United Nations
Educational, Scientific and
Cultural Organization

UNESCO Bangkok
Communication and Information Unit

Strategy Framework for Promoting ICT Literacy

in the Asia-Pacific Region

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Introduction

There is almost universal acceptance that information and communication technologies (ICTs) are good for development.

For example in the area of education, the World Bank points out that "educators and policymakers agree that ICTs are of paramount importance to the future of education" and that "ICT in education initiatives … are likely to successfully contribute to meeting Millennium Development Goals." These technologies, most particularly those that are Internet-connected and capable of providing online information in real-time, "increase access through distance learning, enable a knowledge network for students, train teachers, broaden the availability of quality education materials, and enhance the efficiency and effectiveness of educational administration policy."[1] This position is shared by parents and teachers on the ground, such that the mere availability of ICTs in schools has come to be almost always equated with progress. ICTs in schools engender high hopes and great expectations for expanding personal and national horizons.

A development specialist writing about ICT's role in sustainable agriculture pointed out that "although the Internet is not a panacea for rural development problems and food security, the Internet can open new communication channels that bring new knowledge and information resources to rural communities."[2] The same can be said about the role of ICT in education. Apart from radically changing the modes of educational information delivery, ICTs can perform critical roles in knowledge construction by making possible the creation, management, and sharing of knowledge.

Precisely because of their role in knowledge production and dissemination, educators and policy makers who embrace ICTs to further educational goals must recognize their possible negative consequences. Educational systems, both formal and non-formal, are powerful social institutions infused with the mission of developing and enhancing desirable values and behaviors among the public – and especially among the youth. Thus, they must be most sensitized to ICT's potential dangers and be proactive in addressing them. ICT literacy education provides an appropriate venue for this.

Moreover, given that there is continuous development of ICTs and the people who use them, so should there also be continual assessment of ICT education and curricula by the educational systems/institutions that offer them. Not only have ICTs become increasingly ubiquitous, each generation of these technologies expands its range of applications and runs at speeds that outpace and outmode previous models. Use of these new technologies has created dependency for many individuals who have embraced and integrated ICTs into their daily communication and information-seeking and -giving activities. In a world where information and knowledge are currency, governments aspire to develop their countries as optimized knowledge societies.

Hence, this paper targets individuals and organizations engaged in providing ICT literacy education. The first section provides a situational analysis of ICT usage in the Asia-Pacific region, both to examine current dominant thrusts in ICT literacy education and to serve as background for the strategy framework presented in this report. The second section, then, details this framework. It defines goals, objectives, and approaches, as well as discusses conceptual and operational measures for promoting ICT literacy development throughout the Asia-Pacific region. By so doing, this paper helps contribute to Asia Pacific Information Network (APIN)[3] ICT literacy programming efforts.

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1 http://go.worldbank.org/5OSFGC8WY0. The World Bank is unequivocal in its position regarding its support for ICT in education, "recogniz(ing) the critical importance of effectively utilizing new ICTs to meet the growing need for a more sophisticated labor force, manage information systems, and contribute to poverty reduction around the world."

2 Munya, H. (nd). *Information and Communication Technologies for Rural Development and Food Security: Lessons from Field Experiences in Developing Countries* as cited in Pernia and San Pascual, *The Case of K-AgriNet as Knowledge Management and Strategic Communication: A Model for Evaluation*, paper presented at the 2006 East West Center/East West Center Association International Conference (8-10 December 2006, Hanoi, Viet Nam).

3 APIN is a UNESCO information network that merges the Regional Network for the Exchange of Information and Experiences in Science and Technology in Asia and the Pacific (ASTINFO), the Regional Informatics Network for Southeast Asia and the Pacific (RINSEAP) and the Regional Informatics Network for South and Central Asia (RINSCA).

ICT in the Asia and Pacific Region

ICTs are highly touted tools to correct information and knowledge asymmetries within and among countries. Of the various information and communication technologies, telephones, personal computers, and the Internet are the most basic gateways to information and knowledge. Mobile phones and computers, particularly those that are Internet-connected, are capable of providing online information in real-time, which makes them effective platforms and enabling mechanisms for development.

This situational analysis seeks to determine how countries in Asia and the Pacific are poised to experience ICT's great potential in creating, constructing, capturing, managing, and sharing information and knowledge. Conscious attempts were made to assure comparability of data across countries; hence, only reliable published data sources were consulted for this analysis.

In order to draw a picture about the level of ICT literacy education/training in the Asia-Pacific area, a rather narrow definition of ICT was used, i.e., specific to mobile phones, computers, and the Internet. For this reason, only statistics pertaining to the availability and use of these three technologies are considered.[4]

ICT Appreciation and Availability in Asia and Pacific Countries

Observation has been made that majority of the countries in Asia and the Pacific are yet to experience the great potential of ICT in creating, constructing, capturing, managing, and sharing information and knowledge. How do Asia-Pacific countries compare in their ICT readiness? In particular, how do they compare in terms of (1) their appreciation of information and communication technology (i.e., whether ICT policies, regulatory framework, and the like are present) and (2) availability of such technology (i.e., existence of ICT infrastructures)? Table 1 presents the research findings.

Countries rated low on appreciation have ICT policies that merely recognize the strategic role of ICT for growth and development, while countries rated high have ICT policies that go beyond such recognition and are already institutionalizing concrete measures that support ICT initiatives.

Countries were rated low on availability of technology when: data reported that access to computers is "limited"; the cost of Internet connection is stated as "high," "costly," or "expensive"; ISPs are described as "limited"; and the ratio of computers to students is stated as "insufficient."

4 These country-level statistics were: telephone density, cellphone subscribers, computer ownership, Internet access and availability. Data on fixed telephony were included since Internet connection in developing countries is normally via dial-up. Other data considered for the situational analysis were the existence of a country/regional policy on ICT, regulatory framework(s), ICT initiatives in education, health, and the social sector.

Table 1. Countries According to Appreciation and Availability of iCT

Countries	Appreciation of Technology	Availability of Technology
Afghanistan	LOW	LOW
Australia	HIGH	HIGH
Bangladesh	HIGH	LOW
Bhutan	HIGH	LOW
Cambodia	HIGH	LOW
China	HIGH	LOW
CIS (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan)	HIGH	NO AVAILABLE DATA
Democratic People's Republic of Korea	HIGH	NO AVAILABLE DATA
India	HIGH	LOW
Indonesia	HIGH	LOW
Iran	HIGH	NO AVAILABLE DATA
Japan	HIGH	HIGH
Malaysia	HIGH	HIGH
Maldives	HIGH	LOW
Mongolia	HIGH	LOW
Myanmar	HIGH	LOW
Nepal	HIGH	LOW
New Zealand	HIGH	HIGH
Pacific Islands Countries: (Cooks Islands, Fiji, Kiribati, Marshall Islands. Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu, Vanuatu)	HIGH	LOW
Pakistan	HIGH	LOW
Philippines	HIGH	LOW
Lao People's Democratic Republic	HIGH	LOW
Republic of Korea	HIGH	HIGH
Sri Lanka	HIGH	LOW
Thailand	HIGH	LOW
Viet Nam	HIGH	LOW

Source: Appendix tables A to D. Legend: Countries marked in red are low in both ICT appreciation and ICT availability; those in green are high in both ICT appreciation and ICT availability; and those in blue have high ICT appreciation, but low ICT availability.

All countries except for Afghanistan show high appreciation of technologies. Australia, which is high on both ICT appreciation and availability, has numerous policy goals and action plans that have been implemented at all governmental levels. Some of their ICT initiatives even reach neighboring countries like New Zealand.

In contrast, Afghanistan is lacking in policy goals on ICT. This can be attributed to the specific thrust of the government focusing only on economic growth and poverty reduction strategies, leaving the ICT courses of action at the back seat.

Of the countries in the region, only Australia, Japan, Malaysia, New Zealand, and Korea are high on availability of technologies, as their high economic status allows them to edge out others in terms of providing ICT resources to their people. In Korea and Japan, where almost six out of 10 people are mobile phone subscribers, ownership of personal computers and Internet access are also high (see Appendix C). Moreover, there is roughly a 1:1 student-to-computer ratio in Japanese elementary and high schools.

As expected, those that were rated low on ICT availability consisted of mostly developing countries. In the Lao People's Democratic Republic (PDR), less than 1% of the population has mobile phone subscription. It is the same for Sri Lanka, Myanmar, and several Pacific Island Countries. Moreover, Internet access is limited mostly due to the high cost of computers, low bandwidth, and low computer literacy. In Laos, almost no public or primary elementary and secondary school has access to the Internet.

There are countries in the Asia-Pacific region that are low on ICT availability, but high on appreciation, as indicated by ICT action plans implemented in specific subject/topic areas. The Philippines, for example, has a number of major initiatives focusing on ICT use in education. In 1996, the Philippine government launched the DepEd Modernization Programme, which spearheaded the introduction and use of modern technology to improve learning processes and educational management. Consistent with this programme is Republic Act 8525 of 1998, which mandated private sector participation in upgrading and modernizing public schools especially those in underserved provinces. Non-governmental organizations (NGOs) and private sector companies (e.g., ABS-CBN Foundation, Ayala Foundation, the Japanese government, Makati Business Club, STI, etc.) also gave their support to the government's thrust in improving ICT use in education. Most of these organizations provided funding for acquiring computers, installing Internet connections, and providing hands-on training in basic information and technology.

ICT Use in Asia and Pacific Countries

In order to create a picture of ICT skills literacy and determine dominant thrusts in ICT literacy education in Asia and Pacific countries, various literature on the countries' uses of technology were collected. Table 2 presents the significant ICT literacy education programmes and projects initiated and maintained by countries in the Asia and Pacific region.

