Education & Research Information Service                            | www.keris.or.kr                | • Provides educational services via EDUNET  
• Promotes full utilisation of ICT in education  
• Secures and provides educational contents and core software programs  
• Offers training courses for educators and students  
• Helps schools and related government agencies with administrative digitalization  
• Provides a high-tech system for cyber and lifelong educational services  
• Sets up computerized systems at school libraries                                                                                   |
| Korea Education Frontier Association                                     | www.kefa.or.kr                 | • Develops systems for educational information  
• Establishes foundation for research  
• Enhances education, training, and public relations for ICT use in education  
• Promotes international exchange in research, development, and skills                                                                   |
| Korea Information Strategy Development Institute                          | www.kisdi.re.kr                | • Provides a new vision for building information society in 21st century  
• Strengthens position as leading research institute in mapping out strategy towards knowledge-based economy                                                                                     |
| Korea IT Industry Promotion Agency                                       | www.kipa.or.kr                 | • Promotes software exports  
• Promotes software start-ups  
• Enhances competitive edge of digital contents  
• Operates international IT support centre  
• Improves software process  
• Conducts research and analysis                                                                                                   |
| Korea National Open University                                           | www.knou.ac.kr                 | • Applies and delivers diverse learning systems and educational programmes via Internet, on-line, cable TV, EOD (Education on Demand), CD-ROM, and radio                                                                 |
| The Korea Research Institute for Vocational Education & Training          | www.krivet.re.kr               | • Conducts research on technical and vocational education  
• Supports network of stakeholders in technical and vocational education and provides training and human resources development  
• Supports government policies to develop the vocational capacity                                                                      |
| Korean Society for Educational Technology                                | www.eltkorea.com               | • Improves learning environment and resolves learning problems with educational technology  
• Services for educational and professional activities                                                                               |
| Korea Software Industry Association                                      | www.sw.or.kr                   | • Promotes domestic software industry  
• Implements technical research projects with cooperation of industries                                                                                                                          |
| National Computerization Agency                                          | www.nca.or.kr                  | • Promotes ICT for central and local government agencies  
• Supports policy development                                                                                                      |
APPENDIX 3

Acts, Regulations, and Laws to Promote ICT Use in Education

ICT Use in Education

1991: Research and Development of Information and Communication Act
1/16/2001: Act on Promotion of Information and Communications Network Utilization and Information Protection

Copyright Law

1/28/1957: Copyright Law
3/8/1991: Copyright Law (Revised) - Added Library Promotion
3/24/1994: Copyright Law (Revised) - Added Library Promotion and Reading Promotion
1/12/2001: Copyright Law (Revised) - Added Copyright Protection of Digitized Materials and Its Dissemination
4/3/2003: Copyright Law (Revised) - Added Copyright Protection under the Digital Network Environment and Use of Digitized Materials

Software Industry Promotion Law

12/1987: Software Development Promotion Act
12/6/1995: Software Development Promotion Act (Revised)
1/21/2000: Software Industry Development Act (Revised)
7/25/2003: Software Industry Development Act (Revised) - Added Dispute Mediate Committee

Lifelong Education Law

8/31/1999: Lifelong Education Law
3/13/2000: Enforcement Decree of the Lifelong Education
3/31/2000: Enforcement Rule of Lifelong Education Enforcement Act

NOTES

5 See note 1 above.
6 The Ministry of Education & HRD, Ministry of Information and Communication, and Korea Telecom (KTF) signed an agreement for free computers to low-income family children and free connection for five years, www.kt.co.kr.
8 “Research on Standardization of Students’ ICT Utilization Skills and Curriculum Development” (Ministry of Education & HRD and Korea Education & Research Information Service, 2002).
10 See note 3 above.
12 See note 3 above.
13 See note 3 above.
14 Unpublished data. (KERIS, 2003), www.keris.or.kr.
15 See Korea Research Center (KRC), www.krc.co.kr.
16 See Korean Education Network (KREN), www.kren.ne.kr.
17 “Strategies on ICT Training for Teachers” (KERIS, 2000).
18 See note 3 above.
In line with the global trend, the Government of Thailand recognizes the importance of information and communication technology (ICTs) for achieving broader social and economic objectives. To utilise the full potential of ICTs, Thailand’s National ICT Plan has set three agendas:

- To invest in an equitable information infrastructure to empower human ability and to enhance life quality;
To invest in people to build a literate populace and an adequate information technology manpower base; and

To invest for good governance.

