UNESCO Implemented
Strengthening ICT in Schools and SchoolNet Project in ASEAN Setting

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Report of the Experts' Meeting on

Documenting Experiences in the Use of ICT in Education and SchoolNet Operations

Bangkok, Thailand
7-8 July 2003

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Contents

List of Acronyms and Abbreviations

ASEAN	Association of Southeast Asian Nations
CLMV	Cambodia, Lao PDR, Myanmar and Viet Nam
DepEd	Department of Education (Philippines)
DNS	Domain Name System (or Service or Server), an Internet service that translates domain names into IP addresses
DTVE	Directorate of Technical and Vocational Education (Indonesia)
ICT	Information Communications Technology; the term used to describe the tools and the processes to access, retrieve, store, organise, manipulate, produce, present and exchange information by electronic and other automated means.
IDRC	International Development Research Council
ILC	Internet Learning Centers
ISP	Internet Service Provider, a company that provides access to the Internet
LMS	Learning Management System
MCEETYA	The Ministerial Council on Education, Employment, Training and Youth Affairs
MEXT	The Ministry of Education, Culture, Sports, Science and Technology (Japan)
MOE	Ministry of Education
mp2	The second Masterplan of ICT for education (Singapore)
NIME	National Institute of Multimedia Education
NSW	New South Wales, a southern state of Australia
PUSTEKKOM	The Center for Information and Communication Technology for Education (Indonesia)
QTP	Quality Teacher Program (Australia)
SEAMEO	Southeast Asian Ministers of Education Organization Secretariat
UNESCO	The United Nations Educational, Scientific and Cultural Organization
URL	Uniform Resource Locator, or Web address
VoIP	Voice over Internet Protocol, a category of hardware and software that enables people to use the Internet as the transmission medium for telephone calls
WAN	Wide Area Network
VSSs	Vocational Secondary Schools

Opening Remarks

Mr. Sheldon Shaeffer, the Director of UNESCO's Asia and Pacific Regional Bureau for Education gave a warm welcome to the participants, who were from ASEAN countries, and included experts from Australia, South Africa, and the USA.

This three year project, he informed participants, is funded by the Japanese Funds-in-Trust and the ASEAN Foundation, with the collaboration of other donor agencies including SEAMEO, the Commonwealth of Learning, World Links and World Bank. Mr. Shaeffer urged that this project requires the systematic coordination of various stakeholders, sharing experiences to together generate something really innovative and worthwhile. In addition, the shared knowledge would help the project to prevent reinventing the wheel and save on time, money and effort. He also addressed the constraints in some ASEAN Countries to any project involving ICT, such as inadequate basic infrastructure, lack of connectivity, hardware and software, and high Internet fees. He mentioned that the current use of ICTs in the classroom still focuses on the drill and practice type of learning, with no policies or management support for the use of ICTs in schools. This project is attempting to demonstrate that the use of ICTs in education will make a difference in improving the teaching/learning process through their integration into science, maths, and language curriculum. He pointed out that this Experts' meeting is the launching activity for the project, with the expected meeting results of the development of case studies and the SchoolNet Toolkit. He wished for a productive workshop and hoped that the meeting would provide a basket full of recipes for success and guideposts for countries to follow if they wish their ICT programmes to succeed.

After Mr. Shaeffer's speech, Ms. Carmelita Villanueva, Chief of Information Programme and Services at UNESCO Bangkok, presented the project, covering the objectives, strategies, implementation process, and expected outcomes.

In closing, Mr. Fumihiko Shinohara, manager of the ICT in education team, thanked the participants for their contribution and participation in the meeting. He concluded the introduction by announcing the follow-up actions on the country case studies and the start-up toolkit.

Background

This Experts' Group Meeting was the first activity to launch the "Strengthening ICT in Schools and SchoolNet Project in the ASEAN Setting", an attempt to demonstrate that the systematic integration of ICTs into existing educational curricula on science, mathematics and language will make a difference in improving the teaching/learning process.

Widespread gaps and weaknesses still exist in the use of ICT in education in the region, due to a variety of factors stemming from inadequacies in pedagogy, infrastructure, management and human resources.

Inadequate basic infrastructure, lack of connectivity, hardware and software and high Internet fees remain some of the biggest constraints to ICT use, as identified by the ASEAN countries. Lack of technical support, funds for operations and maintenance and even lack of space to locate computers also pose practical obstacles to the use of ICTs.

