Component 2
Policy and Regulatory Environment
The importance placed on developing ICT policy in education varies from country to country. Some countries piloted ICT use in schools and trained teachers without an ICT in education policy. Others found it important to have a policy to serve as a framework and guide. From a cultural-historical perspective, the launch and implementation of an ICT in education policy are only a part of the development of an overall policy with respect to ICT in education. Malaysia and Singapore carried out pilot studies prior to launching ICT in education policies.

This component includes an account of how ICT policies are transformed into action, driven by a vision and supported by a blueprint and a roadmap. The enabling and inhibiting regulations (e.g. censorship laws) dealing with ICT use in education are examined. ICT in education inevitably has macro-economic impacts on a country, including narrowing the digital divide. Finally, this component ends with examples of inter-ministerial collaborations and how to obtain support from policy makers for the effective implementation of ICT in education programmes and/or policies.

The purpose of this component is to identify strengths, weaknesses and gaps in the development of ICT in education policy. Six issues are discussed: (i) policy development (focus on pre-launch of an ICT in education policy), (ii) transforming policy into action, (iii) legal and regulatory framework, (iv) macro-economic impact, (v) inter-ministerial collaboration, and (vi) advocacy and obtaining support of policy makers and other stakeholders.
Lessons learned

Based on the experiences of the six countries with respect to the six issues above, the lessons learned are the following:

1. Policy Development (focus on pre-launch of an ICT in education policy)
   - To ensure that ICT in education policy is integrated in the national ICT policy, Ministries of Education (MOE) should work closely with other government organizations, especially those in charge of implementing national policies on ICT and telecommunications.
   - Lessons learned from pilot projects and studies in education that are carried out at different levels of the school system provide the basis for further policy expansion.
   - Harmonized implementation of ICT in education programmes can be achieved by defining clearly the roles and responsibilities of all departments (within the MOE and other relevant ministerial departments) in the implementation of ICT master plans, showing clearly the different components of project activities, including budget allocations, manpower requirements and timetables.

2. Transforming Policy into Action
   - Phased implementation of ICT in education policy ensures that the implementation process is manageable and the development of best practices and lessons learned is gradual. It also provides opportunities for evaluations so that the policy can be revised and fine-tuned.
   - Central support from the MOE to pursue a clear and measurable vision helps in developing and implementing a comprehensive programme for the capacity building of schools in using ICT in education.

3. Legal and Regulatory Framework
   - Initial filtering of the Internet from undesirable websites is necessary in order to prevent their harmful influence on younger students who may not be able to discern the veracity and reliability of information.
   - More than any software or hardware device, better protection is ensured by making education on safety issues pertaining to the Internet an integral part of parenting as well as of teaching and learning activities at home and in the school.

4. Macro-Economic Impact
   - To narrow the digital divide, ICT in education policy should complement other government initiatives, such as public education in ICT, donation of computers and provision of free Internet access.

5. Inter-Ministerial Collaboration
   - Sharing expertise, experiences and infrastructures among ministries and government agencies helps to coordinate and harmonise implementation of ICT in education programmes.
   - Creating a national policymaking, regulatory and implementing agency for ICT development systematizes inter-ministerial cooperation on ICT in general, including education.
   - Beyond ministries and government agencies, inter-ministerial collaborations could involve private sector participation.

6. Advocacy and Obtaining Support from Policymakers and Other Stakeholders.
   - By linking the objectives of ICT in education policy with national education objectives, support from policymakers and other MOE stakeholders, including human capacity building, could be more forthcoming.
   - By making policymakers and stakeholders regularly aware of and updated on the benefits of ICT to education, based on research results and documentation of experiences, advocacy for the acceptance of ICT use in education is further strengthened.
   - By making all decisions taken or amended by the MOE’s highest steering committee known to all members of the committee and heads of departments, their sense of ownership and involvement is enhanced.
Synthesis of Experiences

Issue 1
Policy Development

To ensure that ICT in education policy is integrated in the national ICT policy, Ministries of Education (MOE) should work closely with other government organizations, especially those in charge of implementing national policies on ICT and telecommunications.