The first item refers to investment in national information infrastructure (NII), which includes a wide range of equipment and technologies that have to be universally available at affordable costs. The second item refers to investment in ICT skills-related human resource development, and the final item refers to supporting efforts the government needs to accomplish in order to be the driving force of ICT implementation.¹

The National ICT Plan specifically states that information technology needs to be an integral tool in education and training at all levels, and must not be restricted to science and technology but must include humanities as well as the arts.² This should include initiatives to:

- Provide all teachers, college lecturers, professors, school children and college students with the opportunity to learn to use ICTs. The objective is to employ ICTs as an enabling tool to access information and gain knowledge through self-paced learning, or through interactions with teachers and fellow students.

- Link schools, colleges, universities and libraries electronically to provide students, teachers and lecturers with an enriched environment in which distant resources can be made available remotely at one’s fingertips.

- Make full use of ICT and distance education to meet the needs and aspirations of all citizens for continuing education and skills upgrading regardless of age, profession, distance or geography. Special attention must be given in particular to people with disabilities.

**Current level of ICT access and use**

Thailand is an ASEAN countries with a population of over 62 million. Statistics of communication infrastructure are quite impressive. Data show that in 2000, 76 per cent of the households in Bangkok had telephone connection, although only around 28 per cent of households in the whole of Thailand were connected.¹

The cost of the Internet in Thailand is lower than in some other ASEAN countries. For example, the cost of an Internet subscription from an ISP (Inet-Gold) ranges from 13 to 15 baht per hour (US$ 0.39 to 0.45) for “pay in advance” packages, or from 2,700 baht to over 12,000 baht (US$ 81 to 360) per month for a “multiple package.”⁶

The specific goals of ICT implementation in education are the following:⁷

- Implement a “national school-information action programme” with the target of providing all state schools with at least one PC per 80 primary school pupils and at least one PC per 40 secondary school pupils within five years; allocate an annual budget of 1,000 million baht (US$ 30,000,000) to equip state schools with up to 30,000 PCs a year, a substantial number of which will be linked into networks; and connect all universities, colleges and secondary schools to Internet.

- Establish a “national interactive multimedia institute,” which will oversee the development and dissemination of interactive multimedia technologies. An annual budget of at least 400 million baht (US$ 12,000,000) to support the development of technologies and courseware packages.

- Intensify ICT manpower production at all levels, with the target of doubling the supply of computer and telecommunication manpower in five years.

However, by the year 2000, only 22.5 per cent of secondary schools and 1.19 per cent of primary schools were connected to the Internet.⁸ Within these schools, the ratio of students to computers was about 40 secondary school students per computer and 114 primary students per computer (see Table 1).

As of 2000, Thailand’s Ministry of Education has been able to provide almost 190,000 PCs, more than 150,000 of which were used in learning/instruction processes (see Table 2).

In those schools with computers, most have been integrated into the curriculum using both PC standalones and networked units. The predominant use of computers by teachers and students is for word processing, using a spreadsheet for data analysis, using a database for organising research data, using hypermedia for publishing works on the Internet and using both the Internet and CD-ROMs for searching information.
Examples of major initiatives

Many ongoing national projects have been instrumental in providing learning resources through various types of networks. Initiatives to enhance ICT use in the education sector include the following:

- **SchoolNet** started in 1995 as a pilot project to provide Internet access to 50 schools. Presently, it connects over 5,000 schools to the Internet. The network has been designed to serve the goal of universal access for every school nationwide. More specifically, a school pays only the telephone charge at the local-call rate per connection (at US$ 0.08 per call), and no Internet access charge, regardless of where they are located. Furthermore, content creation programmes and activities have been initiated to promote the use of Internet in teaching and learning. For example, a digital library and archive have been created which contain digitised materials in various forms, have proper indexing and a search engine for ease of use. An easy-to-use tool was also developed for teachers to create their own content or teaching materials to add to the digital library. (See the website http://school.net.th for more information.) The SchoolNet Project achieved a “universal access” status in 1997 and is cited in UNDP’s Human Development Report of 2001.

- **A tele-education project** for the non-formal education sector via the ThaiCom satellite and run by the Department of Non-Formal Education is coupled with General Education’s tele-education project via Klai Kangwol School.

- **The UniNet Project**, under the Ministry of Education, connects public universities via a high-speed fibre-optic network providing teleconferencing facilities among campuses throughout the country.

- **The Information Technology Project**, under the initiatives of HRH Princess Mahachakri Sirindhorn, has been working at a grassroots level to develop lessons for the sector as a whole.