Even where infrastructural constraints have been overcome, much of the current use of ICTs in the classroom still focuses on the drill and practice type of learning, with no real change in pedagogy; computers are still seen as tutors, rather than as tools towards engaging students in critical and interactive learning. This is largely due to insufficient teacher training. Though teachers have been trained in the use of ICT and SchoolNet in some countries, the integration of ICT in the teaching of subjects has been weak because of a number of reasons, including:

a. absence of systematic management support;
b. lack of ownership by schools;
c. lack of integration into existing curriculum and textbooks;
d. teachers' workloads becoming over burdened, and lack of incentives and motivation;
e. lack of ICT-based materials that are truly interactive for teachers to use; and
f. shortage of personnel.

On the macro level, the absence of policy and management support to the use of ICTs in schools is hindering progress. It is not uncommon to find that either computers in schools are not being used because they are out of order and there is no technical support to organize their repair; the computers cannot be accessed because they are locked in computer rooms after school hours; or there is a lack of funds for developing educational software to make the hardware productive.

An initial survey has shown wide ranging initiatives to introduce ICT in schools in ASEAN countries. Countries such as Thailand, Malaysia, Philippines and Indonesia have started far ahead of other ASEAN countries such as the CLMV bloc (Cambodia, Lao PDR, Myanmar and Viet Nam). Numerous initiatives and projects both in the areas of teacher training and ICT use in the classrooms are currently in progress in Cambodia, Lao PDR, Indonesia, Malaysia, Philippines, Thailand and Viet Nam, funded by various funding sources such as World Links, UNDP, SEAMEO, Intel,

IBM, Coca-Cola, IDRC, etc. There is a need to learn from each other, as well as from the more advanced countries such as Australia, New Zealand, South Korea, Japan, India, Malaysia, Philippines and Thailand which have already launched SchoolNets to connect schools to the wealth of educational sources and resources available and to share/exchange innovative teaching/learning materials and best practices online.

It is widely recognized that the effectiveness of SchoolNets has yet to be tested since operating SchoolNets depends on the following factors which often are not present in the less developed countries:

a. connectivity down to the rural areas;
b. affordable connectivity, Internet penetration in the rural areas, and telephone lines;
c. hardware;
d. teacher skills and motivation;
e. local content;
f. incentives;
g. interactivity and participation;
h. technical and trouble-shooting support;
i. integration into the school curriculum; and
j. easy accessibility to research and information.

It is the objective of this project that the information-rich and well equipped ASEAN countries share their resources with the information-poor and ill-equipped countries (CLMV) through the ASEAN SchoolNet approach and through south-south cooperation.

In order to attain this goal, the project will implement the following supporting strategies:

a. documenting of successful experiences and innovative strategies in the use of ICT in schools from the more advanced countries to serve as benchmarks and guidance for programme planning and implementation;
b. policy and strategy development, specifically dealing with integration/ mainstreaming of ICT into national education curriculum;
c. development of integrated ICT-based curriculum, teaching and learning materials and applications for teaching science, mathematics and language;
d. establishing connectivity and pilot testing the use of ICT in 24 schools in eight ASEAN countries based on the previous activities;
e. training of teachers in computer literacy, the use of the ICT-based teaching/ learning materials in science, mathematics and language, telecollaboration and the use of SchoolNet;
f. the establishment and use of national SchoolNet to promote sharing of information and resources;
g. the creation of national and ASEAN SchoolNet and telecollaboration among pilot schools in eight ASEAN countries; and finally,
h. sharing of best practices.

The ASEAN countries will be divided into two groups: Group 1 will consists of Malaysia, Indonesia, Philippines and Thailand, while Group 2 consists of Cambodia, Lao PDR, Myanmar and Viet Nam (CLMV). Brunei will participate on their own while Singapore will be sharing their expertise as resource country.

Meeting Objectives

The overall objective of this meeting was to develop the strategy for documenting experiences in the use of ICT in education and the operations and impact of SchoolNets, especially in the areas of science, mathematics and language.