As ICT in education policy is an integral part of the national ICT policy, the MOE has to work closely with relevant organizations in the country.

a. **Indonesia**: The first attempt to wire schools was undertaken by the Indonesian Internet Service Providers (ISP) Association with its Sekolah 2000 Project that was aimed at connecting 2000 secondary schools by the year 2000. The Ministry of National Education, together with other organisations like ISP and telecom operators, and private sponsors such as CISCO and ORACLE, APJII, worked to develop a portal. By the end of the year 2000, the project had connected 1,180 schools translating into half a million new Internet users from high schools.

b. **South Korea**: Collaboration at different levels, including inter-ministerial, was made possible through wide understanding of the first national plan for ICT use in education, when it was established in 1988, and mutual agreement to a national vision that ICT is the basis for future national growth. The Korea Telecommunication Company presented PCs and hardware infrastructure to primary schools throughout the country, while mass media companies and other organizations conducted the pilot project. This type of collaboration in the provision of hardware and software support made the national plan a success.

c. **Thailand**: MOE collaborated with different government agencies on the ICT in Education Master Plan. These included NECTEC, Institute for the Promotion of Teaching Science and Technology (IPST), and Ministry of Information and Communications Technology (MICT). The partnership model is demonstrated by the cooperation among the Faculties of Science of 24 government universities, IPST and MOE to improve science and mathematics teaching and learning in schools. IPST signed an MoU with the Deans of Science Faculties in 2001 to develop schools under the supervision of universities. Under the MoU, IPST would provide financial support to a university that is undertaking such development. The Science in School Project and the GLOBE Programme are other activities conducted in schools under the financial and academic support of universities and IPST.

d. **Singapore**: The National IT Plan provides a seven-pronged approach to the ICT strategy: developing ICT professionals and experts; improving the information and communication infrastructure; promoting the ICT industry; promoting co-ordination and collaboration among ICT-promoting organizations;
establishing a culture that welcomes ICT; encouraging creativity and entrepreneurship; and increasing ICT applications in the workplace (National Computer Board, 1986). To further support these approaches, the education system underwent some major changes. At the tertiary level, polytechnics and universities were oriented towards ICT-related training; and at the secondary and primary levels, the system was restructured away from the British system to incorporate features of a German system, such as training in mathematical and technical competencies. Computer awareness programmes were introduced in schools (Low, Soon, & Toh, 1991). MOE worked closely with the National Computer Board before the launch of MP1.

e. Indonesia: The first attempt by the Indonesian Internet Service Providers (ISP) Association’s to wire schools was undertaken through its Schools 2000 Project, aimed at connecting 2000 secondary schools by 2000. The Ministry of National Education collaborated in developing a portal with ISPs, telecom operators and private sponsors, such as CISCO and ORACLE. By the end of 2000, the project had connected 1,180 schools, translating into half a million new Internet users in high schools.

Pilot studies provide a good basis for the successful implementation of ICT in education policy. Through formative and summative evaluations of pilot studies, best practices and lessons learned can be integrated in the ICT in education policy. The policy should be able to refine and expand the scope of the pilot initiatives. Without follow-up action, it will be difficult to integrate pilot studies in ICT in education policy.

a. Malaysia: A joint Ministry-Industry task force drew up in July 1997 a blueprint on the key components of the Smart School, based on a concept document, “Smart Schools in Malaysia: A Quantum Leap”, which was produced by the MOE in January 1997. The Smart School blueprint is open to further refinements, including advances in pedagogy and improvements in ICT. The Smart School Pilot Project was launched in 1999. The schools served as nucleus for nationwide promotion of the Smart School concepts, materials, skills and technologies. The pilot project tested the Smart School Integrated Solution, which had the following main components:

- Browser-based teaching-learning materials (and related print materials) for Bahasa Melayu, English Language, Science and Mathematics
- A computerized Smart School Management System (SSMS)
- A Smart School Technology Infrastructure involving the use of IT and non-IT equipment, local area networks for pilot schools, and a virtual private network that connects the pilot schools, the Ministry’s Data Centre and the Ministry’s Help Desk
- Support services in the form of a centralized Help Desk and service centres throughout the country to provide maintenance and support
- Specialized services such as systems integration, project management, business process re-engineering, and change management.