Other projects underway include a donation programme for used computers, ICTs for people with disabilities, multimedia for young hospital patients, ICT for cultural promotion and also ICT training for prison inmates.

One comprehensive effort to utilise ICT in the non-formal sector is being made by the Mirror Art Group (MAG), a non-governmental organisation (NGO) based in the northern town of Chiang Rai. MAG’s projects are focused on the hill tribes of northern Thailand (the Akha, Hmong, Karen, Lahu, Lisu and Mien). MAG’s innovative approaches for programming include helping hill tribes harness the power of modern computer communications and broadcast technologies to create an education system that eliminates traditional

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**Table 1: ICT Facilities in Schools by 2000**

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Goals</th>
<th>Status by 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio of secondary schools connected to the Internet</td>
<td>100%</td>
<td>22.50%</td>
</tr>
<tr>
<td>Ratio of primary schools connected to the Internet</td>
<td>100%</td>
<td>1.19%</td>
</tr>
<tr>
<td>Computer student ratio: Secondary school</td>
<td>40:1</td>
<td>40:1</td>
</tr>
<tr>
<td>Computer student ratio: Primary school</td>
<td>80:1</td>
<td>114:1</td>
</tr>
</tbody>
</table>

**Table 2: Number of schools, students and teachers using ICT by levels**

<table>
<thead>
<tr>
<th>Level</th>
<th>Schools</th>
<th>Students</th>
<th>Teachers</th>
<th>Use of PCs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Trained</td>
<td>For instruction</td>
<td>For office</td>
</tr>
<tr>
<td>Primary</td>
<td>30,476</td>
<td>6,633,809</td>
<td>358,781</td>
<td>71,442</td>
</tr>
<tr>
<td>Secondary</td>
<td>2,669</td>
<td>2,638,465</td>
<td>125,983</td>
<td>25,000</td>
</tr>
<tr>
<td>Vocational</td>
<td>413</td>
<td>592,857</td>
<td>19,118</td>
<td>8,542</td>
</tr>
<tr>
<td>Non-formal</td>
<td>1,007</td>
<td>991,464</td>
<td>4,041</td>
<td>3,010</td>
</tr>
<tr>
<td>Chiang Rai In.</td>
<td>61</td>
<td>93,363</td>
<td>5,734</td>
<td>3,560</td>
</tr>
<tr>
<td>Rajabut In.</td>
<td>41</td>
<td>507,342</td>
<td>8,160</td>
<td>4,405</td>
</tr>
<tr>
<td>Religion</td>
<td>405</td>
<td>67,360</td>
<td>4,388</td>
<td>415</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35,072</strong></td>
<td><strong>11,524,660</strong></td>
<td><strong>526,205</strong></td>
<td><strong>116,374</strong></td>
</tr>
</tbody>
</table>
communication barriers by establishing a connection between remote villages and the rest of the world using a satellite dish. Here are some of their other points of focus:

- The Youth Network aims to restore youth pride in tribal identity while giving them a support network and helping them adapt to adulthood in modern Thailand. The network organises a wide range of activities from Saturday computer, English and Thai lessons to large campaigns/discussions on complicated topics such as drugs, gender issues and sex education. MAG uses a website for soliciting donations of books and other resources as well as recruiting volunteer teachers. So far, MAG has attracted more than 1,500 volunteers to Chiang Rai to work on the project.

- The virtual museum of hill tribes is a development to preserve the culture of the six major tribes and to show it to younger generations and outsiders. The customs and ceremonies are presented through a website. The Internet link from the physical counterpart museum in the village will initially be done with solar power due to electricity being unavailable in the village.

- The development of ebannok, a web commerce site that is designed to sell handcrafted products made by community members of the hill tribes.

- The creation of Bannok TV (www.bannoktv.com) to help fill the need for positive media images of hill tribe people, and to provide an information forum capable of reaching the remote villages of Mae Yao. Bannok TV is supported by an extensive community video archive, which is a multimedia collection that documents traditional ceremonies, songs, customs, costumes, farming practices, weaving methods and hunting techniques. MAG uses the archive to produce educational documentaries for hill tribe people and lowland Thais. In addition to video, MAG also makes audio recordings of a vast array of hill tribe songs.

Examples of training

To promote the use of ICTs in the classroom, Thailand has allocated substantial money for various training programmes. As shown in Table 2, about 71,442 teachers and related personnel out of 358,781 at the primary levels, and 25,000 out of 125,983 at the secondary level have been trained. Around 21 per cent of the teachers have received training to date. The content of ICT training depends on the needs of each group, but Microsoft Office, Visual Basic, Power Builder, FOXPRO, MS ACCESS, SQL, HTML, CAI have been the most requested.

