Broader Environmental Context
Overview

I CT in education policy falls within a broader environmental context of the education system, covering economic and social infrastructure and policies and global market conditions. Elements in the education system, including the national curriculum; examination boards; leagues; teacher recruitment, training and retention; and the roles of major stakeholders in the education system, may affect the formulation and implementation of ICT in education policy.

Discussions in this component focus on three issues: (i) responsiveness of the education system, (ii) ICT in education policy and ICT infrastructure support, and, (iii) the economic and social/cultural context.

The education system and policy support in the areas of budget, curriculum, professional development and research may facilitate or hinder the launching of a country’s ICT in education policy, as well as its expansion and sustainability in the future. The national ICT infrastructure (connectivity and accessibility) may also affect the implementation of ICT in education policy. All these elements are within a larger environmental context that may include the need to develop a competitive workforce – regionally and globally, the economic cycle that a country or the world is undergoing, economic policies (budget cut or expansionary fiscal policy), political and social stability, the bureaucracy of the system, and so on.
Based on the experiences of the six countries, following are the lessons learned with respect to three issues:

1. **Education System Responsiveness**
   - A well-planned and responsive education system provides an appropriate enabling environment for the successful implementation of ICT in education policy and programme.
   - To make ICT an integral part of the education master plan and ensure programme support, ICT in education policy should share the same vision as other educational policies or initiatives.

2. **ICT in Education Policy and ICT Infrastructure Support**
   - ICT in education policy that is driven by a vision which can be translated into action targeted at realistic and manageable goals contributes to successful programme implementation.
   - A holistic approach to ICT in education policy goes beyond a technological dimension.
   - Adequate physical and technological infrastructures are necessary conditions for effective ICT integration.

3. **Economic and Social/Cultural context**
   - A well-developed ICT infrastructure in the economic sector facilitates successful implementation of ICT in education policy.
   - ICT in education policy is one of several key economic strategies to ensure sustained economic development of any country.
This means that various aspects in the education system, such as policy, budget, curriculum, professional development, teaching and learning assessment practices and research affect the integration of ICT. Ongoing changes in the system and policy may include use of ICT in all aspects of education. The education system must be responsive to technological changes, making it easy to integrate these changes in the system.

a. **Indonesia**: Further to efforts to enhance the quality of education and to improve educational relevance and efficiency, the Ministry of Education (MOE) is determined to make use of ICT in resolving educational problems. This policy is stated in the Appendix of Presidential Instruction No. 6 in the year 2000. All departments have responded to the policy positively, although the pace and level of implementation have varied. Coordinating teams are being set up to ensure that the policy is implemented effectively and consistently.

b. **Malaysia**: The Ministry of Education (MOE) considers ICT as a means, not an end in itself. All departments in the MOE are actively engaged in the implementation of the ICT in education policy. The departments work together to develop new media as tools for a richer curricula (tools that provide authentic learning contexts and activities for students), promote enhanced pedagogies (from teacher-to student-centred approaches), facilitate more effective organizational structures in the schools (more autonomy to heads of departments and teachers, more sharing among teachers, and less bureaucracy in the organization), and establish stronger links between schools and society (open communication between schools and parents and collaboration with industries and institutes of higher learning).

c. **South Korea**: In a knowledge-based society, work and education are integrated. Thus, knowledge is produced not by a small elite class but by a mass of active workers in the workplace. To make the education system more responsive to the needs of a knowledge-based society, the Korea Education and Research Information Service (KERIS, 2002, pp.4-5) has recommended changes to the education system. The first is a change of direction based on learning, not on education. Up to now, the main function of school education has been to deliver knowledge accumulated throughout human history. But in a knowledge-based society, knowledge is delivered and developed by the people. For as long as schools maintain the cramming system of education, it will be difficult to
cultivate new intelligence essential for a successful knowledge-based society.

The second change is to have the education system focus on students. In an industrial society, standardized textbooks and identical teaching methods are used in educating students who have different aptitudes and learning habits. In a knowledge-based society, the main focus of education is the individual student.

The third change is the introduction of a creative and self-directed education method. The new knowledge for the knowledge-based society is living knowledge that takes into account many factors, such as real life situations and problems.