At the end of the Smart School Pilot Project in December 2002, there were 87 networked schools (83 secondary and 4 primary) in all states throughout the country, 1494 courseware titles for Bahasa Melayu, English Language, Science,
Mathematics, a computerized and integrated Smart School Management System, a Help Desk, and a Data Centre, and trained administrators, teachers and IT coordinators from all the pilot schools.

b. **Singapore**: Three pilot studies were conducted targeting primary schools, secondary schools and junior colleges, taking into account that operations, teaching and learning are different at these three levels. ICT was first piloted by the MOE as a tool to assist students’ learning with the introduction of a project, “Accelerating the Use of ICT in Primary Schools (AICTP)”. The AICTP, implemented in six pilot schools in mid-1995, introduced multimedia teaching in key subjects at the primary level. Students in pilot schools spent about 10% of curriculum time using ICT. The evaluation found the programme helpful to most pupils in their learning. Academically inclined students using ICT have become more independent learners, while others, encouraged by hands-on lessons, showed greater interest in their studies and reached the curriculum objectives.

The Student’s and Teacher’s Workbench (STW) implemented in six pilot secondary schools in 1996 with a fully ICT-based science curriculum, provided a central repository for educational resources and lesson packages for teachers.

The JCNet, a Research and Development project on Internet use, was implemented in two junior colleges in 1997. The AICTP, STW and JCNet projects were integrated and expanded in scope in the ICT in education master plan, launched in April 1997. Several features of the STW were incorporated in the MP1, such as the development of Digital Media Repositories (DMRs), resources used by teachers and involvement of private sector content providers. In the course of implementing MP1, further lessons were drawn from the STW project on extending it to other schools.

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**Harmonized implementation of ICT in education programmes can be achieved by defining clearly the roles and responsibilities of all departments (within the MOE and other relevant ministerial departments) in the implementation of the ICT master plan, showing clearly the different components of project activities, including budget allocations, manpower requirements and timetables.**

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a. **Malaysia**: Although the specific roles of concerned agencies were not clearly defined when the Multimedia Super Corridor (MSC) Flagship Applications were launched in 1997, the following general roles were designated:

- MOE as lead agency of the Smart School, one of the flagship applications
- MDC as coordinator of the MSC Flagship Applications
- A company or a consortium short-listed by the lead agency to deliver the solution requested through the Concept Requests for Proposals Process
- Central agencies with responsibility for procurement and legal aspects, such as the Treasury and the Attorney-General’s Chambers.

In 1999, the MDC invited all government agencies and consortia involved in the MSC to help clarify and delineate roles and responsibilities. As a result of this exercise, many of the implementation problems identified by the lead agencies and the consortia, such as manpower shortage, unclear government
procedures and processes, and cross-flagship integration requirements, were resolved.

b. **Thailand**: The MOE appointed four sub-committees responsible for specific areas in the ICT in education master plan. To ensure effective policy implementation, the sub-committees were supervised and directed by the MOE Deputy Director-Generals, serving as Chief Information Officers of relevant departments. However, policy implementation depended on the ICT vision of the Director-Generals, with some of them not fully appreciating the value and importance of ICT use. Frequent transfers of senior executives between departments also affected the continuity of the work plan. The recent establishment of ICT Operation Centres at all levels, from ministerial to national, could address this setback. The centres are expected to be in operation by the end of 2003.

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**Issue 2**

*Transforming ICT for Education Policy into Action*

Demonstration schools (from the first phase) could serve as models for ICT integration. These schools could encourage the staff to share their experiences and expertise with staff from other schools, or they could post their teachers to other schools that wish to start ICT integration. Alternatively, staff from other schools could be attached to these demonstration schools to observe best practices and immerse themselves in a culture that supports ICT integration.

a. **Singapore**: MP1 consisted of three phases: Phase I (1997), Phase II (1998), and Phase III (1999). Schools with a history of effective ICT integration were chosen as demonstration schools, also known as Phase I schools. There were 22 Phase I schools: 10 primary schools, 10 secondary schools and two junior colleges/centralized institutes (JC/CIs).