More specific objectives included the following:

1. To formulate the framework, rationale/objective, outline and data collection methods of the case study exercise to document the experiences of selected countries in the use of ICT in education, especially in the areas of science, mathematics and language, as well as the operations and impact of national SchoolNets.
2. To develop the work plan for writing the case studies in the two areas described in Item 1.
3. To formulate the framework, rationale/objectives, outline and data collection methods for developing the SchoolNet Start-up Toolkit.
4. To develop the work plan for writing up the SchoolNet Start-up Toolkit.
5. To assign participants/experts to write-up/compile the case studies through fee contracts.

Abstracts

Use of ICT in Education and SchoolNet Operations: Australia's Experience

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Australia recognises the importance of the role of ICT in education. In 1999, the Federal Government created the Quality Teacher Program (QTP) and provided $77.7 million over three years to states and territories to strengthen teachers' skills. Information technology is one of six priority areas for QTP.

In Australia, the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA) is the key body responsible for formulating national school education policy and setting national goals, including ICT strategies. MCEETYA is made up of state and territory ministers who share a vision of the key role that education and training must play in supporting the development of Australia's information economy and knowledge society. They acknowledge the opportunities and challenges their vision poses – and clearly understand that realising their vision depends on collaborative strategic action across all education and training sectors.

Currently MCEETYA's key national goals are:

- developing a national strategic framework to facilitate and support the nation's transition to an information economy and knowledge society; and
- establishing nationally consistent standards and frameworks for reporting on student ICT achievements and outcomes.

From 2005, national monitoring of ICT skills and knowledge of students will be undertaken at key points of schooling. How ICT is used to achieve national education goals and objectives is the responsibility of individual states and territories. All states have committed considerable funds to the integration of ICTs in curriculum learning and teaching. In the 2002/03 New South Wales State Budget, for example, more than $963 million in recurrent and capital funding was allocated over four years for a range of technology initiatives designed to equip schools, teachers and students for the future.

Since 2000, education systems across Australia have made substantial financial investments to acquire new computers for schools. As a result, Australian schools are now approaching a ratio of one computer to every five students and almost all Australian schools have access to the Internet. States and territories have different approaches to school management and ICT. Generally, however, a school's technology plan is part of their management plan. A growing number of schools have developed their own websites.

There is evidence that Australian school education has made significant progress in the development of infrastructure, online content, services and the integration of ICT into teaching and learning programmes. However, for Australian students to

reap the full benefits of new technologies for learning, equal and ongoing priority must be given to bandwidth, professional development and online content.

In order to maximize the substantial investment in infrastructure and content development, Australia needs to provide quality research, professional learning programmes, pre-service teacher ICT education, equitable online access and copyright reform.

The Use of ICT in Education in Indonesia

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In an effort to extend educational opportunities, to improve the quality of education and to increase educational relevance and efficiency of delivery, the Indonesian government through the Ministry of National Education has determined to utilise ICT. A Five-year Action Plan was set up for the Development and Implementation of IT in Indonesia, detailing a plan of implementation for the use of Telematika in education from 2001 to 2005, which includes the following strategies:

- Develop ICT networks for public and private universities, as well as research and education networks
- Prepare a master plan for ICT human resource development
- Develop and implement ICT curricula
- Use ICT as an essential part of the curricula and learning tools in schools/ universities and training centres
- Establish education programmes including participation in Global Development Learning and other networks
- Conduct ICT skills training for government employees
- Facilitate the use of the Internet for more efficient teaching and learning

Besides these efforts, the Center for Information and Communication Technology for Education (PUSTEKKOM) is now developing e-dukasi.net, an Internet-based learning programme that provides some learning materials for mathematics, physics, chemistry and biology to be used in general high schools and vocational schools.

In the 1994 curriculum, ICTs were introduced in some subjects. ICTs have also been used as tools in the high school level – the general high schools and vocational schools. In the 2004 curriculum, ICT will be introduced as a subject matter, to be taught across the grades, from elementary school to general high school levels. At every level, it is taught at least two hours each week. Besides that, for every subject it is suggested to make use of ICT as a source for information to support the learning process.

There has been much in-service and pre-service ICT training provided to improve the capabilities and professionalism of teachers, enabling them to make use of ICT for their teaching activities. Yet while some teachers/lecturers have used or integrated ICT for education, on the whole, awareness of the importance of integrating ICT for education remains limited. This is in part due to the limitation of modem availability and the Internet being expensive.