As shown in Table 2, there is a broad range of ICT usage in the countries. Not surprisingly, the extent of ICT use is generally consistent with the level of economic development. The more developed countries manifest a wider application of technology.

Low or Limited ICT Use: Afghanistan and the Maldives

Afghanistan is one of the least developed countries in the region. After two decades of war, the country is battered and impoverished. Although the country has been in a period of restoration, ICTs are very minimally available and utilization is extremely poor. In April 2003, the UNESCO Bangkok website noted that less than three percent of Kabul's population knows how to use a computer, and this figure is even smaller in other parts of the country. Moreover, although Afghanistan has an established educational radio and television service, computer-based work in classrooms is still limited. This can be attributed to the insufficient, partly destroyed, communications infrastructure; shortage of schools; limited educational background of students; and linguistic barriers.

The Government of the Republic of Maldives, on the other hand, shows appreciation for the potential benefits of ICTs in the country. Hence, ICT policies in various sectors have been formulated, but very little has been actualized, specifically in education. While there are computers in schools, these resources are mainly used for limited office automation and not for general student use. Thus, ICT use is in its infancy due to the high cost of technology, uneven access to ICT devices, and limited connectivity.[5]

5 Internet prices can reach up to US $3 an hour, with additional expenses for transportation to avail of the technology.

Table 2. Uses of Technology in Asia and Pacific Countries

Countries	Programmes/projects Related to ICT/ICT Literacy Education
Afghanistan	■ ICT is seen as a powerful reconstruction and development goal ■ The Telecommunications and Internet Policy was approved to improve all aspects of Afghan life, including education, healthcare, employment, and access to information
Australia	■ Training and access to ICTs for marginalized sectors of society (indigenous and older Australians, women, people with disabilities, homeless, drug –addicted youths) are being given attention. ■ Satellite broadband networks allow video/audio interaction between teachers and students, interactive whiteboard, and controlled Internet access. ■ Efficient hardware, server software, and desktop software are used by the government, NGOs, and schools. ■ ICT education partnerships between all states/territories in Australia and New Zealand are prevalent. ■ The Notebooks Teachers Programme provides notebook computers and ICT training for all teachers and principals under the Victorian Government schools. ■ A post-graduate certificate, diploma and masters courses on ICT have been extensively developed. ■ Evaluation of ICT projects is being promoted to progress forward into the next phase of the initiative concerned. ■ Interactive distance learning through satellites, web cameras, and electronic whiteboards are continuously being developed. ■ Online, collaborative learning via the Internet, called the Global Classroom Project, was made possible by Australia and other international schools. ■ Recently trained teachers graduate with competent ICT skills, including multimedia software development skills.
Bangladesh	■ ICT penetration is very limited in Bangladesh, with Internet use estimated about 1.4 per thousand, and restricted largely to the capital, Dhaka and its surrounding suburbs. ■ Grameen Communications organizes regular seminars, workshops, training programmes and projects utilizing the Internet. ■ The Village Computer and Internet Programme was launched on June 1999 to provide low-cost computer training to villagers to improve their skills and employment opportunities. ■ A large number of private sector computer and training institutes provides training in basic and advanced computing skills.
Bhutan	■ The country is working towards building a "network nation" by planning projects geared towards ICT public access (e.g. e-mail, e-post, national intranet infrastructure, international e-mail access, telecentre). ■ Focus is also on building capacities and competencies (ICT in government, training).
Cambodia	■ Cambodia is ranked among the least e-ready countries in Asia. ■ ICT penetration is low. ■ The country is setting up computers in schools. ■ Training on distance education/designing and maintaining computer networks has taken place. ■ ICT training for disadvantaged people is also provided.

Countries	Programmes/projects Related to ICT/ICT Literacy Education
China	▪ The Chinese Educational Informationization Project focuses on ICT application in education. ▪ Distance education programmes exist. ▪ Training for IT personnel and teachers is provided.
CIS (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan)	▪ Kyrgyzstan inherited a sound educational system from the Soviet Union and sees itself as the leading CIS state in the reform of education. ▪ The Aga Khan Foundation established the University of Central Asia is committed to use different appropriate distance education technologies.
Democratic People's Republic of Korea	▪ The country focused on software development due to financial constraints. ▪ ICT is used by a limited number of organizations. ▪ The government requested the Institute for Strategic Reconciliation (ISR) to conduct computer education for students and teachers. ISR is a non-profit organization whose members are Koreans residing in the United States). ▪ No evidence of training on ICTs for education. Any training is focused on achieving specific goals (e.g., computer security technology in the military)
India	▪ Training has been an important element of Indian efforts in deploying technologies for education. ▪ Various ICT projects exist for communication, education, and gov't applications.
Indonesia	▪ The dominant use of ICT is for e-mail. ▪ ICT is included in the curriculum of some schools ▪ Private training centers offer short courses in ICT related subjects (e.g., MS Office, web design, animation) ▪ A budget has been allotted for ICT facilities and Internet connection in schools. ▪ Basic computer training is provided for teachers.
Iran	▪ The most widely used ICTs are multimedia CD-Roms, web portals, electronic support of traditional curricula (power point, etc.), and online newsgroups. ▪ Vocational training institutes have been set up. ▪ Pardis Technology Park established to provide ICT services, e.g., training and education. ▪ Support from universities was evident in providing access to the Internet.
Japan	▪ No digital divide in ICT infrastructure and in access. Differences in gender, cultural background or place of residence are not issues in accessing ICT. ▪ High percentage of schools has Internet connection. ▪ High percentage of teachers can operate the computer. ▪ High percentage of computer use, access to the Internet, and ability of teachers to use computers in the schools for the disabled.

Countries	Programmes/projects Related to ICT/ICT Literacy Education
Lao People's Democratic Republic	■ Government officials have little experience in using ICT. ■ There are established Internet Learning Centres. ■ ASEAN and UNESCO held seminars and workshops in ICT in education ■ Trainings on ICT are outside the country ■ ICT infrastructures have been developed and expansion plans also in place. ■ Number of internet usage has increased gradually ■ Increasing acceptance of ICT as tool to fight poverty, empower the poor, and eliminate gender inequality accord by the government, which can be seen through government policies, plans, strategies, programmes, and projects.
Malaysia	■ 75% to 90% of all schools and 100% of universities have access to the Internet. ■ A number of schools have their own websites. ■ Online portals for students and teachers have been established. ■ All teachers are required by the government to take basic informatics courses. ■ Principals and support staff receive ICT training. ■ ICT training for women is free through the Federal Ministry of Women and Family Development and Sabah Skills Technology Center (SSTC). ■ Malaysian web-surfers are increasingly turning to the Net for getting information.
Maldives	■ Integration of ICT use in education is stated in the policy, but very little has been done.
Mongolia	■ Only half of citizens (1.3 million) access the Internet (connection is done by modem). ■ Focus has been on teaching ICT as a subject, rather than integrating it into teaching/ learning process. ■ The government is focused on providing access and connectivity to the Internet, web training, and distance learning. ■ The government offers retraining for its public servants in using ICT. ■ Mongolian software packages have been developed. ■ Malaysia provides aid for an Internet connectivity project. ■ ICT training has taken place outside of the country. ■ ICT training on word processing, computer programming, desktop publishing, and graphic design is available through private sector ■ A project entitled "Strategies for e-Government Blueprint and Roadmap in Mongolia" was started to establish the e-Government Masterplan.
Myanmar	■ Multimedia classrooms have been installed. ■ E-education/learning centres and computer labs provide non-formal training. ■ ASEAN and UNESCO have sponsored technical and vocational education through ICT application.
Nepal	■ There have been some early initiatives on: human capacity-building in ICTs in education, for NGOs using ICTs for communication purposes, and for community radio's non-formal community education programmes. ■ There has been little actual activity in training.

Countries	Programmes/projects Related to ICT/ICT Literacy Education
New Zealand	▪ ICT Cluster Programme of 1998: cluster of schools support each other to incorporate new technology both at classroom and whole-school level. ▪ Bilingual (Maori and English) online support resources for schools, students, and staff are available. ▪ Maori-centered initiatives are pursued by the gov't – establishment of video conferencing network and acquisition of computers in some Maori schools. ▪ Distance education through teleconferencing and computer-based conferencing system has been funded by the Ministry of Education. ▪ Acquisition and access to laptops and computers are also given priority. ▪ The government and NGOs are working together to close the digital divide.
Pacific Islands: Cooks Islands, Fiji, Kiribati, Marshall Islands. Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu, Vanuatu	▪ NGOs, private sector, and donors work for the development of ICT in the country. ▪ Aid from international organizations has helped improve the ICT infrastructure.
Pakistan	▪ The existence of PC software industry attracts work from major international companies in the area. ▪ Computer studies has been added to the high school curriculum. ▪ The government has provided schools with computer labs. ▪ NGO-funded experimental projects encourage computer education in schools.
Philippines	▪ The dominant use of ICTs is for e-mail, which is primarily used for administrative purposes and correspondence. ▪ Teachers and education administrators are given ICT training. ▪ The Department of Science and Technology trains students on robotics using advanced ICT facilities in physics.
People's Democratic Republic of Korea (North)	▪ Government officials have little experience in using ICT. ▪ There are established Internet Learning Centres. ▪ ASEAN and UNESCO have held seminars and workshops in ICT in education. ▪ ICT training has taken place outside of the country.
Republic of Korea (South)	▪ Vocational education courses are offered online. ▪ ICT is a required subject in elementary school and an elective in high school. ▪ Universities and government-funded organizations offer ICT training for free or for a minimal fee. ▪ NGOs are active in promoting e-learning and in building a cyber education community. ▪ Training for teachers is provided to enhance and update ICT teaching methods. ▪ A collective database for education was constructed with 5.3 million users. ▪ The curricula for ICT use in elementary and high school has been revamped. ▪ Some half a million children were given free ICT lessons, and 50,000 of them were given PCs. ▪ Teachers have shown initiative by creating study groups and have met for lectures, seminars, etc. to develop educational materials.