In Phase II and III schools, implementation of the ICT in education master plan started in 1998 and 1999, respectively. Phase II schools were identified based on the school principals’ evaluation of staff readiness for the new initiative. There were 106 Phase II schools and 268 Phase III schools. Schools were given the flexibility to decide on the pace of ICT integration.

ICT core training for all schools was completed by May 2001. The teachers were trained in basic ICT use, including word processing, spreadsheets and the Internet. A four tier-fan training model was put in place to acquaint teachers with ICT integration. This started with 60 senior ICT instructors from the Education Technology Division (ETD) who trained before visiting the schools to train, team-teach teachers and work with them. Together with teachers and heads of departments from Phase I schools, these instructors went to Phase II schools. Together with Phase II schools teachers, they went to Phase III schools.

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**Phased implementation of ICT in education policy ensures that the implementation process is manageable and the development of best practices and lessons learned is gradual. It also provides opportunities for evaluations so that the policy can be revised and fine-tuned.**
Central support from the MOE to pursue a clear and measurable vision helps in developing and implementing a comprehensive programme for the capacity building of schools in using ICT in education

a. Indonesia: Most departments within the Ministry of National Education administer programmes on ICT use in education in their chosen manner. The same situation also occurs at the school level, with schools running their ICT in education programmes in their own way, without any special directives/regulations follow. The MOE may need to set up a special working team (national commission) that will be fully responsible for developing and implementing ICT use in education. This national commission may be responsible for:

- establishing a five or ten-year strategic plan with a clear and measurable vision;
- creating an institutional mechanism for effective and efficient implementation of the plan;
- planning the budget needed to implement the plan;
- planning the infrastructure and connectivity needed to implement the plan;
- developing and implementing clear regulations and guidelines (from national to school levels) on ICT use in education;
- developing and implementing a comprehensive programme for building the capacity of schools (teachers and administrators) for ICT use in education. This would include ICT literacy skills, use of ICT for instructional and/or non-instructional purposes; ICT-based learning materials and development of skills; and
- planning and implementing evaluation and monitoring to make sure that ICT use in education is in accordance with the plan.

b. Malaysia: To monitor and guide the progress of the Smart School Pilot Project, the following committees were set up:

- Ministry of Education Smart School Steering Committee, chaired by the Secretary-General of Education. Members included all heads of departments and divisions in MOE and representatives from central agencies and the MDC.
- Smart School Pilot Project Steering Committee, chaired by the Deputy Director-General of Education. This committee ceased to function upon completion of the pilot project in December 2002. Members included the Pilot Project Director, senior officers from the Pilot Project Team, the Ministry’s Legal Adviser, a representative from the Ministry’s Supply, Privatization and Development Division, a representative from the Treasury, a representative from MDC, and representatives from the senior management of the shortlisted consortium.

c. Philippines: While there is no national government agency dedicated to ICT, policy and regulatory functions are shared by the Department of Transportation and Communications and the National Telecommunications Commission. Responsibility for policymaking and coordination of national ICT plans and initiatives is held by the Information Technology and Electronic Commerce Council (ITECC), a joint private-public sector body constituted in 2000 and currently chaired by the President of the Philippines. Within ITECC is a Committee on Human Resource Development, which in turn has a Subcommittee on Basic Education. There are plans to create an ICT Commission that would supersede ITECC and will be the precursor to a Department of ICT. The plans...
were announced in August 2003. The ICT Commission, to be established in 2003 (Oliva, 2003), will be empowered to implement ICT projects.

However, at the time of writing, the ICT Plan for Basic Education is still a draft document and has not been circulated widely in the Department of Education, leading to some confusion at the sub-national and school levels concerning its implementation. Moreover, implementing guidelines have not yet been formulated and schools are not aware of what is expected of them, in relation to the curriculum and the management of their ICT resources.

d. **Singapore**: Responsibility for facilitating the conceptualization and implementation of the five-year MP1 and the follow-up MP2 is held by the Education Technology Division (ETD) at MOE. Different branches and offices at ETD work together and share responsibilities to achieve the objectives of the Division. These branches include ICT Planning, ICT Curriculum and ICT Training.