The Government of Indonesia has taken determined action towards utilizing ICTs in education. ICT has been included as a part of the national curriculum. Pre-service and in-service training workshops on ICTs for learning have been conducted. Infrastructure and school management capabilities in utilizing ICT for education have been improved.

In the future, efforts to utilize ICTs for education, thus far restricted to certain pockets of innovation around the country, need to be made on a national level, especially in the eastern part of Indonesia and small towns. With decentralization and local government autonomy, utilization of ICTs for education can be accelerated in line with the economic development of these provinces.

SchoolNet Operations: A Case of Indonesian Vocational Secondary Schools

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Although information and communication technology has been around for many years, there has been no systematic approach to utilize this technology to improve educational quality in Indonesia's school system. A number of initiatives on the use of ICT in education were organised in one or two universities, schools and private education services. In 1999, the Directorate of Technical and Vocational Education (DTVE) launched the IT Programme in Vocational Secondary Schools (VSSs), which became a compulsory programme across all skill competencies. The objectives were mainly to prepare VSS graduates to enter the global labour market, to improve learning quality, and to develop VSSs as agents of change towards computer literacy.

National ICT policy was issued and the national steering committee was established. However, this policy was overshadowed by other more dramatic changes, with the decentralization of the administration system within the government and school systems being transformed under a new policy of school-based management. Allocation of education funds, without earmarking, was transferred from the central to the district level. The effectiveness of ICT policy in schools then became entirely dependant on schools, communities, and district governments, with the role of central government (DTVE) being limited to formulating policy, facilitating and providing technical assistance, and monitoring and evaluation. Within this decentralized framework, school initiative and ownership are key to the sustainable development of ICT and SchoolNet operations. Indeed, the WAN Kota pilot project was mostly funded and supported by participating schools and district governments.

On the positive side, decentralization has encouraged competition among districts and among schools in every aspect, including in the ICT for development field. Smart schools and Smart districts use all possible resources to improve their education standards. The basic services offered by WAN Kota improve educational quality through: e-mail, mailing lists, newsgroups, ftp, www, technical support and help desks, virtual library, school magazines, modular (interactive self-instructional) learning packages, multi-media learning activities, IT training packages, and an education information centre. In some instances, VoIP and video conferencing services are also available. Teacher training programmes have been the first priority before implementing policy. When the IT Programme was introduced to VSSs, at least two teachers per school were sent for training to Vocational Teacher Training Centres.

Lessons Learned

1. Human Resource Development

Learning from the development of WAN Kota in eight cities, the most strategic policy in developing ICT in education is preparing the right human resources. Trained and competent teachers will have the right attitude toward technology. Although school management support was lacking, infrastructure was inadequate and Internet fees were high, competent teachers will find ways to face these obstacles with creativity.

2. Integration of ICT in the Existing Curriculum

Given their background on technical training, very few of the teachers and administrators raised issues related to courseware, content of educational dialogue, design and development of interactive learning materials, or integration of ICT into the existing curriculum. However, there has not been any observable change in teaching and learning practice. This area needs to be immediately improved to obtain real benefits of ICT in education.

3. Awareness and Advocacy of ICT Culture

When ICT is used for managing the overall school administration system as well as in the classroom, school wide reform will become more apparent. For example, the on-line student admission system in Malang has significantly affected the attitudes and behaviour of school administrators, teachers, parents and students.

The Use of ICT in Education and SchoolNet Operations in Japan

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The Ministry of Education, Culture, Sports, Science, and Technology (MEXT) of Japan has established a policy to enhance the use of ICT in Education. This policy aims to cultivate the ability of students to use ICT to function independently within todays advanced IT networked society, to enhance teachers' instructional abilities, to develop educational content for classes and other learning activities, and to enhance the functions of the National Information Centre for Education Resources.

In 2002, the Japanese Government allocated a budget to several areas of ICT use, specifically: the promotion of ICT-based learning in public schools; the installation of computers in private schools; the enhancement of media literacy of teachers; the improvement of high-speed Internet connections in public schools; the development and distribution of educational content; the improvement of the National Information Centre for Educational resources; the realization of the e-School concept; psychological care for children affected by the IT revolution; the elimination of the digital divide; and, measures for controlling unsafe information.

Several ICT projects have been established to support the ICT policy at the elementary, secondary, and higher education levels, such as the 100 School Networking Project (1994), the KONET Plan (1996), the New 100 School Networking Project (1997), EI-Net (1999), the E-Square Project (2002), the Space Collaboration System (1997), and the el-Net Open College.