Countries	Programmes/projects Related to ICT/ICT Literacy Education
Sri Lanka	▪ There is evidence of ICT utilization in various sectors of the economy, but not much for instructional purposes.
Thailand	▪ Intensification of the ICT manpower production ▪ The predominant use of computers by teachers and students is for word processing, using spreadsheets, using database, using both Internet and CD-ROMs for searching information. ▪ The is a tele-education project for the non-formal education sector via the Thaicom satellite and Klai Kangwol School. ▪ The Information Technology Project, under the initiative of HRH Princess Mahachakri Sirindhorn, has been working at the grassroots level to develop lessons for the sector as a whole. ▪ 20% of the teachers and personnel for both primary and secondary levels have been trained to develop ICT literacy. (e.g., MS Office, Visual Basic, MS Access, etc.).
Viet Nam	▪ Work has been conducted to develop, collect, and adapt educational software. ▪ Attention has been given to enhancing ICT programmes for teachers. ▪ Training programmes for ICT lecturers and researchers is provided. ▪ Int'l NGOs support the acquisition of computers (e.g., HP, Apple, etc.). ▪ Among small/medium enterprises, there is strong awareness and demand for IT-related business development services, such as Internet information and computer services. ▪ ICT-based services for enterprises are usually small-scale and consist of: 1) business and trade information 2) e-marketplaces and 3) e-learning resources.

Source: Freire, C. (2006). *Cambodia and Vietnam ICT Status and Project*. Bangkok: United Nations ESCAP; UNESCO. (2003). *Meta-survey on the Use of Technologies in Education in Asia and the Pacific 2003-2004*. Bangkok: UNESCO; "Lao PDR Country Report on ICT 2006," retrieved from www.stea.gov.la; Wentz, L., Kramer, F. and Starr, S. (2008) *Information and Communication Technologies for Reconstruction and Development: Afghanistan Challenges and Opportunities*. Retrieved from http://www.ndu.edu/CTNSP/Def_Tech/DTP%2045%20Afghan%20ICT.pdf; "Malaysian Household Use of Internet Survey 2006," retrieved from http://www.skmm.gov.my/facts_figures/stats/pdf/HUIS06.pdf; "IP Issues in Mongolia," presented in IP Symposium for Asia and the Pacific, UNCC Bangkok, Thailand, and retrieved from www.unescap.org/icstd/events/IP_Symposium/presentation/Mongolia.ppt.

Moderate Levels of ICT Use: China and Indonesia

In China, the government has been giving much attention to the introduction and integration of ICT application into the educational system. This is done essentially to produce students who can be competitive in the information era. In this light, China is continuously developing infrastructure for educational informationisation, establishing about 70% campus networks, and implementing education resource development and the modern distance education. Generally, China has made great progress in the application of ICT in education as a result of the government's sustaining effort. However, its educational ICT industry is still immature due to various obstacles, such as lack or insufficient high-quality ICT products, a shortage of ICT-skilled people, and a lack of coordinating policies, competitive mechanisms, and evaluation of results.

Similar to other countries, Indonesia is determined to harness the use of ICTs to improve national competitiveness. While Indonesia ranks fourteenth among the top 20 countries in Internet usage,[6] its Internet penetration is still lower than those of other ASEAN countries like Malaysia. Data show that the most common use of ICT in the country is for e-mail, the practice of which is rather limited since e-mail is generally for administration purposes and corresponding with donors, regional and international partners. The Internet is considered useful for the purposes of networking, information access, and advocacy. In education, ICTs are only beginning to be used

6 Miniwatts Marketing Group. 2008 "Internet Usage in Asia (Asia Internet Usage and Population Statistics in 2007" retrieved from Internet World Stats website, www.internetworldstats.com/stats3.htm

due to the financial difficulties of providing ICT facilities. In fact, it is in international schools where ICTs are used for teaching-learning activities. On the other hand, ICT use in the non-formal education sector is very popular. Private training centres can be found throughout the country that offer short ICT-related courses (e.g., word processing, programming, web-designing, graphic design, animation, etc.).

High ICT Use: New Zealand and the Republic of Korea (South Korea)

In only in a few countries of the Asia-Pacific region can ICT use be considered high. New Zealand and South Korea are members of that elite ICT group.

In New Zealand, national ICT policies, strategies, and programmes are present throughout the educational sector, in technical/vocational schools and teacher education. With distance education implemented through teleconferencing and computer-based conferencing systems, access to laptops and computers by students is given priority. Moreover, bilingual (Maori and English) online support resources for schools, students, and staff are available. Although ICT in education is progressive, the technology has not displaced the traditional teacher-student classroom setting because teachers and school administrators retain control over when and how the technology is employed.

The Republic of Korea (South Korea) appears to have maximized the ICT potential for education. In 2000, it was evaluated to have developed the best educational infrastructure in the world. Aside from the extensive ICT training widely provided by the government, various NGOs, educators and private sectors, South Korea has also been successful in constructing a collective database for education, promoting e-learning, building cyber education community, and developing software to enhance their ICT development. In their advanced ICT stage, South Korea's problems revolve around issues of ICT infrastructure maintenance, best usage of ICT facilities, and identification of what should be transmitted on the information super highway.

Situational Analysis Synthesis

In summary, almost all countries in the Asia and Pacific region greatly appreciate the value of information and communication technology in their respective growth and progress. This is evidenced by the explicit ICT policies, strategies, and master plans, which involve specific projects to improve their ICT capacities in each of these countries.

However, a high appreciation and an acknowledgment of ICTs' growing impact of ICTs on societies and economies do not translate into high ICT availability and use. Socio-economic diversity among countries in the Asia-Pacific region is extreme, with the majority of countries still classified as "developing" and, therefore, lacking in resources to fully implement their ICT policies/plans. In fact, high levels of ICT availability and ICT applications are limited to and characteristic of the relatively few countries in the region thta have a comparatively better economic development status, a competitive ICT infrastructure and skilled human resources.

The data in this situational analysis provide evidence that while the levels of ICT availability and use – and consequently that of ICT literacy – in Asia and the Pacific are predominantly low, there are areas which are more advanced. Given these different ICT proficiencies, a strategy framework to promote ICT literacy must follow an approach that is situation-appropriate, while at the same time being adaptable/open/expansive in order to respond to the increasing range of skills people need to function in today's global and technology-oriented world.

Strategy Framework for Promoting ICT Literacy:

A Framework for Developing ICT Competencies

(Competency-Based Approaches for ICT Literacy)

Goals

To ensure that ICT literacy is integrated into present ICT/IT/media educational programmes and curricula in Asia-Pacific countries.

To improve the quality and effectiveness of ICT literacy education/training in order to enable citizens to take advantage of opportunities and meet challenges brought by new and emerging ICTs.

Specifically, the curricula – whether in traditional, non-traditional, formal, non-formal, and informal educational contexts – will deepen appreciation for and enhance technical and critical assessment skills in ICT.

Definition of Terms

ICT

Using the 2004 definition given by the UNESCO Asia and Pacific Regional Bureau for Education and Commonwealth of Learning, "Information and communications technologies (ICTs) are technologies used to communicate and to create, manage and distribute information. A broad definition of ICTs includes computers, the Internet, telephones, television, radio and audiovisual equipment."

Although the situational analysis of this research study used a rather narrow definition of ICT, henceforth ICT will take on an expanded definition. The term applies to any device and application used to access, manage, integrate, evaluate, create and communicate information and knowledge, including but not limited to radio, television, cellular phones, computer hardware and software, network hardware and software, satellite systems, peripherals, connections to the internet, etc. Digital technologies are included in this definition, as are the services and applications used for communication and information processing functions associated with these devices.

ICT Literacy

Sometime in 2001, the Educational Testing Service (ETS)[7] convened an international panel comprised of academics, development specialists, and telecommunications experts representing the governmental and private sectors "to study the growing importance of existing and emerging ICTs and their relationship to literacy."[8] This international panel's report on ICT literacy was the product of a yearlong deliberation, which the ETS used as a basis to develop a framework for designing test instruments to measure individual skills related to ICT.[9]

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7 The Educational Testing Service (ETS) is a private, non-profit organization devoted to educational measurement and research, primarily through testing. It develops and administers millions of achievement and admissions tests each year in the U.S. and 180 other countries. Source: http://www.ets.org/portal/site/ets/

8 Educational Testing Service. (2002) *Digital Transformation A Framework for ICT Literacy: A Report of the International ICT Literacy Panel*. ETS: New Jersey, p. iii.

9 Ibid. The ETS points out that the "panel deliberations had two major themes. First, … to examine the need for a measure of ICT literacy across countries as well as within specific organizations such as schools and businesses … and to develop a workable Framework for ICT Literacy."

In the report entitled *Digital Transformation: A Framework for ICT Literacy*, this international panel's definition of ICT literacy is specified as the ability to use "digital technology, communications tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society."[10]

Inherent in this definition is the recognition that there are varying levels of ICT literacy.[11] In fact, it is possible to locate ICT literacy along a range of proficiencies that vary from more simple technical skills to rather complex critical thinking abilities. Seven ICT proficiencies, identified by the ETS, echo the increasing complexity of abilities:[12]

Define: Using ICT tools to identify and appropriately represent and identify an information need.

Access: Knowing about and knowing how to collect and/or retrieve information in digital environments, also the ability to develop a search strategy to locate information within a database.