e. **South Korea**: The Ministry of Education and Human Resources Development set up a commission to manage the ICT in education policy, coordinate projects involving educational reform and human resources, implement basic plans, mobilize and allocate resources, and provide administrative and financial support for the promotion of ICT use in education. The commission consists of specialists and officials from various ministries. As South Korea is highly centralized, policies from the national level (ministerial level) are disseminated throughout the country through 16 boards of education, 200 regional boards of education and about 10,000 primary and secondary schools. The ICT policies cover hardware instalment, educational software development and teacher training. A new body with responsibility for the policies was established at the Korea Educational Development Institute in 1988, later becoming KERIS. By 2001, all primary and secondary level schools were provided multimedia laboratories, network, software, educational contents, teacher training and support for educational administration.

f. **Thailand**: The ICT Planning Team was formed with representatives from departments in the MOE to determine the scope of work and to plan tasks in accordance with established policies. Generally speaking, the master plan is quite clear and useful in guiding and supporting existing projects and initiatives. The only weakness in implementing the plan is the lack of standards and models for teaching and learning, hardware and software requirements, and staff development. Research studies on standards and models have been subsequently conducted and made available as references for setting target outcomes and as benchmarks for evaluating accomplishments.

For example, the MOE Staff Development Sub-Committee has been working on a master plan to guide the organization and development of professional personnel in education, including school administrators, ICT teachers, non-ICT teachers, technology coordinators, and other education personnel.
Two common filtering techniques are human analysis and software analysis. Human analysis is labour intensive as websites are reviewed one by one and those with objectionable contents are put in a “blocked list”. Software analysis can be carried out with a database of content that should be blocked, such as vulgar images and texts. When somebody attempts to access a website, the software checks whether the site contains any block-worthy content, and performs a block accordingly. Filtering is particularly crucial for young students who are not be able to discern the veracity and reliability of information. Although an excellent idea, filtering is not foolproof and Internet-savvy children can still get around it. Some schools have adopted extreme measures, such as keeping the students off the Internet entirely unless supervised by teachers. However, such measures deprive students of essential tools for survival in the 21st century.

a. **Singapore**: The framework for the Internet developed by the Media Development Authority (MDA) emphasizes public education, industry self-regulation, and minimum regulation through a transparent licensing framework. One of MDA’s main concerns is access to pornography on the Internet, especially by children and minors. Its regulatory focus is on mass impact websites that distribute pornography. The Internet Code of Practice identifies what the community regards as offensive, that is, pornography, violence and materials that may undermine Singapore’s racial and religious harmony. It also spells out the obligations of Internet Service Providers (ISPs) and Content Providers (MDA, 2003). The three ISPs, Pacific Internet, SingNet and StabHub have launched their own Family Access Networks (FAN) that offer services to filter out most undesirable or pornographic sites. They are the Cyber Guard Family Access, Family Online and Infinity Family Access, respectively.

Apart from filters provided by ISPs, there are commercially available software programmes that help to block out unsuitable websites. Software filters block harmful websites, such as those on pornography, drug abuse and hate. It is important to note that no filter offers a foolproof way of blocking all child-corrupting sites.
More than any software or hardware device, better protection is ensured by making education concerning safety issues pertaining to the Internet an integral part of parenting as well as of teaching and learning activities at home and in the school.

E ducation concerning the dangers of the Internet offers better protection than any software or hardware device (Aftab, 2000). Therefore, schools and parents should guide students in surfing the Internet and discuss Internet issues with them (Turow & Nir, 2000). Schools should also allow children to share experiences online and give them opportunities to show teachers and parents what they know. Teachers and parents also need to be trained and supported so that they can educate students and children about Internet safety. Government organizations, volunteer organizations and schools can provide training and support.

a. **Indonesia**: To ensure safe surfing, ICT WATCH, a private institution, has introduced a programme known as “Internet Sehat” or “Healthy Internet”. The programme provides guidance and issues guidelines concerning safe and appropriate use of Internet such as:

1. To be careful when using e-banking in public service areas, e.g. in Internet kiosks,
2. To refrain from giving any passwords to others through the Internet, and
3. To refrain from opening any attachment file from unknown senders.