The training has been conducted in collaboration with Rajabhat Institutes. Currently eight of their 36 campuses nationwide are able to offer Internet training courses. These eight campuses are in different provinces and can serve as regional training centres for schools in those areas. Through the regional training centres, schools save tremendously on travel expenses.

Constraints on the use of ICT

In the process of carrying out developmental work on ICT for education, many issues and problems arise that require appropriate remedies. They fall into three groups:

Accessibility and affordability:

- Extensive telecommunication infrastructure is a prerequisite;
- Highly centralised access;
- Long-distance call from remote areas;
- Digital divide within the nation.

Need for appropriate content:

- Present focus on basic computer skills and English;
- Lack of software with Thai content;
- Lack of evaluation standards;
- Lack of input from private sector.

Need for ICT literate teachers:

- Short courses have not much impact, but peer training effective;
- Lack of sustainable and systematic professional development;
- Need for realistic objectives in training programmes.

Analysis

Thailand has started to prepare its primary and secondary education systems for the digital era. The initiatives and incentives given to the school system show that much has been accomplished already. The initiatives taken by the non-government sector such as those of MAG promise a lot of things for the non-formal sector. MAG’s programmes show innovations in utilising ICTs without being hindered by the absence of fundamental necessities such as electricity. Nevertheless, it seems that the initiatives are mostly project-based and have not really touched the fundamental issues such as more equal and affordable access to the Internet.
NOTES

2 See note 1 above.
5 See note 4 above.
7 See note 1 above.
9 See note 8 above.
13 See note 8 above.
Viet Nam

ICT USE IN EDUCATION
Ms Tian Belawati, Ph.D

National policy

As early as 1993 Viet Nam recognised the importance of developing an information and communication technology (ICT) policy, but it did not publish a Master Plan for ICT in Education until 2001.¹ Based on a review of similar policies in other countries, the Ministry of Education and Training (MOET) of Viet Nam noted that information technology “has been used as a tool for teaching all subjects and there is no fixed curriculum. Teachers should be innovative in applying IT to their subject teaching. [The] concept of education technology [was] built into IT application.” The Master
Plan focuses on meeting the demand for ICT human resources; educational reform in content, teaching and learning methods; study modes; and educational management.

In the Master Plan, Viet Nam aims to develop a computer-based information network system for education and to improve computer ratios at educational institutions (every school is expected to have at least one classroom with five computers). For the period 2001–2005 the objectives for IT development are as follows:

- To build ICT infrastructure for education and training. This consists of computer networks (local networks, intranets, Internet), computer rooms in schools, computers in all educational institutions (schools, colleges, universities, provincial departments, MOET departments) linked together providing access to various databases and resources for teaching and learning activities and educational management.

- To develop the ICT human resource for sector by preparing up to 25,000 or 30,000 trained specialists at all levels of qualification. Specialised ICT training programmes for other disciplines are developed to promote ICT applications in all different fields. Flexible training modes with quality training are encouraged.

- To use ICT as a tool to promote innovative thinking, initiatives, communication, independent problem-solving skills, information searching and processing skills to facilitate lifelong learning for all people. To apply ICT to any subject, at any school, at any level through use of educational software (software for teaching, learning, testing and evaluation).

- To build suitable curricula, teaching methods and student evaluation systems for teacher training programmes and to revamp educational management through student databases, teacher databases, databases for educational institutions as well as legal and regulation documents. This information system will allow faster and more efficient decision-making.

- To reach the goal of at least 25,000 trained ICT specialists by 2005 by strengthening training quality at all ICT faculties, increasing technical and practical works, regularly revising IT faculties and updating their programmes, setting up more ICT faculties at other state universities, increasing the intake into two-year training programmes for technicians and technologists with more emphasis on practical skills, encouraging second degree training in ICT for graduates holding bachelor’s degrees in other disciplines, creating a quality accreditation committee for reviewing programmes at ICT faculties and at other ICT training levels, setting up joint training programmes with foreign universities, and by encouraging students, lecturers and researchers to study in developed countries. As far as ICTs in schools are concerned, the major aims of the Master Plan include providing general knowledge about (1) computers and IT for all school teachers and students, (2) computer use for teaching and learning other subjects and (3) computer use for school management.