Manage: Organizing information into existing classification schemes.

Evaluate: Reflecting to make judgments about the quality, relevance, usefulness, efficiency, authority, bias, and timeliness of the information.

Integrate: Interpreting, summarizing, drawing conclusions, comparing and contrasting information from multiple digital sources.

Create: Generating new information and knowledge by adapting, applying, designing, inventing, or representing information in ICT environments.

Communicate: Conveying information and knowledge to various individuals and/or groups.

Potter (2001), Schiller (1996), and Silverblatt and Finan (1999) similarly acknowledge the developmental nature of media literacy. Their ideas were integrated into a framework for a media literacy programme developed by the University of the Philippines' College of Mass Communication, which pointed out that as a person's use of or experience with media increases, so does her/his literacy level move from awareness to critical states: [13]

Awareness and Acquisition State is that condition wherein the person becomes aware and conscious of the technology, analyzes its significance, reflects on its value and, subsequently, desires and decides on acquiring the technology.

Interpretive State bears on the meaning-and-sense-making initiatives of the users. As the person acquires, uses, interprets and develops an affinity to the communication technology, s/he harnesses her/his literacy skills.

Critical State is that condition wherein persons possess a wholistic view or understanding of a technology, including its origin, uses and effects on the technology users and their viewpoints. Further, they become aware of the motives of technology companies, judge the truthfulness of advertisements regarding technologies, understand the consequences of acquiring a technology, judiciously use the technology and critically assess the effects of the technology on their values, communication and buying behavior as well as their development as persons and leaders in society."

The above-stated ICT literacy levels assume ready availability of ICT technologies in the immediate environment of people. Potter *et al.* banked on developed country experience – where ICTs are commonplace – when they proposed their literacy theories. The ETS-convened international panel, which was comprised of individuals and organizations from developed countries of North America and Europe, similarly considered ICT availabilities to be routine and routinely increasing:

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10 Ibid, p. 2.

11 According to International ICT Literacy Panel "ICT literacy cannot be defined primarily as the mastery of technical skills… (it) should be broadened to include both critical cognitive skills as well as the application of technical skills and knowledge… as (it is) a continuum of skills and abilities… rang(ing) from simple uses of technology in everyday life to uses in performing complex tasks." Ibid, p. 1.

12 Educational Testing Service (2003), *Succeeding in the 21st Century: What Higher Education Must Do to Address the Gap in Information and Communication Technology Proficiencies*, p.18. and http://www.ets.org/Media/Products/ICT_Literacy/demo2/index.html

13 UP-CMC Department of Communication Research. (2005) *ICT Literacy of Individuals and Households in Metro Manila.* UP-CMC: Quezon City, p. 5.

> Technology is of increasing importance in people's everyday lives and that presence will most certainly increase in the coming years. No longer relegated to specialized workplace settings, information and communication technologies have become increasingly common in community settings, at school, and at home. Whether looking up a book on a computerized card catalogue at the public library, making a withdrawal from an automated teller machine, or accessing telephone messages, everyday activities have been transformed by ICT. As a result, the notion of a literate populace must be expanded to include the technology-based skills and abilities that will enable citizens to function in an increasingly technological world.[14]

However, in the case of developing countries, the levels of proficiency or ICT literacy presented above are not all that applicable because the levels of ICT availability, access, and use in these countries are variable. Moreover, where ICT technologies are present, mere availability does not ensure that information will flow to those who need it, nor that relevant knowledge will be created when such information reaches those who need it. As such, appropriate mechanisms for making available, accessing, and processing information must be present. In other words, there are several dimensions to ICT literacy, such that movement from one dimension to the next represents an increase/improvement in ICT-related proficiencies or competencies.

Within the scope of this research, ICT literacy differentiates among three major dimensions: one pertains to *knowledge* of technology, the second to *skills* relevant to using the technology, and the third to *attitudes* accruing from critical reflection of technology use.

Table 3. ICT Literacy Dimensions: Conceptual Labels and Descriptions

Dimensions	Conceptual Label	Description
Knowledge	Foundational knowledge	Awareness of technologies and appreciation of their relevance.
Skills	Technical skills	Use of technology for information and knowledge encompassing skills or abilities to access, retrieve, store, manage, integrate, evaluate, create and communicate information and knowledge, and participate in networks via the Internet.
Attitude	Critical assessment skills	Understanding that ICT acquisition and use impacts on personal and social development, including perception of values and responsibilities, communication practices and other behaviors. Social and ethical competencies develop as a result of this critical assessment and reflection.

Three Dimensions of ICT Literacy

1. The *knowledge dimension* of ICT literacy is characterized by a user's *awareness* of ICTs and *appreciation of the relevance* of these ICTs in both her/his personal and professional life. It is familiarity with the technologies and understanding how these are actually or can be potentially beneficial to her/his own and other people's lives.

2. Meanwhile, the *skills dimension* of ICT literacy pertains to, and often results from, the *use of* or *experience with* the technologies. For many, the abilities "to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in networks via the Internet"[15] are hallmarks of an ICT-literate individual.

   While the terms *information* and *knowledge* are often used interchangeably, distinctions have to be made between them. In this paper, information is seen to be inherent in an ICT material. In other

14 Educational Testing Service (2002), *Digital Transformation A Framework for ICT Literacy: A Report of the International ICT Literacy Panel*, ETS: New Jersey, p. 10.

15 European Commission, Directorate for Education and Culture, *Implementation of 'Education and Training 2010' Work Programme: Key Competencies for Lifelong Learning, A European Reference Framework*, November 2004, p.7.

words, information supplied through ICT. On the other hand, knowledge is a feature of the user; it is the product of the interaction between the information supplied through ICT and the user of such information. Hence, knowledge is information given meaning by its user.

3. Reflecting a higher level of ICT literacy than either the knowledge or skills dimensions, the attitude dimension represents the product and process of a person's *critical assessment* of her/his use of ICT for information and knowledge. In recursive fashion, the continued use of ICTs increases and deepens the user's *critical reading of the information and knowledge* that is accessed, managed, integrated, created, and communicated through ICT.

   The Belgium (Flanders) National ICT policies explain further that "social and ethical competencies refer to the development of attitudes to cope in a justified and responsible manner with the new technology. They are about complying with agreements, approaching ICT in a critical way, [and] helping each other in case problems occur." [16]

ICT Competencies

The European Union (EU) Directorate-General for Education and Culture (EU DEC) provides an appropriate definition for ICT competency as the "confident and critical use of electronic media for work, leisure and communication. These competencies are related to logical and critical thinking, to high-level information management skills, and to well-developed communication skills."[17]

Key proficiencies or competencies correspond to each of the ICT dimensions presented above.[18]

Developing *foundational knowledge* should be essentially about creating awareness of ICT – its nature (what these are), role (what personal and social needs they may be expected to fulfill), functions (what opportunities) – among those who have minimal or no exposure to and experience with these technologies. More specifically, the key competencies that can be expected of individuals who have completed a foundational knowledge course/module on ICT are as follows:

Table 4. Key Competencies for Foundational Knowledge

Dimensions	Conceptual Label	Key Competencies
Knowledge	Foundational knowledge	■ Familiarity with mobile phones, computers, the Internet, and other ICTs ■ Ability to identify ICTs ■ Appreciation of actual and potential functions of these technologies in everyday life (i.e., personal fulfillment, social inclusion, and employability). ■ Understanding basic features/uses of ICTs (e.g., for mobile phones: voice calls and SMS; for computers: word processing, spreadsheet, database, information storage; for Internet: web browsing, e-mail, and instant messaging). ■ Ability to distinguish between the virtual and real worlds. ■ Awareness of need for "phonethics," "netiquette."

16 *Belgium (Flanders) National ICT Policies*, European Schoolnet: October 2005, p. 12. Also on http://insight.eun.org

17 According to the EU Directorate-General for Education and Culture, "Key competences represent a transferable, multifunctional package of knowledge, skills and attitudes that all individuals need for personal fulfillment and development, social inclusion and employment. These should have been developed by the end of compulsory schooling or training, and should act as a foundation for further learning as part of lifelong learning." Source: EU Directorate-General for Education and Culture (November 2004), *Implementation of 'Education and Training 2010' Work Programme: Working Group B "Key Competencies,"* p.7.

18 The key competencies for each of the literacy dimensions benefits from several sources, but the author wishes to acknowledge two that have been most informative. One is the document entitled *Belgium (Flanders) National ICT Policies*, European Schoolnet: October 2005, p. 12 (also on http://insight.eun.org). Another is from the author's institutional affiliation: UP-College of Mass Communication (2006), *Media Literacy Modules*, UP-CMC: Quezon City.

Meanwhile, *technical skills* training ensures that learners become proficient in the various applications of ICT, i.e., searching and accessing information, collecting and organizing data, integrating and interpreting information from multiple sources, assessing validity and reliability of information, creating or generating new information and knowledge, participating in networks.

Table 5. Key Competencies for Technical Skills

Dimensions	Conceptual Label	Key Competencies
Skills	Technical skills	▪ Ability to use ICT features and applications (e.g., for mobile phones: voice calls, SMS, still camera, video recorder and/or player, voice recorder and/or player, radio, music player, multi-media service, word processing, spreadsheet, presentation, infrared, bluetooth, and internet connectivity; for computers: word processing, spreadsheet, database, information storage; for Internet: web browsing, e-mail, and instant messaging ▪ Ability to access and search website (e.g., log on to the Internet, use search engines, refine search using keywords, etc.) ▪ Ability to use Internet-based services (e.g., create an account, compose e-mail, attach and download files, participate in discussion fora and social networking sites, create blogs, etc.) ▪ Ability to collect and process (e.g., create database, organize, store, filter out irrelevant, etc.) electronic data for immediate or later use ▪ Ability to convert data into graphic presentation and other visual formats ▪ Using ICTs to support critical thinking, creativity, and innovation for educational, work-related, and leisure purposes (e.g., make the most of multi-media information, cross-reference information across websites, dealing with spam and fraud, etc.) ▪ Ability to distinguish credibility (e.g., differentiate relevant vs. irrelevant, subjective vs. objective, real vs. virtual, filter out porn and other offensive content, check for and guard against plagiarism, etc.)