Recognising the social paradigm shift, top-level decision makers have supported the long-term plan for ICT in education, leading to the country’s ICT in education policies implemented in 1989 up to the present.

d. Thailand: To make the education system more responsive, the newly established school curriculum standards in eight key learning areas incorporate ICT as a tool to support the shift to student-centred approaches. The integration of ICT in the curriculum is encouraged and driven by several projects and initiatives in line with national and local ICT policies, e.g. EdNet, SchoolNet, Teacher Support System and ICT Training Centre Schools. At the same time, administrative measures at the ministerial level are mandated to facilitate the operation of responsible units at departmental levels in the development of ICT educational resources, e.g. e-Learning, e-Book, on-line testing system and educational multimedia to support teaching and learning in all subject areas. Several special task force committees have been established to move these activities forward.

However, integration requires effective coordination and communication among the decentralized administrative structures, within and outside the MOE. This has been rather difficult to handle at this stage because of frequent staff transfers of personnel in the responsible units. Current efforts focus on the implementation of a school-based management approach in a number of pilot schools to prepare them for responsibilities in the areas of policy, budget, curriculum, professional development, research, and general affairs.

e. Singapore: Teaching and assessment methods are reviewed and modified continuously to nurture thinking skills and creativity and to encourage knowledge generation and application. Various initiatives have been implemented over the years: Thinking Programme, Project Work, Integrated Programmes (for secondary schools and junior colleges) and Fostering a Spirit of Innovation and Enterprise in Schools. The Project Work (PW), implemented in the schools since 2000, provides students with an integrated learning experience to explore inter-relationships and inter-connectedness among different disciplines. It encourages the application of creative and critical thinking skills and provides opportunities to develop communication, collaborative and lifelong learning skills. Another initiative is the Integrated Programmes (IP) where a broader and more flexible Junior College (JC) curriculum and a more diverse JC/Upper Secondary Programme are developed to better prepare students for varied challenges in the future. The revised JC curriculum will be first offered to JC 1 students in 2006, while the first batch of approved IP schools will admit students in 2004. In all these initiatives, ICT is a mediating tool. The first Master Plan for ICT in Education (MP1) is well placed and supported within the education system.
With a clear and common vision, ICT becomes part and parcel of education plans, ensuring its implementation. It also enables education stakeholders to examine opportunities for ICT in education.

a. Malaysia: A mission statement formalized by the MOE in 1995 reflects the Ministry’s commitment to the goals of Vision 2020: “To develop a world class quality education system which will realize the full potential of the individual and fulfil the aspirations of the Malaysian nation.” This vision is consistent with the objectives of ICT in education policies.

b. Philippines: The overall goal of education at all levels is the development of a higher level of thinking skills (e.g., abstracting, planning, critical thinking and problem solving). In support of this, the ICT in education policy envisions that ICT will be used as a mediating tool in education to engage students in a higher level of thinking.

c. Singapore: MP1 was implemented in 1997, the same year as the launching of the vision, “Thinking Schools, Learning Nation”. Under this vision, the MOE has shifted from efficiency- to ability-driven education aimed at developing and harnessing the abilities and potential of every child. This vision is consistent with the objectives of MP1, that is, to create a student-centred learning environment, inculcate good values and nurture thinking skills and creativity through the formal and informal curricula.

d. South Korea: The objectives of the ICT in education policies are consistent with changes to the education system as proposed by KERIS in 2002, covering (i) a change of direction based on learning that is geared towards construction and generation of knowledge; (ii) a focus on students; and (iii) a creative and self-directed education approach where education stakeholders are given more autonomy.
**Issue 2**

**ICT in Education Policy and ICT Infrastructure Support**

Realistic goals are observable and measurable. For example, “by the end of 2005, X number of teachers would have been trained in the use of ICT in science, mathematics and language” or “by the end of 2005, an electronic library would have been set up to support teaching/learning and training activities”. During the different phases of ICT in education policies, these goals can be assessed to identify gaps and adopt strategies to address them.

**a. Indonesia:** Based on the vision of life-long learning, the working teams of MOE have developed a five-year action plan (2001-2005) for integrating ICT in education. The Plan covers the following:

- To prepare a masterplan for the development of human resources for ICT.
- To develop ICT networks for public and private universities, as well as research and education networks in the country.
- To develop and implement ICT curricula for all levels of education.
- To use ICT as an essential part of the curricula and learning tools in schools, universities and training centres.
- To participate in global learning and other networks.