b. **Malaysia**: In order to promote Internet use for education, business and entertainment, the Government has decided against censorship of the Internet. Instead, education is the main tool to prevent misuse and abuse of the Internet.

c. **Singapore**: Teenagers generally favour educational strategies over control measures, as revealed in a survey conducted by the National Institute of Education (NIE) in 2001. The items ‘discuss with children dangers on the Internet’ and ‘learning more about the Internet’ (two educational strategies) were rated as most desirable by teenagers, and the items ‘stop child from using the computer’ and ‘complain to Internet Service Provider’ (two control measures) were rated as the least desirable (Lim, Khoo, & Williams, In Press). A volunteer organization that supports parents, teachers and students is the Parents’ Advisory Group for the Internet (PAGi) (http://www.pagi.org.sg/). Volunteers assist in various activities, such as exhibitions, workshops, talks, and production of useful references on online safety, including handbooks and VCDs. These activities are usually carried out in public libraries, community centres and schools.

d. **Thailand**: There is no long-term policy on censorship and, for the time being, censorship is just an experiment, a response to social criticism. As there is no censorship regulation, on-line games and adult entertainment material that inhibit the use of ICT for learning have become a big issue for parents. MICT has passed some measures to restrict access to such material. More serious action has yet to be taken. Teachers and parents should be more involved with students to guide and direct them.
To narrow the digital divide, ICT in education policy should complement other government initiatives, such as public education in ICT, donation of computers and provision of free Internet access.

Investments in ICT facilities in schools will increase access to computers and the Internet, particularly for students from poor socio-economic backgrounds.

**a. Malaysia:** The digital gap between rural and urban schools was reduced through the Universal Service Provision Project that had a budget allocation of RM 50 million in year 2002. The project, involving 220 schools in Sabah and Sarawak, provided basic infrastructure, including electricity, telephone lines, Internet access, computers, telephones and other related equipment. The project will be expanded into a nationwide SchoolNet, benefiting 10,000 schools in the country.

**b. Singapore:** In 2001, PC ownership and Internet penetration for private housing were 81.2% and 73.9%, and 59.6% and 52.4% for public housing; compared with the 1996 figures for PC ownership and Internet penetration of 64.8% and 23.1% for private housing, and 31% and 6.1% for public housing. (IDA, 2002). The Government has committed S$25 million to promote PC and Internet awareness and use in collaboration with community groups and volunteer welfare organizations. In 1999 six hardware and software providers and one ISP funded a key initiative to provide 30,000 low-income households with used PCs bundled with free Internet access and basic training (Choi & Toh, 2000). MOE gave the largest number of used computers.

**c. South Korea:** The Government recognizes the importance of equal access to information and information sharing in a knowledge-based society. Carrying out a promise made by President Kim Dae Jung in 2000, the Government has provided PCs and financial support to students from poor families, enabling them to learn how to use computers and the Internet. In January 2001, the Government enacted a law to further reduce the information gap.

Following the President’s leadership and the policy concerns of Government ministries, the Ministry of Education and Human Resources Development established in April 2001 the Plan for Promoting ICT Use and Distributing PCs to Children from Low-Income Families.

500,000 children from low-income families were given opportunities for computer lessons and practice. In addition, outstanding students received free PCs and financial rewards. 50,000 PCs were distributed. PC distribution and
support for learning fees for the students will continue until 2005. About 27.4 billion Won (US$23 million) was allocated in 2001, with another 70.9 billion Won (US$60 million) allocated for 2002 to 2005.

**Issue 5**

*Inter-ministerial Collaboration*

**Sharing expertise, experiences and infrastructures among ministries and government agencies helps to coordinate and harmonise implementation of ICT in education programmes**

The MOE needs to make its vision of ICT in education explicit and clear when working with other ministries or government agencies. This vision can then be translated into action plans to be carried out collaboratively. Collaborations between the MOE and other ministries should be encouraged and should be subsumed under an overarching framework for ICT in education.