As pointed out earlier, *critical assessment skills* pertain to reflection, critical assessment and understanding that ICT acquisition and use impacts on personal and social development, including values, responsibilities, communication and other behaviors. It is through this critical reflection that a person understands the social and ethical implications of ICT-related behaviors and, hence, develops social and ethical competencies.

More specifically, the key competencies that can be expected of individuals who have completed a critical assessment skills course/module on ICT are:

Table 6. Key Competencies for Critical Assessment Skills

Dimensions	Conceptual Label	Key Competencies
Attitude	Critical assessment skills	▪ Ability to use ICTs to work individually or in teams, complying with agreements and helping each other in case problems occur. ▪ Judicious/responsible use of technology: Sensitivity to safe and responsible use of the Internet ▪ Critical and reflective attitude when assessing information: Awareness of the motives of technology companies and ability to judge the truthfulness of advertisements regarding technologies. ▪ Interest in using ICT to broaden horizons by taking part in communities and networks for various causes. ▪ Understanding the consequences of acquiring and using technology: Ability to understand that use of ICTs affects formation of values and responsibilities, communication practices and other behaviors. ▪ Ability to critically assess the effects of the technology on values.

Lifelong Learning as the Framework for Promoting ICT Literacy

In reality, the ICT competencies listed above will need continual review and possible (re)setting since technologies – along with their functions in a global knowledge society – are ever evolving and expanding.

A World Bank report on ICTs in schools points out that "… society (continually) requires new skills: ICT increasingly pervade every aspect of life (work, learning, leisure, and health). Because ICT are the preeminent tools for information processing, new generations need to become competent in their use, should acquire the necessary skills, and therefore must have access to computers and networks during their school life."[19]

Given this scenario of change and development, it makes sense that lifelong learning[20] becomes the key concept for ICT literacy education.[21] Moreover, educational/training institutions have introduced various innovations in delivery modes to accommodate the needs of diverse learners, depending on their socio-economic and demographic characteristics, current level of ICT skills and technology competencies.

Competency-based Approaches for Promoting ICT Literacy

However high the regard and expectation is for the role ICTs play in development among countries in the Asia and Pacific region, wide disparities exist among these countries' socio-economic circumstances – and consequently in their levels of ICT preparedness, availability, use, and literacy. Hence, the thrusts/objectives, contents, and delivery mechanisms of ICT literacy education cannot be uniform across countries – or possibly even within countries – in the region.

Assuming that consensus exists among stakeholders that the goal of ICT literacy education should be to arm citizens with an expanding range of skills necessary to function in today's global and dynamically changing technology-oriented world, specific approaches to promoting ICT literacy anchored on the concepts of lifelong learning and ICT key competencies may prove beneficial.

Knowing the current ICT literacy level in a country or specific area enables planners to identify key proficiencies or competencies that may be expected and likewise specify the progression or contents of ICT education/ training.

For example, taking the data on ICT appreciation and availability that was earlier presented (*see Table 1 on page 3*), countries in the Asia and Pacific region can be categorized in terms of their ICT knowledge dimension as either:

1. *Low:* where the country has low ratings in both appreciation[22] and availability[23] of technology, or
2. *Moderate:* where the country is high in appreciation but low on availability of technology, or
3. *High:* where the country rates high in both appreciation and availability of technology.

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19 Hepp, P., Hinostroza, E., Laval, E., and Rehbein, L (2004) *Technology in Schools: Education, ICT and the Knowledge Society*. World Bank, p. 1.

20 "The latest knowledge and successful practices of planning and implementing education for lifelong learning suggest that lifelong learning is more than just education and training beyond formal schooling. A lifelong learning framework encompasses learning throughout the life cycle, from birth to grave and in different learning environments, formal, non-formal and informal." See http://www1.worldbank.org/education/lifelong_learning/. Similarly, the European Commission says "Lifelong learning is … central not only to competitiveness and employability but also to social inclusion, active citizenship and personal development." See http://ec.europa.eu/education/policies/lll/lll_en.html

21 See, for example, "Information Literacy and Lifelong Learning," a paper prepared by Philip Candy in July 2002 for UNESCO, the U.S. National Commission on Libraries and Information Science, and the National Forum on Information Literacy, for use at the Information Literacy Meeting of Experts, Prague, The Czech Republic. Available at http://www.nclis.gov/libinter/infolitconf&meet/candy-fullpaper.pdf

22 Countries rated as low in appreciation are those with ICT policies that merely recognize the strategic role of ICT for growth and development; meanwhile countries rated as high in appreciation are those which have ICT policies and are already institutionalizing concrete measures that support ICT initiatives.

23 Countries are rated as low on availability of technology when: data reported that access to computers is "limited"; the cost of Internet connection is stated as "high", "costly", or "expensive"; ISPs are described as "limited"; and the ratio of computers to students is stated as "insufficient." Conversely, where there are no reports of such access problems, countries are rated as high in technology availability.

The resulting categorization of countries in Table 7 below is useful as an indicator of key ICT proficiencies or competencies that may be expected to be normatively obtainable among its citizens.

Table 7. Countries According to Ranking on ICT Knowledge Dimension[24]

LOW	MODERATE	HIGH
Afghanistan	Bangladesh	Australia
	Bhutan	Japan
	Cambodia	Malaysia
	China	New Zealand
	India	Republic of Korea (South)
	Indonesia	
	Maldives	
	Mongolia	
	Myanmar	
	Nepal	
	Pacific Island Countries: (Cooks Islands, Fiji, Kiribati, Marshall Islands. Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu, Vanuatu)	
	Pakistan	
	Philippines	
	Lao People's Democratic Republic	
	Sri Lanka	
	Thailand	
	Viet Nam	

A country's classification on the ICT knowledge dimension (as indicated above) can also be the basis of designating which of the ICT literacy approaches (i.e., foundational knowledge approach, technical skills approach, critical assessment approach) and which topics/course content are most appropriate.

Competency-based ICT Literacy Curriculum for Foundational Knowledge Approach

As indicated in Table 7 above, only one country fits the low knowledge dimension profile (i.e., extremely poor in ICT readiness such that ICT policy and infrastructure are generally non-existent). However, it is possible that there are sub-areas within the moderate- and high-ICT knowledge dimension countries where there are hardly any ICT-related initiatives and infrastructure. Hence, in those areas, ICT literacy training should necessarily focus first on *foundational knowledge* formation.

24 Source: Table 1, p 3.

Specific key competencies that need to be developed among learners include: creating awareness for technologies and the benefits they may pose for personal fulfillment, social inclusion, and employability; distinguishing between the virtual and the real. For example, the following topics[25] (among others) would be appropriate in foundational courses:

- Welcome to the Virtual World

  A Brief History
  Internet Data Systems
  The World Wide Web
  Connecting to the Internet
  Important Internet Terms
  Internet Applications

- You've Got Mail!

  What is E-mail?
  Benefits of E-mail
  Spammers
  Viruses
  Internet Fraud and Crime

- Internet and Research: The World of Google

  What is a Search Engine?
  How Search Engines Work
  Using Search Engines for Research

Competency-based ICT Literacy Curricula for Technical Skills Approach

Meanwhile, in countries or sub-areas within countries where the ICT knowledge dimension is moderate, ICT literacy training could center on developing and/or deepening technical skills development such that curriculum content includes: using Internet-based services; collecting and processing; converting data into graphic presentation and other visual formats; and using ICTs to support critical thinking, creativity, and innovation for educational, work-related, and leisure purposes.

Competency-based ICT Literacy Curricula for Critical Assessment Approach

In countries or sub-areas within countries rated high in ICT knowledge, ICT literacy training could include critical assessment skills alongside sharpening technical skills in order to build social and ethical competencies alongside technical proficiencies. This means that curricula would integrate topics such as: using ICTs to work individually or in teams; complying with agreements and helping each other in case problems occur; using the Internet safely and responsibly; and developing awareness about the motives of technology companies and ability to judge the truthfulness of advertisements regarding technologies.

Mechanisms for Implementation/Institutional Arrangements for Promoting ICT literacy

ICT, IT, and media education/training institutions – particularly those that have been recognized/awarded as *national/international centers of excellence* in their specific area of expertise – in partnership with the UNESCO are ideal organizations to initiate the activities listed in the specific objectives.

Other stakeholders in ICT literacy education whose partnerships should be harnessed for planning, implementation, monitoring, and evaluation include government agencies (e.g., the education ministry, national and local planning units, etc.), non-governmental organizations and civil society groups involved in education and ICT, and private sector businesses – most especially those from the telecommunications industry.

25 Source: Department of Communication Research, College of Mass Communication, University of the Philippines. (2008) Module on Using the Internet. UP-CMC: Quezon City.

Recommendations for Promoting ICT Literacy

Consistent with the concept of lifelong learning as the framework for promoting ICT literacy and in line with the competency-based approaches specified above, the activities listed below may serve to guide APIN liaison workers towards effecting ICT literacy curricula appropriate to the situation of specific countries/citizens/students/trainees.