In order to support the national policy, the National Institute of Multimedia Education (NIME) reorganized its core institution. NIME undertook research & development and transformed correspondence education into ICT-based open and flexible learning.

MEXT has played a major role in leading Japanese institutions towards the utilization of new learning technologies and the promotion of international collaboration.

Lessons Learned for Effective ICT in Education: The Korean Experience

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National Policy and Strategy

Government policy began with the top-down approach, but later, as the policy was put in place, the bottom-up approach was more practiced. This approach can be seen in the government's strategy of encouraging the implementation of ICTs in schools through reward schemes. When any school applied for ICT support, they were rewarded with incentives, such as promotion opportunities for teachers, more financial support for schools etc. The Government also recognizes that ICT in education is an ongoing process which needs support from the community to be fully sustainable.

Ongoing Maintenance and Support

Support was given to the school that initiated the programme (not by region) as per the top-down approach, while support through teachers' communities was given under the bottom-up approach. The community played an important role, becoming involved in promotional programmes initiated by mass media and the private sector.

Infrastructure Installation - Hardware, Connection, Peripherals

The Government has made periodical updates of hardware with Internet connections at schools. Technical support for multimedia labs was provided based on one year contracts. Teacher education was carried out on a massive scale, with all teachers receiving ICT education every three years.

Different Training Strategies for Teachers

At the beginning of the top-down policy, government-driven training programmes can be effective. Later, as teachers become increasingly aware of the intricacies of ICT in education, we must respect teachers' requests for unique training opportunities and programmes according to their different roles, such as administrators, key teachers in software development and teacher trainers. Teacher training should be knowledge-based and with lab practice.

Instructional Materials Development and Distribution

Teachers remain unsatisfied with the educational software available, since they always lack quality software. Teachers are encouraged to develop instructional strategies and materials, and teacher participation in software development is also promoted. Access to community resources is necessary, such as to museums, professional research institutes through database sharing or sharing the process of ICT programmes from the planning stages.

Curriculum

ICTs are implemented in all subject areas. While computer science as an independent subject is also offered, it is elective, not compulsory. Since independent ICT courses cover only ICT literacy, applications, and ethics, the concern arises about how ICT education can contribute to developing deep thinking skills, such as logical thinking, creativity and problem solving.

The Use of ICT in General Education in Lao P.D.R.

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The Ministry of Education in Lao PDR has developed a policy on the use of ICT in formal education. Currently in its fifth phase (2001-2005), the policy has three goals. The first goal is to revise the upper secondary curriculum and begin to introduce ICT as a subject in selected schools. The second goal is to develop and distribute textbooks, provide libraries and materials, develop appropriate classrooms to teach technology, and provide computers in selected schools. The third goal is to upgrade potential to teach modern science and technology and organize activities to generate productivity step by step.

There are several ICT projects currently being implemented in Lao PDR, including: Internet Learning Centers (ILC), supported by the Jhai Foundation and Schools Online; the Remote IT project supported by the Jhai Foundation; Smart Schools, supported by the Malaysian government; and the Teaching Computer Skills project, supported by the private sector.

The most successful of these has been the ILC Project. The objectives of the ILCs are to provide Internet access/facilities and technology for students, teachers and the community; to help schools gain effective access to the communication and information resources of the Internet; to facilitate teachers' professional development and support for technology integration; to provide teachers with technology tools to enhance their teaching; and to develop sustainable and replicable models of good practice that use technology for learning and collaboration.

In implementing the ICT projects, the following challenges have arisen: unclear ICT policy, lack of curriculum supporting the ICT integration, the high costs of Internet access, and lack of funding in schools for sustainability.

ICT in Malaysian Schools: Policy and Strategies

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Malaysia implemented its first computer system in 1966. Since then, the Government has introduced various initiatives to facilitate the greater adoption and diffusion of ICT to improve capacities in every field of business, industry, education, and life in general. Malaysia has an ICT master plan, referred to as "Vision 2020", which calls for a sustained, productivity-driven growth, achievable only with a technologically literate, critically thinking workforce prepared to participate fully in the global economy of the 21st century.

The concept of ICT in education, as seen by the Ministry of Education, includes systems that enable information gathering, management, manipulation, access, and communication in various forms. The Ministry has formulated three main policies for ICT in education.