**a. Philippines**

Inter-ministerial collaboration on ICT in Education has taken at least two general forms. The first is exemplified by the cooperation between the Department of Trade and Industry (DTI) and DepEd on a computerization project called “PCs for Public Schools”. In 2001-2003, DTI facilitated a grant from the Japanese Government in the amount of US$12 million dollars to provide 1,000 public high schools with 20 computers each. DepEd, for its part, was responsible for the selection of the school beneficiaries, ensuring that each school was able to meet counterpart requirements. It also supervised actual deployment of the technology package and created mechanisms for proper monitoring and evaluation.

Another form of inter-ministerial collaboration is found in many ICT-related programmes spearheaded by the DOST in DepEd-run schools. Whereas the collaboration with DTI was primarily at the national level, DOST’s dialogue with DepEd is oftentimes at the sub-national and school levels, with minimal interface at the programme (national) level.

**b. Singapore**

The MOE and Infocom Development Authority (IDA) worked closely on projects that drew upon IDA’s technical and connectivity expertise and experiences, as well as IDA’s database of industry partners. MOE also worked with IDA to tap the Singapore ONE national broadband network for interactive, multimedia applications and services. A major collaboration between MOE and IDA is the FastTrack@School project (http://schools.s-one.net.sg/index.html), launched in September 1999 to make Singapore ONE (S-ONE) relevant and useful to schools so that teachers and students could use it for teaching and learning activities. Singapore ONE is the world’s first national broadband network. Over 300 interactive, multimedia applications and services have been developed in Singapore for delivery to offices, homes and schools.

The Fast Track@School encompasses 3 initiatives: (i) create relevant and useful broadband content for schools on S-ONE, (ii) help schools to have wide access to S-ONE; and (iii) help students to have S-ONE access from their homes at an affordable rate. These
initiatives are open to all schools. Schools are invited to submit an initial project proposal to outline their plans. MOE and IDA assess proposals that are received from schools and industry. Twenty-seven schools took part in the pilot project in 2000.

c. **Thailand**: Active collaboration between the MOE and other ministries and the private sector include the EdNet Project (carried out by MOE, the Ministry of Science and Technology and MICT); and the Computer Donation Project (carried out by MOE and the private sector with support from MICT). MOE also collaborated with NECTEC in a project called SchoolNet, launched in 1995 and to be handed over to MOE in 2003. During the period 1998 to 2000, NECTEC collaborated with the Telephone Organization of Thailand (TOT) and the Communications Authority of Thailand (CAT) to set up SchoolNet@1509, a low-cost Internet for schools.

Other examples of cooperation in ICT-related initiatives are the Software Industry Promotion Agency (SIPA), the Multi-application Smart ID Card, e-Procurement, the Government Data Exchange (GDX), personnel development in software industries, development of instructors and R&D researchers for software development, and establishment of institutions for software professional training.

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**lesson learned**

*Creating a national policymaking, regulatory and implementing agency for ICT development systematizes inter-ministerial cooperation in ICT in general, including education*

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a. **Malaysia**: When the MSC Flagship Applications were launched in 1997, the roles of various agencies involved were not clearly defined. In 1999, the MDC invited government agencies and consortia to help clarify and delineate roles and responsibilities. As a result, many implementation problems, such as manpower shortage, unclear government procedures and processes, and cross-flagship integration requirements, were addressed.

b. **Thailand**: The strength of inter-ministerial collaboration is reflected in the unity and determination of all sectors to use ICT in the country’s further development. However, inter-ministerial collaboration is time-consuming as, prior to their launch, projects must undergo a series of consultations between ministerial representatives and their superiors. Because cooperation is carried out on a project-to-project basis, there is no one agency that is willing to be solely liable for implementation and such reluctance frequently causes project delays.

In response the Government is gathering senior officers from related agencies to form a matrix organization or ad-hoc committee. This set up must be recognized by top ranking administrators, including the Prime Minister who has to clearly set up the national agenda and provide more resources for the implementation of the project.