Current level of ICT access and use

Viet Nam has moved ahead in Internet access since the first Internet service provider (ISP) licences were granted in 1997. As of 1999, Viet Nam had two low-speed lines connecting Hanoi and Ho Chi Minh City to the outside world. Internet use in Viet Nam from 2000 to 2002 increased by about 100 per cent. However, the number of Internet users in 2002 was still very low, at about 0.2 per cent of its total population.

The small number of Internet users is due partly to the high cost of Internet access, which before 1999 was one of the highest in the world. Although the cost now is slightly lower, it is still considered very high by most Vietnamese. The International Telecommunication Union (ITU) reported that the cost for accessing the Internet in Viet Nam is almost US$ 40 per 30 hours (this includes the cost for ISP subscription and telephone usage). Furthermore, since Internet access is mainly done through telephone lines, the low percentage of users reflects telephone availability in the country since only eight per cent of Vietnamese households have a telephone.

In the education sector, the MOET used its own budget to supply computers and other ICT equipment to universities and schools in the early 1990s. This played a vital role in introducing ICT teaching in schools and universities. Subsequently, many local authorities and communities used their own budgets to set up computer rooms in schools. As of 2000, about 80 per cent of secondary schools (out of 1,760) have at least one computer, but only a few primary schools (out of 22,200) have set up computer rooms. Nevertheless, some private schools in big cities have better facilities. An example is the Hanoi Amsterdam High School. From the “Maths-gifted class” that graduated in 1991, 16 of the 26 students had e-mail addresses. Many are working in the ICT sector or in government institutions of one form or another, including universities. Another example is the Chu Van An Secondary School, which has an active alumni section that helps provide computers for the school. Generally, however, given the relatively high costs of Internet access, it is only those students whose parents are able to pay that have access to ICT facilities.

Furthermore, ICT has now become a compulsory subject in specialised upper secondary high schools (grades 10, 11 and...
In other general (upper and lower) secondary schools and in primary schools, ICT teaching is optional depending on computer availability. (In the beginning, computers were utilised exclusively for teaching ICT.)

Examples of major initiatives

Several international co-operative projects have been established:

- Canada, Australia and Japan provide assistance to improve ICT facilities in Vietnamese universities and scholarships for Vietnamese students.
- The Institute for Francophone Informatics (French) offers a master’s programme in ICT for 25 students every year.
- Some foreign information technology companies set up ICT training centres.
- Apple, Microsystem, HP IBM, COMPAQ and Coca Cola offer assistance to Viet Nam education, including setting up ICT training centres and conducting ICT-related training.
- The World Bank and Asian Development Bank gave financial assistance to improve ICT facilities in universities, colleges and provincial educational departments.

As well, an educational network, EduNet, has been designed to link all universities, colleges, provincial departments of education and MOET departments. Despite the slow progress due to low investment, this initiative has prompted other projects to take off, including ICT teacher training and teaching ICT as a subject in schools.

Another project has been the development of an inter-linked network of learning centres in secondary schools and youth centres across Viet Nam known as the Coca-Cola Learning Centers. Coca-Cola established the network in partnership with Viet Nam’s Ministry of Education-Training and the National Youth Union. It is to provide a dynamic environment in which Vietnamese youth can extend their education through ICT access and tools. Covering 33 provinces and cities and benefiting an estimated 10,000 students and their teachers, 40 centres have so far been built. Staffed by teachers, Learning Centers are equipped with computers providing Internet and e-mail access, software and books in a comfortable learning environment for use both during and after school hours. The programme is expected eventually to cover each of Viet Nam’s 61 provinces and cities and to provide a dynamic environment in which Viet Nam’s young people (in and out of school) can extend their learning and development opportunities through information technology access and tools. Even though there is no specific information on the learning programmes conducted within the centres, the programmes include the annual Young Leaders of the Future contest, covering a number of academic disciplines and involving the 200 top students enrolled in the Learning Center programmes.

Another effort of the government is the development of a CD-ROM containing information on citizens’ rights called “Your Lawyer,” by the Office of the National Assembly (ONA). This is an attempt to educate people about law and order and to make Viet Nam’s laws accessible in simple language. The CD-ROM adopts a step-by-step approach to guide the reader through the vast array of rules, regulations and forms relevant to a multitude of day-to-day legal topics in Viet Nam. Copies are to be distributed to offices of delegates to the National Assembly in all 61 provinces, offices of provincial People’s Councils, media organisations and to the 7,000 post offices in all 12,000 localities.