**b. Malaysia:** The objectives of the ICT in education policy are in support of the goal to achieve a world class education system by 2020. Thus, ICT is used as an enabler to reduce digital gaps among the schools, as a teaching and learning tool, and as a tool to increase the productivity, efficiency and effectiveness of the management system. When fully developed, the Malaysian Smart School is expected have the following features:

- A philosophy that affirms students’ ability to learn if taught, and responds to the high expectations from students
- A broad curriculum that considers students’ different capabilities and needs
- A school climate that is conducive to learning
- An on-going assessment that supports good instruction
- Strong and professional principals and teachers
- A high level of parent and community involvement and support
c. **Singapore**: Based on the vision, “Thinking Schools, Learning Nation”, the blueprint for MP1 consists of four main goals:

- **Enhance linkages between the school and the world around it, so as to expand and enrich the learning environment**: Teachers and students can access a wealth of educational resources outside the school and collaborate with other educational institutions - local and foreign, and the community at large. With these new learning connections, students develop appropriate perspectives on working and living in an increasingly borderless and complex world.

- **Encourage creative thinking, lifelong learning and social responsibility**: Students develop competencies in accessing, analyzing and applying information, and cultivate independent learning. ICT-based learning strategies help to develop the students’ ability to think creatively, to cooperate with one another and to make sound value judgments.

- **Generate innovations in education**: The integration of ICT-based teaching and learning approaches engenders innovations and encourages new curricula and new assessment methods to meet the objectives of education. In addition, MP1 provides schools with autonomy to use ICT resources flexibly to meet the needs of students. ICT also enhances learning and school administration.

- **Promote administrative and management excellence in the education system**: ICT promotes efficient communication within the school, among schools and between them and the MOE. It also enhances school administration and effective decision-making at all levels.

d. **Thailand**: The e-Education component of the 2001-2010 National ICT Master Plan in education is fully supportive of the vision of lifelong learning. It aims to develop mechanisms for effective educational policy and management, improve and develop the ICT infrastructure to provide education for all, promote and develop human resources at all levels, accelerate the development of knowledge and information, and provide more access to knowledge and information.
A holistic approach to ICT in education policy goes beyond a technological dimension.

Although ICT infrastructure may be a necessary condition for successful ICT integration in education, it is not an end in itself. The ICT in education policy should consider other aspects, such as the curriculum, assessment, ICT resources, professional development of teachers, research and development and fund generation.

a. **Philippines**: The ICT Plan for Basic Education focuses on seven key areas: infrastructure development; technical support; teacher training in the design, production and use of ICT-based instructional materials; research and development; technology integration in the curriculum; use of innovative technologies in education and training; and fund generation, particularly through non-traditional funding schemes.

b. **Singapore**: Four key areas are covered in MP1: curriculum and assessment, learning resources, teacher development, and physical and technological infrastructure.

c. **Thailand**: MOE’s ICT Plan focuses on ICT use in four areas: improving the quality of teaching and learning, developing the educational management and administration system, building the capacity of education personnel, and developing educational ICT infrastructure.
Adequate physical and technological infrastructures are necessary conditions for effective ICT integration

According to many researchers, the most frequently mentioned problem in integrating ICT in education is the insufficient number of computers (Cheung, 1997; Williams, Coles, Wilson, Richardson, & Tuson, 2000; Pelgrum, 2001). Countries with adequate budgets for ICT in education tend to have good physical and technological infrastructures. Other countries have successfully overcome budget constraints and are able to provide necessary infrastructure based on the needs of the school or region. Some other countries that have large budgets for ICT in education lack the expertise to identify appropriate hardware and software to purchase and, as a result, ICT integration is not well-supported by adequate infrastructure.

a. Indonesia: Some programmes have been launched to provide ICT infrastructure in schools. Among the programmes are OSOL (One School One Computer Laboratory) and WAN Kota. OSOL is a programme of the Ministry of Communication and Information under Ministerial Decree 17/KEP/M.KOMINFO/4/2003, through which the Government encourages all concerned parties to assist in providing good computers for schools at low prices. Many members of the private sector are collaborating among themselves to produce low-priced computers (US$170–180 each) as well as software for teaching purposes. Through their efforts, it is hoped that every school will have its own computer laboratory facility. In addition, other members of the private sector are helping to solve the country’s ICT infrastructure problem. Microsoft Indonesia, for example, is cooperating with many concerned parties. For every used computer donated to a school, Microsoft Company has provided Microsoft Office for free. Microsoft Windows and Microsoft Office to be used for education purposes are offered at a reduced price of about 2.5 USD/license for MS Windows 98 and MS Office. Another example is Cisco’s assistance to the Directorate of Vocational Secondary Education in developing local area network for some vocational secondary schools.