1. Identify, invite, and involve stakeholders (e.g., education ministry, public and private educational/training institutions, telecommunications industry representatives, ICT service providers, business sector, etc.) in a public-private partnership for ICT literacy education
    - to define the continuum of ICT/ICT literacy competencies, skills, and abilities needed by citizens to hurdle the digital divide
    - (as an ICT steering group) to set in place opportunities for optimal learning from data provided by the research and assessment activities (described below) for continued planning and action related to ICT literacy education/training
2. Create task forces among stakeholders:
    - Private sector stakeholders, particularly telecommunication companies and the business sector, may be invited:
        - to provide insights/trends/data regarding prospects for ICT developments, present and projected skills needed, etc., and
        - to ensure sustainability of educational/training programmes (for example, private telecoms may provide financial resources as part of their corporate social responsibility).
    - Educational/training institutions may be asked to form the core/consortium that will:
        - ensure/guarantee that agreed-upon ICT literacy competencies (i.e., foundational knowledge, technical skills, and critical assessment skills) are introduced or redefined as the desired outcomes of ICT skills education/training;
        - set standards for delivering ICT competency/literacy training;
        - take the lead in setting standards and mechanisms for assessing ICT competency training.
    - Specialized educational/training institutions or individuals may be tasked or commissioned to develop/revise/update age- and educational level-appropriate content of ICT literacy education/training curricula. Curricula should be ladderized, i.e., subsequent modules build up on earlier ones, following this general sequence:
        - development of foundational knowledge competencies about technologies, hardware, software applications, and other elements of digital technologies;
        - deepening of technical competencies;
        - stimulation of critical thinking for responsible and ethical use of ICTs.
3. Conduct/commission the conduct of research studies to determine:
    - learner characteristics, such as:
        - age and educational levels
        - needs, motivations, and uses for ICT
        - level of ICT competency
    - community characteristics, and
    - job/work opportunities that are available and/or needed.

Research will ensure a match among learner needs, available training opportunities in formal/non-formal/informal educational/training contexts, and job/work availabilities.

Conclusion

During this Information Age, the growth in information and knowledge (and the evolution of technologies that make information and knowledge growth possible) has become increasingly faster. It is, thus, important that the progression of ICT literacy (i.e., foundational knowledge, technical skills, and critical assessment skills) along with the corresponding ICT key competencies as discussed above be used as the basic outline and sequence for ICT literacy training, whether it be for formal, non-formal, or informal education. They serve as important guides for planning the thrust and content of ICT literacy education/training.

While this research acknowledges that ICT literacy development may not always progress in a linear manner, this framework benefits from such linearity for programme administration and management purposes. Likewise, this work recognizes that the features of ICT technologies are biased towards those who are already literate in a more traditional sense (i.e, have reading and writing skills) and are also numerate (i.e., can understand and use numbers). As such, it is strongly recommended that general literacy should be addressed alongside, or even prior to, ICT literacy.

In preparing this report, the author took great care to cull materials from well-respected institutions as well as to assess credibility and validity of the data used for the situational analysis. Working with secondary data often poses problems, such as non-availability of information or inexactness of data. Hence, there is wisdom in validating data at/by the country level. Such validation may then allow better intra- and cross-country discussion and comparison. Importantly, too, data validation helps to surface even more recent information that would be relevant to the application of this framework.

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Appendices

Appendix A. Detailed Description of Combined Technology Literacy Dimension and Information and Knowledge Dimension: LOW

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
Afghanistan				
	Policy to develop access: Specifically to: ■ Develop ICT networks that would be accessible and affordable to all Afghans ■ Develop policies for universal access to information and knowledge ■ Improve government use of ICT.	■ Public access to computers is limited ■ Majority has little or no access to the Internet ■ Mobile phone subscriber = 0.00002 per 100 ■ PC ownership = 0.13 per 100 ■ Internet users = 0.05 per 100	■ Purdue University in the United States and Technical University of Berlin and the software company CISCO have announced plans to expand computer-based systems in cooperation with Afghan higher education partners.	

Appendix B. Detailed Description of Combined Technology Literacy Dimension and Information and Knowledge Dimension: MODERATE

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
Bangladesh				
	Formulated ICT policy for Human Resource Development (HRD), this states that the country must prepare itself to compete effectively in the global ICT market. ■ Specifically, policy statements endorse the need for widespread introduction of ICT training in public and private educational institutions as a prerequisite for producing skilled manpower. ■ The policy also envisages that universities, institutes of technology and colleges, both in the public and private sectors, shall be strengthened to produce ICT graduates from four-year Computer Science and/or Engineering courses. ■ The policy also proposes establishing multimedia institutes up to district level that will produce skilled human resources. ■ Proposes building capacity in teacher training institutions to upgrade skills that will create a pool o f skilled trainers. ■ Promote distance education in response to country's limited teaching resources ■ Invite international faculty	■ Internet use = 1.5 per thousand ■ PC ownership = 0.78 per 100 ■ Mobile phone = 5,413,800 ■ There are more mobile than fixed telephone lines. ■ ICT penetration is very limited in Bangladesh, with Internet use estimated about 1.4 per thousand, and restricted largely to the capital, Dhaka and its surrounding suburbs.	■ Grameen Communications organizes regular seminars, workshops, training programmes and projects utilizing the Internet. ■ Village Computer and Internet Programme was launched on June, 1999 to provide low-cost computer training to villagers to improve their skills and employment opportunities ■ A large number of private sector computer and training institutes provide training in basic and advance computing skills	

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
Bhutan				
	Overall policy for ICT development in the country. Specifically for the following areas: ■ *Institutional arrangements:* ■ *Human Resource and Training* ■ *Regulations, guidelines and legislation* ■ *Public access and awareness* ■ *Private Sector development*	■ ICT access is limited due to high cost. ■ 1999-Interet came into Bhutan ■ 2.2%-teledensity (lower than the average from lower income countries) ■ 7.4% per 1,000 (2000)-teledensity ■ 2,550 –total computers in Bhutan, majority owned by corporations	■ Building a Network Nation by planning projects geared towards ICT public access (e.g. e-mail, e-post, national intranet infrastructure, international e-mail access, telecentre) ■ Building Capacities and Competencies (ICT in government, training)	
Cambodia				
	Policy for ICT use in education ■ Training in ICT skills for teacher under the "Promoting the Effective Use of ICT in Education for All in Cambodia" project sponsored by UNESCO and the government	■ Public access to computers is limited ■ Majority has little or no access to the Internet ■ Mobile phone subscriber = 2 per 100 ■ PC ownership = 0.11 per 100 ■ Internet users = 0.05 per 100	■ Setting up of computers in schools ■ Trainings on distance education/designing and maintaining computer networks ■ ICT training for disadvantaged people	

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
China				
	■ Government projects on encouraging access to the Internet and application of ICT ■ The actions being undertaken by the government and schools include the following: 1. Constructing the infrastructure needed for an information environment; 2. Developing educational resources 3. Supporting teacher professional development 4. Integrating ICT into traditional classrooms 5. Delivering good educational resources into rural areas using ICT-assisted distance education methods 6. Changing administration systems through ICT applications	■ Mobile phone subscriber = 15 per 100 ■ PC ownership = 11 per 100	■ Focus of ICT application in education through Chinese Educational Informationization Project ■ Distance education programmes ■ Training for IT personnel and teachers	
India				
	■ National Programme for Human Resource Development in IT (NP-HRDI) ■ Overall, India's policy and strategies have been to build self-reliant indigenous capacity	■ Theoretically, availability of ICTs is widespread in large parts of the country However, access to ICTs is still limited because of physical infrastructure constraints, economic constraints, educational limitations, and social constraints. ■ Computer ownership: 0.6 per 100 inhabitants	■ Training has been an important element of Indian efforts in deploying technologies for education. ■ Various ICT projects for communication, education, and government applications	

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
Indonesia				
	■ Establishment of the Indonesian Telematics Coordinating Team (TKTI) in 2000 which will take an active role to drive ICT implementation in Indonesia. ■ ICT awareness campaigns were prevalent with the help of various institutions ■ IT Programmes are launched in vocational secondary schools	■ In 2003, almost 7.5 million people are Internet users ■ Mobile phone subscriber = 1.73 per 100 ■ PC ownership = 1.01 per 100 ■ Internet users = 1.82 per 100	■ The dominant use of ICT is for e-mail. ■ ICT is included in the curriculum of some schools ■ Private training centers offer short courses in ICT related subjects (e.g. MS Office, web design, animation) ■ Allotment of budget for ICT facilities and Internet connection in schools ■ Basic computer training for teachers	
Maldives				
	■ Ministry of Communication, Science and Technology (MCTS) developed a Science and Technology Master Plan which gives priority to (1) issues such as formulating a national ICT policy along with strategies and an action plan for the Government Network of Maldives (GNM), (2) form a National Computer Center (NCC) as support to structure GNM, (3) oversee the implementation of ICT policy, (4) define ICT standards and establish a community-owned telecenters ■ NCC committees created: ■ *Information Technology Advisory Committee* – give guidance on ICT policy issues ■ *Information Technology Standards Group* – to work on ICT Standards	■ The country is in its infancy when it comes to ICT use and applications ■ 36 Internet users per 1,000 population	■ Integration of ICT use in education is stated in the policy, but very little has been done	

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
Mongolia				
	■ The First National ICT Summit was organized and the "ICT Vision 2010" policy document was developed in 2000 served as a blueprint for ICT development in the country. ■ Ministry of Education, Culture, and Science (MOECS) has used Vision-2010 as a model to implement ICTs in education sector with the following components: ■ Training (to utilize 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)	■ In April 2003, there are 2,041 computers in 518 schools or 4 PCs per school on the average. ■ Mobile phone subscriber = 8.84 per 100 ■ PC ownership = 1.64 per 100 ■ Internet users = 1.23 per 100	■ The focus has been on teaching ICT as a subject rather than integrating it into teaching/learning process ■ The government focused on the access and connectivity to the internet, web training, and distance learning ■ Retraining for public servants in using ICT ■ Development of Mongolian software packages ■ Internet connectivity project with aid from Malaysia ■ Trainings on ICT outside the country ■ ICT training on word processing, computer programming, desktop publishing, and graphic design through private sector	
Myanmar				
	■ A 30-year long term education development plan formulated by the government ■ Establishment of the Myanmar e-National Task Force to promote ICT ■ Establishment of the Myanmar Information and Communication Technology Park in 2001 to promote ICT development in the private sector.	■ An estimated 50,000 PCs are in the country ■ Mobile phone subscriber = 0.06 per 100 ■ PC ownership = 0.5 per 100 ■ Internet users = 0.5 per 100	■ Installation of multimedia classrooms ■ Establishment of e-education/learning centers and computer labs to provide non formal trainings ■ ASEAN and UNESCO sponsored technical and vocational education through ICT application.	