Examples of training

Since 1990, various ICT teacher training programmes, including short courses and an ICT bachelor’s degree, have been set up to meet the increasing need for ICT teachers. In 1999, through the Secondary School Teacher Training Project, most of the teacher training colleges acquired modern computer rooms to facilitate training ICT teachers. Furthermore, training programmes for ICT technicians have been set up at various vocational training schools. ICT training for educational management officials has been carried out routinely to improve their knowledge and skills. As a result of these training programmes, teachers should now have a

Other projects are aimed at:

- Developing, collecting and adopting educational software;
- Enhancing the development of databases for educational management;
- Enhancing ICT training programmes for teachers;
- Creating schools with good ICT application in teaching and management;
- Providing high-quality training programmes for ICT lecturers and researchers;
- Building joint ICT schools or colleges (including 100 per cent foreign investment) for ICT training.

Unfortunately, there is no data or information available to the author to elaborate on the above initiatives.

Examples of training

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broader understanding of the role of computers and ICT in education.\textsuperscript{12}

In a broader scope, the Japanese government has initiated a Japan-Viet Nam Project to improve Viet Nam’s ICT workforce. Started in March 2002, the programme strives to improve the quality of ICT work produced by the Vietnamese and to teach the workers Japanese language skills. The Vietnamese government has also gone the way of other techno-developing countries like China and India in sending promising ICT students to North America to receive workplace ICT training and to learn about current developments in ICTs. These measures should assist Viet Nam in developing a larger pipeline of ICT workers (assuming the students don’t emigrate to other more developed countries), which in turn will help to meet the government’s goal of US$ 300 million for software exports and US$ 200 million for domestic software production by 2005.\textsuperscript{13}

**Constraints on the use of ICT**

As in other developing non-English speaking countries, constraints on ICT use in education seem to be related to content and access. Specifically, significant problems in Viet Nam include:

- The lack of Vietnamese language software for use in educational applications. This effectively restricts the likely user population for the Internet to the 10 per cent or so of Vietnamese who understand some English;
- The limited ICT facilities that do exist have not been effectively used in general teaching, training and educational management;
- The limited access to Internet for education due to high cost of access;
- Lack of qualified personnel, including trained teachers.

**Analysis**

Viet Nam has been eager to be one of the hubs for ICT development in South-East Asia as indicated by its comprehensive Master Plan with specific emphasis on developing a skilled ICT workforce. Further evidence is the IT in Education Master Plan of 2000, which aims to broaden the ICT degrees offered at state institutions. Nevertheless, efforts seem to be still tinkering with the establishment of infrastructure to secure greater access of the Vietnamese to ICTs especially those in the education sector (including the students). As recommended by Viet Nam’s country report for the APEID conference, a formal programme should be developed to extend the level of access to computers and to improve computer skills in order to encourage Internet take-up among students in primary and secondary schools. This could include the establishment of computer clubs to encourage students to explore the Internet and to develop research projects, the inclusion of some element of computer training (e.g., keyboard and mouse skills) as a compulsory element of the secondary school curriculum and the provision of PCs in school classrooms.

Realigning prices towards regional norms is an urgent priority. Currently Viet Nam’s rates for domestic and international leased lines are among the world’s most expensive, which inevitably causes higher prices for local ISPs and for Internet access.

Most importantly, since the majority of Vietnamese do not speak English, the lack of Vietnamese language software for use in educational applications should also be overcome. Access alone will not enhance the use of ICT in education without the availability of relevant and understandable content. Some programmes devoted to content development in the local language should be initiated. Accordingly, it seems that any international assistance to enhance the use of ICT in Viet Nam’s education should be focused on the elimination of the four types of digital divide: access, human resources development, language and content.

**NOTES**


3 “Internet Usage in Asia (Internet Users and Population Statistics for Asia)” (Internet World Stats, 2003), \texttt{www.internetworldstats.com/asia.htm}.

4 See note 2 above.

5 Michael Minges, “Measuring the Internet in South East Asia” (2001), \texttt{www.itu.int/ITU-D/ict/series/Malaysia}.


7 See note 1 above.

8 See note 1 above.

9 “E-Learning in Asia and Beyond: Coca Cola Learning Centers” (2003), \texttt{www.unesco.org/bangkok/education/ict/teaching\_learning/ pri_sec\_edu/Viet\_Nam.htm} and \texttt{www2.coca-cola.com/citizenship/education\_asia\_digital\_divid.html}.


11 See note 1 above.

12 See note 1 above.

13 See note 5 above.