Another good example is WANKota (City Wide Area Network of Schools) that is managed by Directorate of Vocational Secondary Education. This programme was developed to connect vocational schools in one district through the use of wireless technology. Each school is connected to the centre (server school) utilising radio frequency. In other words, WANKota serves as:

1. a means for information and communication among schools within a specific district, including junior high school, vocational secondary school and senior secondary school;
2. a server for learning materials (especially modules) in all subjects required by students;
3. a centre for information technology training;
4. a centre for distance learning.
5. a digital library centre that can be accessed by all schools in a specific district.

b. Malaysia: Various types of schools are equipped based on their needs, location and region. Three models of ICT infrastructure are found in pilot schools under the Smart Schools Project.

- Level B provides 37 computers. 21 are placed in a computer laboratory and the rest are in the resource centre and administrative office. There are two notebooks and three servers per school. The computers are connected to the Internet by Fast Ethernet backbone with 128/64 kbps leased line.
Level B+ provides the computer laboratory with 81 computers, two notebooks and three servers. Six computers are placed in each of the 15 classrooms and science laboratories. Computers in the resource centre and the administrative office are supported by 128/64 kbps leased line.

Level A provides computers in full classrooms. The schools are located in urban areas and are equipped with 520 computers, five notebooks and six servers with 512/256 kbps leased line. 35 computers are placed in each of the four computer laboratories, seven computers in each of the 40 classrooms, seven computers in each science laboratory, and the rest are in the resource centre, the teachers’ room, and the administrative office.

Countries that face budget constraints could adapt these models.

c. Singapore: As a guideline for schools, MP1 set out national standards for ICT infrastructure by the year 2002, which envisaged that students would spend up to 30% of their study time using ICT. A student-computer ratio of 2:1 was targeted for every school by 2002. All primary schools were initially provided with a student-computer ratio of 6.6:1, while secondary schools and junior colleges had an initial student-computer ratio of 5:1. Students were also provided access to ICT facilities in all learning areas in the school, including classrooms, libraries and special rooms, besides computer laboratories. This encouraged effective integration of ICT in the curriculum.

MP1 provided school-wide networking in every school and allowed access to courseware, the Internet and digitized media resources in all classrooms and learning areas. Networking also allowed sharing of teaching resources within and between schools. All schools were linked through a Wide Area Network (WAN), which was eventually connected to the high-speed backbone of Singapore ONE. Teachers and students from primary four and above were given email accounts. Additional physical infrastructure, with respect to power, space and furniture required for an ICT-enriched school environment, were incorporated into future school building specifications.


The Comprehensive Plan was completed with cooperation from the Ministry of Planning and Budget and the Ministry of Information and Communication and the infrastructure for ICT use in education was constructed. As a result, every elementary and secondary school in the country has installed a LAN and is connected to the Internet, marking the first time that this has been achieved on a national scale anywhere in the world. More than 13,000 computer laboratories are now in use by teachers and students in these schools. Each of the 222,000 classrooms has PCs and multimedia equipment. PCs have also been distributed to every member of the 340,000 teaching staff. Thus, all elementary and secondary schoolteachers are able to use the Internet as a teaching-learning resource.

e. Thailand: There are several projects in which educators and researchers employ innovative strategies to combine old and new technologies, exploiting the potential of both, and making decisions about the best medium to convey information and to improve
learning. One notable example is Sukhothai Thammathirat Open University’s School of Education (STOU) that offers in-service programmes (two-year and four-year degree programmes and one-year teaching certificates) for the professional upgrading of teachers. A six-credit course in STOU may consist of 15 units of printed text and workbooks, 15 twenty-minute radio programmes, 3-5 half-hour TV programmes, 1-3 audio-cassettes and 10-25 hours of face-to-face tutorials.