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
Nepal				
	■ The Information Technology Policy of Nepal, 2000, aims to build a knowledge-based society and establish knowledge-based industries. ■ The plan ids to make ICTs accessible to the general public and to provide employment in the ICT sector. ■ The government has developed a strategy and action plan that includes private sector participation, infrastructure development, provision of technology to rural areas and the creation of an enabling environment for private sector investment in ICT-related service industries, such as e-commerce, e-education and e-health	■ 3.5 million of 24 million Nepalese have access to electricity ■ 3 Personal Computers / 1,000 people ■ 16 Internet service providers (ISPs) ■ 290 Internet hosts ■ 50, 000 Internet and e-mail users ■ PC ownership 0.86 per 100 inhabitants	■ There have been some early initiatives of human capacity-building in ICTs in education, for NGOs around using ICTs for communication purposes and for the community radio's non-formal community education programmes, there has been little activity in training	

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
Pacific Island Countries: (Cooks Islands, Fiji, Kiribati, Marshall Islands. Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu, Vanuatu)				
	■ Existence of the Pacific Islands Communications Technology Policy and Strategic Plan (PIIPS), a regional ICT strategy agreed and signed by the Communication Ministries of each Forum member country. ■ ICT action plan was in place for countries like Cooks Islands, Kiribati, Marshall Islands, Micronesia, Palau, Samoa, Tonga, Tuvalu, and Vanuatu but some of them was not that successful due to constraints like lack of funding ■ Some countries have their policies still on the process of writing because the focus of their governments is economic growth and poverty reduction. ■ Members of the University of South Pacific have access to the facilities of the institution including the USP Centre, and trough it, the USPNet satellite system (members Cooks Is., Fiji, Kiribati, Marshall Is., Nauru, ■ Niue, Samoa, Solomon Is., Tokelau, Tonga, Tuvalu, Vanuatu)	■ Prepaid mobile phone was introduced in 2003 in Samoa. ■ 1500 mobile phone customers are served in Cooks Islands ■ Majority of the countries have only one Internet service providers ■ There is a relatively high Internet access in Vanuatu (In 2002, 25-50% access in homes, 75% from workplace) ■ Internet cafes became venue for Internet access in Tonga ■ E-mail has become a popular means of communication in urban areas in Samoa ■ Papua New Guinea has Aid from international organizations helped improve the ICT infrastructure ■ 10,000 Internet subscribers and the Internet connectivity has low cost ■ Mobile phone subscriber = 10 per 100 (the highest in the region, Palau; followed by Fiji with 9.7 and Cooks Island with 9.5) ■ PC ownership = 5.5 per 100 (the highest in the region, Fiji and Papua New Guinea; followed by Solomon Islands with 4.6)	■ NGOs, private sector, donors work for the development of ICT in the country. ■ Aid from international organizations helped improve the ICT infrastructure ■ ICTs are commonly present and used in education (Distance learning, ICT training for students)	

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
Pakistan				
	■ Formal policy and action plan for the development of ICT was developed ■ The major features of the policy are (1) to encourage the development of a workforce with information technology skills, (2) to provide simple regulatory and enabling legal framework, and (3) to promote the use of information technology within both the private and public sectors.	■ In April 2003, there are 2,041 computers in 518 schools or 4 PCs per school on the average. ■ Mobile phone subscriber = 8.84 per 100 ■ PC ownership = 1.64 per 100 ■ Internet users = 1.23 per 100	■ Existence of PC software industry which attracted work from major international companies in the area. ■ Inclusion of computer studies into the high school curriculum. ■ The government provided schools with computer labs. ■ The government provided schools with computer labs. ■ NGOs funded experimental projects to encourage computer education in schools	
Lao PDR				
	■ "The Lao National Pan for Information and Technology: Master Plan up to year 2002" ■ The Ministry of Communication, Transport, Post, and Construction (MCPTC), with the support form the Japan International Cooperation Agency, developed a Telecommunications Master Plan for the period of 2003-2015 ■ The Ministry of Education 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 Los (NUOL) ■ The incorporation of ICT content into the secondary and tertiary curriculum ■ The promotion of distance learning and e-learning through ICT.	■ Only a few have access to computers ■ Almost no public or primary and secondary school have access to the Internet ■ Mobile phone subscriber = 0.54 per 100 ■ PC ownership = 0.18 per 100 ■ Internet users = 0.16 per 100	■ Government officials have little experience in using ICT ■ There are established Internet Learning Centers ■ ASEAN and UNESCO held seminars and workshops in ICT in education ■ Trainings on ICT outside the country	

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
Philippines				
	■ Philippine's Information and Technology Plan aimed to foster lifelong learning skills in learners. ■ The 1996 General Appropriations Act (GAA) laid the groundwork for the procurement of hardware and software, teacher training and courseware development. ■ The Act of 1998 (R.A. 8525) was passed to generate private sector participation in the upgrading and modernization of public schools especially those in underserved provinces. ■ DepEd Modernization Programme including acquisition of ICT facilities with international aid	■ In 2000, the International Telecommunication Union reported that only about 17% of the 7,509 secondary schools were equipped with PCs and about 1.16% of this group had access to the Internet. ■ According to the Internet World Stats, 1.1% of the country's total population (2 million) are Internet users. ■ PC ownership = 1.93 per 100 ■ Internet users = 0.0016 per 100	■ The dominant use of ICTs is for e-mail, which is primarily used for administrative purposes and correspondence. ■ Teachers and education administrators were given ICT training. ■ The Department of Science and Technology trains students on robotics using advanced ICT facilities in Physics.	
Sri Lanka				
	■ In 1983, Compute Policy for Sri Lanka (COMPOL) was formulated ■ In 1983, Compute Policy for Sri Lanka (COMPOL) was formulated ■ Computer and Information Technology Council of Sri. Lanka (CINTEC) was established by an Act of Parliament (Act No. 10 of 1984)	■ Internet use: 8 per 1,000 people ■ Internet use remains very low due to (1) high cost of computers, (2) low banwidth, and (3) low computer literacy. ■ Internet use remains very low due to (1) high cost of computers, (2) low banwidth, and (3) low computer literacy. ■ There is little access in Sri Lankan school and colleges ■ Mainly urban elite, businesses and private sector corporations use the Internet	■ There is evidence of utilization of ICT in various sectors of the economy, but not much in instructional purposes	

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
Thailand				
	■ The formation of the National ICT Plan ■ Implementation of the "national school-information action programme" aiming to increase the number of computers in schools.	■ Lower cost of Internet connection compared to other ASEAN countries. ■ Mobile phone subscriber = 12.33 per 100 ■ PC ownership = 2.78 per 100 ■ Internet users = 6.7 per 100	■ Intensification of the ICT manpower production ■ The predominant use of computers by teachers and students is for word processing, using spreadsheets, using database, using both Internet and CD-ROMs for searching information ■ A tele-education project for the non-formal education via the Thaicom satellite and Klai Kangwol School. ■ The Information Technology Project, under the initiative of HRH Princess Mahachakri Sirindhorn, has been working at grassroots level to develop lessons for the sector as a whole. ■ 20% of the teachers and personnel at the primary levels, and also, 20% from the secondary level have been trained in terms of ICT literacy. (e.g. MS Office, Visual Basic, MS Access, etc.)	
Viet Nam				
	■ The Master Plan for ICT in Education 2001 which focused on meeting the demand for ICT human resources; educational reform in content and methods of teaching, study modes; and educational management.	■ As of 2000, 80% of the secondary schools have at least one computer. ■ Mobile phone subscriber = 1.9 per 100 ■ PC ownership = 1.17 per 100 ■ Internet users = 1.3 per 100	■ Developing, collecting, adopting, educational software ■ Enhancing ICT programmes for teachers ■ Providing training programmes for ICT lecturers and researchers ■ International NGOs supported the country in acquiring computers (e.g. HP, Apple, etc.) ■ Since 1990, various ICT teacher training programmes, including short courses and an ICT Bachelor's degree, have been set up	

Appendix C. Detailed Description of Combined Technology Literacy Dimension and Information and Knowledge Dimension: HIGH

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
Australia				
	■ Numerous policy goals and action plans have been implemented at all government levels. Some initiatives even reach neighboring countries such as New Zealand. ■ Policies and strategies have been developed to address the digital divide.	■ 57% or more of the population has PC in their homes ■ 57% of the population has access to the Internet at home ■ Mobile phone subscriber = 64 per 100 ■ PC ownership = 25.6 per 100 ■ Internet users = 72.5 per 100	■ Training and access of ICT for marginalized sectors (indigenous and older Australians, women, people with disabilities, homeless, drug –addicted youths) in the society are being given attention. ■ Satellite broadband network allows video/ audio interaction between teachers and students, interactive whiteboard, and controlled Internet access. ■ Efficient Hardware, server software, desktop software are used by government, NGOs, and schools. ■ ICT education partnerships between all states/territories and Australia and New Zealand are prevalent. ■ The Notebooks Teachers Programme provided notebook computers and ICT training for all teachers and principals under the Victorian Government schools. ■ Postgraduate certificate, diploma and masters courses on ICT have been extensively developed ■ Evaluation on ICT projects are being promoted to progress forward into the next phase of the initiative concerned. ■ Interactive distance learning through satellites, web cameras, and electronic whiteboards are continuously being developed.	