At the same time, MICT is tasked to bring together ICT needs of various ministries. The Ministry’s Office of Policy and Planning works with the Office of the Budget Bureau to consider ICT budgets from various ministries to prevent budget overlap. The budget is then appropriated in accordance with the framework and priority based on the National ICT Master Plan.
When developing ICT-based resources, industry partners and government agencies should work closely with schools, especially teachers and students. This will ensure that the design and development of ICT-based resources are pedagogically sound and meet the teaching and learning needs of teachers and students.

a. **Indonesia**: The Government encourages the participation of the private sector in ICT programmes, such as the WAN Kota and OSOL. PT Indosat and Microsoft Indonesia provide affordable infrastructure service and software. Some mining corporations are also encouraged to donate their used computers to schools.

b. **Philippines**: The Adopt-a-School Act of 1998 complements direct assistance packages from the Government. The Act gives tax incentives to private entities that donate ICT facilities to public schools. Among the Adopt-a-School partners are Intel Philippines, Citibank, Coca-Cola Export Corporation, Philips Electronics and Lighting Co., and various corporate foundations and NGOs.

c. **Singapore**: In order to encourage industry/school partnerships, IDA initiated the Adopt-a-School Project, with help from industry partners to develop and provide a wide range of innovative services suitable for schools using Interactive Broadband Multimedia (IBBMM) technologies. The partners also assisted the schools to create and acquire the necessary content for Singapore ONE, developed tools and platforms for teachers and students, provided training for teachers and students to familiarize them with the tools and the content, and extended technical assistance to maintain and update the content for teachers and students. In many instances, the partners worked with teams of teachers and students to improve the pedagogical aspects of IBBMM in the school curriculum.

Some examples from the Adopt-a-School Project include the Physics experiments at St. Andrew’s Junior College, and the Falling in Love with Raffles Museum of Biodiversity Research (RMBR) at Crescent Girls’ School. The project in St. Andrew’s Junior College (http://onezine.s-one.net.sg/@School/Standrew/) consisted of 30 Physics experiments with video illustrations and online technical notes, explaining basic physics principles and concepts and encouraging the students to reflect on them. The Falling in Love with RMBR (http://onezine.s-one.net.sg/@School/RMBR/index.html) was about students in Crescent Girls’ School getting to know RMBR and the exciting things they found there.
ICT in education objectives are linked to economic growth and sustainability. Policymakers and stakeholders should be convinced of the urgency of implementing ICT in education policy. The ideal pace for technological change and paradigm shifts in society should be highlighted and explained.

a. Singapore: At the launch of MP1 in 1997, the Minister of Education called on all Singaporeans to “think beyond the obvious, to think creatively, to search for new knowledge, to come up with new ideas to exploit new technologies, to venture beyond current boundaries and open up new frontiers of knowledge.” ICT has changed the way people communicate and do business and is now poised to bring about a paradigm shift in the way people learn. Such changes are seen in the way educational materials are designed, developed and delivered. Policymakers and other stakeholders from the MOE are aware of these changes.
Policymakers and stakeholders are more likely to support ICT in education policy when real-life examples are identified, documented and presented.

a. **Singapore**: Policymakers and stakeholders are aware of ICT in education blueprints from other countries, some of which are as follows: (i) the United States’ $200 million Technology Literacy Challenge Fund to give American students access to computers. Over 6000 schools will be linked; (ii) Major programmes for ICT in education in Germany, France, Britain and Italy, including a programme in Italy to install multimedia workstations and Internet connections in 15,000 schools by the year 2000, with an investment of about $850 million. Finland, with the highest connections to the Internet in the world, has launched a five-year strategy in “Education, Training and Research in the Information Society”
This facilitates continuity and encourages common understanding at all stages of the project. It also keeps all heads of MOE departments and divisions informed and involved in the project.

a. Malaysia: It is important to retain the membership of important ICT-related committees and to update new members on decisions that have been taken. For example, at the start of the Smart School Project, the then Minister of Education, the Director-General of Education and the Secretary-General of Education were enthusiastic supporters. At that time, the Smart School Steering Committee had a tripartite chairmanship, including the Director-General of Education, the Secretary-General of Education, and the Chairman of the Multimedia Development Corporation. The Minister of Education chaired regular meetings. However, the Smart School Project lost two champions when the Minister was transferred to another Ministry and the Director-General retired. The composition of the Smart School Steering Committee kept changing as members retired or were transferred. Decisions made at steering committee meetings were not always brought to the attention of new members.
Integrating ICTs into Education

ICT LESSONS LEARNED