A more recent example is the development of a Linux School Internet Server (Linux SIS) by the National Electronics and Computer Technology Centre (NECTEC), offering the Government a cheaper alternative to move schools beyond the first phase of Internet implementation and eliminating the need to invest on expensive server software. It also overcame the language barrier since documentation is in the Thai language.
There should be a national ICT plan to develop basic ICT infrastructure in the country. This plan should provide a foundation for ICT in education policy.

a. **Malaysia**: The Multimedia Super Corridor (MSC), launched in August 1996, is a regional launch site for companies developing or using leading multimedia technology. It has facilitated successful implementation of ICT in education policy. It brings together four key elements:

- Best possible physical infrastructure, including Kuala Lumpur City Centre, the new Kuala Lumpur International Airport, rapid rail links to Kuala Lumpur, a smart highway, and two intelligent garden cities (Cyberjaya and Putrajaya).

- New laws, policies, and practices designed to enable and encourage electronic commerce, facilitate the development of multimedia applications, and position Malaysia as a regional leader in intellectual property protection.

- High capacity global communications infrastructure built on the MSC’s 2.5 – 10 gigabit digital optical fibre backbone and using Asynchronous Transfer Mode (ATM) switches to provide fibre to the buildings. This network has a 5-gigabit international gateway with direct links to the United States, Europe, and Japan, as well as other countries in Southeast Asia.

- The Multimedia Development Corporation (MDC), a one-stop shop that manages and markets the MSC. The MDC’s mission is to create the best environment for private sector companies to use multimedia and to promote investments in the MSC.

b. **Singapore**: The Civil Service Computerization Programme launched in 1982 paved the way for nationwide computerization and set the pace for ICT application in Singapore. This was followed by the National IT Plan (NITP) in which the National Computer Board (NCB) made improvements to the ICT infrastructure as part of a seven-pronged ICT strategy. The current phase of ICT initiatives began in 1991 with the launch of the IT 2000 Master Plan. Singapore will be transformed into an intelligent island, where ICT permeates every aspect of life – at home, work and play. These initiatives in infrastructure development provide the basic foundation for the introduction of ICT in education.
ICT in education policy is one of several key economic strategies to ensure sustained economic development of any country.

ICT in education policy should not be formulated in isolation but should be planned and implemented to complement and support other development strategies. In the face of intense competition, countries can no longer rely on the accumulation of capital and labour to sustain economic growth. Each country has to redefine itself to remain competitive and this requires it to move towards more value-added industries that produce high-tech and knowledge-intensive products.

a. **Malaysia**: Consistent with Vision 2020, seven flagship applications were introduced in 1997 as part of the overall plan to develop the MSC and to jumpstart the country’s leapfrog into the ICT Age. Vision 2020 calls for sustained, productivity-driven growth that can be achieved only with a technologically literate workforce that is capable of critical thinking and is prepared to participate fully in the global economy. One flagship application is the ICT-enabled Smart School. The others are Electronic Government, Telemedicine (later renamed Telehealth), Multipurpose Card, Research and Development Clusters, Worldwide Manufacturing Web, and Borderless Marketing.

b. **Singapore**: National policies to nurture the country’s knowledge-based economy and to work towards becoming the knowledge hub in the region and beyond have been formulated. Efforts in support of these policies include enhancing the national innovative system and entrepreneurship and education capability (Toh, Tang, & Choo, 2002). The capacity of the workforce to generate new knowledge is continuously being upgraded. A three-tier system suggested by the ERC Working Group on Education for the short- to medium-term includes universities (to provide a broader tertiary education base as well as cater to specialized niches), a core of quality commercial schools (to foster on-the-job upgrading), and multi-national corporations (to set up regional training facilities in Singapore). (Toh et al., 2002).

c. **Thailand**: MOE’s ICT in Education Master Plan focuses on the use of ICT as a major tool for education reform, consistent with ICT strategies in the ICT Master Plan of the Ministry of Information and Communications Technology (MICT) in the e-Education, e-Society and e-Government components. The e-Education and e-Society strategies provide for the use of ICT infrastructure in accessing information and knowledge to upgrade the basic capacity of the Thai society, reduce the digital divide and promote learning in the Thai society. The country’s telecommunications network has to be developed and improved to provide services at affordable costs.

ICT will be utilized for educational development and services (e.g. content development, curriculum resources and media development, distance learning via satellite or Internet). These strategies support the MOE 2004-2006 mission to improve the quality and effectiveness of student learning, the development and production of ICT personnel, and the distribution of ICT infrastructure for education. The e-Government strategy, utilizing ICT for good governance, emphasizes improvement and development of the administration and management systems in all government organizations. This strategy supports the decentralization of the MOE administration and management, from the ministerial level to the level of schools and educational service areas.