The **first policy** is that of ICT for all students, meaning that ICT is used as an enabler to reduce the digital gap between schools.

The **second policy** emphasizes the role and function of ICT in education as a teaching and learning tool, as part of a subject, and as a subject in its own right. Apart from radio and television as teaching and learning tools, this policy stresses the use of the computer for accessing information, for communication, and as a productivity tool. ICT as part of a subject refers to the use of software (e.g. AutoCAD and SCAD) in subjects such as "Invention" and "Engineering Drawing." ICT as a subject refers to the introduction of subjects such as "Information Technology" and "Computerization".

The **third policy** emphasizes using ICT to increase productivity, efficiency and effectiveness of the management system. ICT will be used extensively to automate and mechanize work processes, such as the processing of official forms, timetable generation, management of information systems, lesson planning, financial management, and the maintenance of inventories.

There are several ICT initiatives by government agencies, such as the Malaysian Smart Schools, the MySchoolNet website, ICT training in schools, the computerization programme in schools, the Electronic book project, and the Penang E-Learning Community project. There are also some ICT initiatives run by non-government agencies, such as the Chinese Smart Schools and the Private Smart Schools.

Introducing ICT into all schools in the country is a major undertaking, but it represents an investment in the future productivity of Malaysia's workforce and a down-payment on the country's future prosperity. It requires a major commitment of Malaysia's resources, which the country is willing to set aside in view of the long-term benefits expected. Change management will have to be intensified to obtain support from the many stakeholders involved, including all agencies in the educational system. Sufficient funds will have to be allocated to establish and maintain ICTs, while policies, norms, and guidelines will have to be established to promote the use of ICT in schools. Lastly, continuing professional development for teachers, school heads, and other educational personnel must be instituted.

The Status of ICT in Basic Education in the Philippines

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The Philippine ICT Plan for Basic Education, although still in draft form, is the guiding document for ICT in Education programmes initiated and endorsed by the Department of Education (DepEd), the government agency governing and regulating basic education in the Philippines. This Plan focuses on seven key areas, namely:

1. infrastructure development;
2. technical support;
3. teacher training;
4. research and development;
5. technology integration in the curriculum;
6. the use of innovative technologies in education and training; and
7. fund generation, particularly through non-traditional funding schemes.

Over the past seven years, DepEd has provided public secondary schools with computers, software, peripherals, and some teacher training using funds drawn from the national budget. DepEd's computerization programme has so far benefited 986 (out of around 4,500) public secondary schools. Similar programmes have been implemented over the years by other government agencies, such as the Department of Science and Technology and the Department of Trade and Industry, as well as by various local governments, corporations and non-government organizations. By 2001, 56.4 per cent of public secondary schools had been given ICT facilities. DepEd intends that by 2004-2005, 75 per cent of secondary schools will have computers. Once this target is reached, DepEd will then shift its attention to public primary schools.

ICT facilities in secondary schools have been used primarily for the teaching of basic computing skills, in accordance with the national curriculum. In 2002, however, DepEd introduced a new curriculum, which no longer specifies the deliberate teaching of basic computing skills, but rather that such skills be taught as ICT is integrated in specific learning areas and across the curriculum.

Concerns have already been raised about how such integration can be realistically achieved. To begin with, no specific guidelines or instructional materials have yet been developed to assist teachers in using ICTs as teaching and learning tools. Other constraints include:

1. poor student-to-computer ratios (averaging 267:1);
2. lack of appropriate/relevant software;
3. lack of connectivity;
4. low level of basic ICT skills among teachers; and
5. lack of funds to pay for the cost of running the ICT facilities.

DepEd has attempted to address these issues as much as possible given its limited budget. It has drafted a framework for ICT integration in science and maths and is currently working on the same for the other learning areas. It has also partnered with the "Teach to the Future" programme of Intel to provide basic computing and Internet literacy training to teachers nationwide. To date, it has reached around 32,000 teachers via a cascade or echo training scheme. DepEd is also working with the Foundation for IT Education and Development on a programme called "Pilipinas SchoolNet," which is piloting the integration of computers and the Internet in the new curriculum.