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
			■ Online, collaborative learning via Internet called the Global Classroom Project was made possible by Australia and other international schools ■ Recently trained teachers graduate with competent ICT skills including multimedia software development skills.	
Japan				
	■ The e-Japan Priority Policy Programme in 2003, as a part of e-Japan Strategy, aimed to create a basic ICT infrastructure.	■ Low ratio of students per computer from elementary to high school ■ High Internet access of students from elementary to high school ■ Mobile phone subscriber = 61.1 per 100 ■ PC ownership = 34.9 per 100 ■ Internet users = 44 per 100 ■ Launching of the Information Technology in Education Project (ITEP) which aims to use computers in teaching in all schools ■ Awards such as Japan Association for Promotion of Educational Technology's Computer Education Practical Idea Award were given to broaden the use of computers. ■ Certificate exams are offered for people to be well versed in ICT and to train teachers. ■ IT as a required subject in high school ■ Training for teachers are done face to face and online	■ No digital divide in ICT infrastructure and in access. Differences in gender, cultural background or place of residence are not an issue either in accessing ICT. ■ High percentage of schools has Internet connection. ■ High percentage of teachers can operate the computer. ■ High percentage of computer use, access to the Internet, and ability of teachers to use computers in the schools for the disabled	

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
Malaysia				
	■ The policy "Vision 2020" calls for sustained productivity-driven growth with technologically literate workforce. ■ The Ministry of Education gave 30% of its annual budget to Internet connectivity of rural schools	■ In 2001, Malaysia has the second lowest dial-up Internet cost among ASEAN countries. (ave. cost = US$ 20 in 30 hours of Internet use). ■ Mobile phone subscriber = 32.8 per 100 ■ PC ownership = 12.61 per 100 ■ Internet users = 27.31 per 100	■ About 75 to 90 percent of all schools and 100 percent of universities have access to the Internet ■ A number of schools have their own web sites ■ Establishment of online portals for students and teachers ■ All teachers were required by the government to take basic informatics courses ■ Principals and support staff received trainings in ICT ■ Free ICT training for women by the Federal Ministry of Women and Family Development and Sabah Skills Technology Center (SSTC)	
New Zealand				
	■ The Ministry of Education developed a coordinated vision and strategy for the use of ICT in schools – developing infrastructure and improving school capability ■ The government lead the ICT campaign by including schools, NGOs, and businesses in promoting access and use of ICT in education ■ Institutions developed their own strategy in promoting and utilization of ICT in vocational and teacher education. ■ Stronger role was given to the Tertiary Education Commission in developing ICT in tertiary education.	■ There are 3.5 million cell phone connections from a population of 4 million ■ Almost 75% of the country's population have direct access to the Internet ■ Mobile phone subscriber = 56.33 per 100 ■ PC ownership = 36.02 per 100 ■ Internet users = 53 per 100	■ ICT Cluster Programme of 1998 in which cluster of schools will provide support each other to incorporate new technology both at classroom and whole-school level. ■ Online support resources for schools, students, and staff are available bilingual (Maori and English). ■ Maori-centered initiatives are pursued by the government – establishment of video conferencing network and acquisition of computers in some Maori schools. ■ Distance education through teleconferencing and computer-based conferencing system funded by the Ministry of Education	

COUNTRY	TECHNOLOGY LITERACY DIMENSION		INFORMATON AND KNOWLEDGE DIMENSION	
	Access/ Relevance	Availability	Uses of Technology	Assessment of Information and Knowledge Accruing from Technology Use
			■ Acquisition and access to laptops and computers are also given priority. ■ The government and NGOs are working together to close the digital divide.	
Republic of Korea (SOUTH)				
	■ Paradigm shift from information-based society to knowledge-based society. ■ The government announced the Comprehensive Plan for Developing ICT use in Education. ■ The government will develop the National Education Information System to improve the efficiency of education administration ■ The Classroom Advancement Plan in 1999 aimed to provide one computer, TV, beam projector, and printer. ■ The Revised Classroom Advancement Plan at the end of 1999 focused on the utilization rate of the ICT facilities	■ Mobile phone subscriber = 61 per 100 ■ PC ownership = 25 per 100 ■ Internet users = 54 per 100	■ Vocational education courses are offered online ■ ICT is a required subject in elementary and an elective in high school. ■ Universities and government funded organizations are offering free ICT training or if not, with a minimal fee. ■ NGOs are active in promoting e-learning and building a cyber education community. ■ Training on teachers were provided to enhance and update ICT teaching methods ■ A collective data base for education was constructed with 5.3 million users ■ Revamping the ICT use in elementary and high school curricula ■ Some half a million children were given free ICT lessons and 50,000 of them were given PCs ■ Teachers have shown initiative by creating study groups and have met for lectures, seminars, etc. to develop educational materials	

APPENDIX D: Comparative Country Data on Availability and Use of ICTs (*per 100 inhabitants)

Country	Total Population	Computer ownership*	Telephone density*	Internet hosts*	Internet cafés	Internet users*	Internet subscribers*	Mobile phones subscribers*
Afghanistan	22.5 million	0.13	0.19	-	Only 2 in the country	0.05	-	.00002
Australia	19.8 million	25.6	37	0.4 ISPs per 10,000	.006 per 10,000 (but mainly in remote areas, and 57% of the population has access to the Internet at home)	72.5	-	64
Bangladesh	138.23 million	0.78	4.64	.00015	.00019	.1904	-	3.91
Bhutan	.83 million	0.64	2.14	.0715	.0172 (including public call offices)	0.43	-	-
Brunei	340, 800	10	24.7	-	0.01	5	-	42
Cambodia	12.3 million	.11	0.27	-	.0008	0.05	-	2
China	1,295,330,000 billion	11	32	.022	-	-	-	15
Hong Kong	6.77 million	38.46	58	5.7352	-	45.86	-	87
India	1.037 billion	0.6	4.2	.0035	.001	1.65	0.33	1.73
Indonesia	228,437,870 million	1.01	3.11	.0127	.0007	1.82	-	1.73
Japan	127,560,000 million	34.9	40.1	6.9826	-	44	-	61.1
Lao PDR	5,377,000 million	0.18	0.91	.00011	.00371	0.16	-	0.54

APPENDIX D: Comparative Country Data on Availability and Use of ICTs (*per 100 inhabitants) (cont'd)

Country	Total Population	Computer ownership*	Telephone density*	Internet hosts*	Internet cafés	Internet users*	Internet subscribers*	Mobile phones subscribers*
Macau	436,700 million	17.86	40.4	.0422	-	22.5446	-	44.5
Malaysia	24.5 million	12.61	20.5	.3110	-	27.31	-	32.8
Mongolia	2,442,500 million	1.64	5.18	.0063	.0031	1.23	-	8.84
Myanmar	51.2 million	0.5	0.6	-	-	0.5	-	0.06
Nepal	23.15 million	0.86	1.42	.0067	-	0.43	-	0.09
New Zealand	3.79 million	36.02	49.99	9.0059	-	53	-	56.33
Pakistan	146 million	0.41	2.44	.078	5 per 10,000 inhabitants	1.16	-	0.56
Philippines	79,503,675 million	1.93	8.70	.0254	4.27	.00165	-	15.897
Republic of Korea	47, 639, 618 million	25	57	.90	.05	54	-	61
Sri Lanka	18.73 million	0.79	8	.0120	.001	.00785	-	3.6
Thailand	61.25 million	2.78	12.6	.1175	-	6.7		12.33
Timor Leste	800,000	-	-	-	1 internet café in the country	-	-	-
Viet Nam	80 million	1.17	2.44 Working) 3 (Installed)	.0006	.062	1.3	-	1.9

APPENDIX D: Comparative Country Data on Availability and Use of ICTs (*per 100 inhabitants) (cont'd)

Country	Total Population	Computer ownership*	Telephone density*	Internet hosts*	Internet cafés	Internet users*	Internet subscribers*	Mobile phones subscribers*
PACIFIC ISLAND COUNTRIES								
Cooks Island	14,300	-	45	.010	-	-	1,100 inhabitants	9.5
Federated States of Micronesia	118,100	-	10	.014	-	-	1,800 inhabitants	-
Fiji	824,700	5.5	10	.66	-	-	6,000 inhabitants	9.7
Kiribati	90,700	-	-	-	-	-	510 inhabitants	-
Nue	1,500	-	-	-	-	-	200 inhabitants	-
Palau	19,100	-	39	-	-	-	1,700 inhabitants	10
Papua New Gunea	4,790,800 million	5.5	12	.009	-	-	24,600 inhabitants	0.2
Republic of Marshall Islands	51,800	-	15	-	-	-	-	-
Solomon Islands	447,900	4.6	1.5	.085	-	-	600 inhabitants	0.3
Tonga	100,200	-	8	-	-	-	1,200 inhabitants	0.2
Tuvalu	9,900	-	8.6	.009	-	-	250 inhabitants	-
Vanuatu	199,800	-	3	-	-	-	2,000 inhabitants	0.2
Samoa	169,200	0.6	6.6	-	-	-	3,000 inhabitants	1.9