ICT Masterplan for Education in Singapore

By Dr. Lim Cher Ping
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The primary motivation for integrating ICTs in education is the belief that they support students in their own constructive thinking, engaging them in cognitive operations that they may not have been capable of otherwise. Most ASEAN countries have channelled many resources into the development of ICTs for education to ensure that their workforce is competitive regionally and globally. Singapore is no exception.

When the first Masterplan was launched in 1997, the underlying rationale behind the plan was that students needed to acquire skills such as the ability to think independently and creatively, to be competent and confident problem-solvers, and to be life-long learners. The use of Information Technology was seen as a means of preparing students with such skills, and it would thus be important to equip schools and teachers with the necessary infrastructure.

This rationale is still applicable today. The government sees technology as a key enabler in making student-centred learning and assessment a reality, helping to reach the goal of ability-driven education and the government's vision of Thinking Schools, Learning Nation. Dubbed mp2, this Second Masterplan aims to build on what has been achieved in the first, and bring the use of IT in Education to greater heights. mp2 adopts a systemic and holistic approach. All the key pieces - curriculum, assessment, instruction, professional development, and culture of the school are integrated and addressed. The approach calls for the involvement of the major stakeholders in education and emphasizes that they work together to tap the potential of IT.

Results

- Pupils use IT effectively for active learning
- Connections between curriculum, instruction and assessment are enhance using IT
- Teachers use IT effectively for professional and personal growth
- Schools have the capacity and capability in using IT for school improvement
- There is active research in IT in education
- There is an infrastructure that supports widespread and effective use of IT

It should be noted that these Masterplans emphasize specifically what works in Singapore, taking into account the country's society and education system. While mp2 acts as a guidebook, sensitising readers to what is likely to happen given a particular situation, readers still have to decide whether the account really fits the situation in which they work.

ICT in Science and Mathematics Education in Thailand

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The use of ICTs in science and mathematics education at the school level is promoted and encouraged by the national policy framework, deriving from the National

Education Act 1999, the National ICT Master Plan 2010, and the Thai Learning Technology 2010 Master Plan. The framework supports the use of ICT for education in four main areas:

1. Infrastructure,
2. Software and Content,
3. Human Resource Development, and
4. Education Management and Administration.

ICT education is compulsory at all school grades. The new science and mathematics curriculum, as well as other curricula, requires the use of ICT tools to improve the quality of education and promote lifelong learning.

Learning outcomes outlined for science and mathematics key learning areas focus on higher order thinking and communication skills that utilize digital resources and technology tools. Teachers across the subject areas should then acquire a high level of ICT knowledge and skills, including an understanding of the development of learning and teaching media for instruction. Teachers should be trained and supported by effective management and administration in coordination with the school ICT plan and implementation. If the sustainability of teacher training is to be ensured, an ICT-based Teacher Support System will need to be set up that provides academic consulting services and curriculum resources. This initiative could be run successfully through a school-university networking model.

EduNet (SchoolNet) Project in Viet Nam

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Centre of Information Technology, Ministry of Education and Training

The EduNet Project in Viet Nam officially began in December 1997. EduNet consists of two parts: SchoolNet for schools and UniNet for universities. In April 2003, the Ministry of Education and Training and the Ministry of Post and Telecommunications signed an agreement for the project. EduNet plans to connect all upper secondary schools by the end of 2003.

EduNet's main activities are establishing a National Internet infrastructure, establishing hardware in schools and universities, developing content, building an e-learning environment, developing an EduNet portal, providing training to teachers, setting up an EduNet control centre to coordinate all activities, creating EduNet for the Department of Education and Training in provincial areas, and collaborating with international organizations on ICT projects.

Some of the projects on which the Ministry of Education and Training collaborates with international organizations are the Asian E-Learning Network (AEN), Coca-Cola E-Learning Centres, World Links & School-Based Telecentres, mobile training stations, and the e-Learning project with Hewlett Packard.

There have been major obstacles to introducing e-learning projects, including the unclear policy framework at both the national and the organizational level, the lack of curricula which facilitate the development of e-learning, the lack of infrastructure and access to computers and the Internet, the insufficient e-learning skills of educators, and the lack of content in local languages.

Building Pilot SchoolNet Programmes in Developing Countries: Lessons from the World Links Experience

By Michael Trucano

Since it was founded in 1997, World Links has been working to help develop pilot SchoolNet projects in over twenty less developed countries. These SchoolNet projects have sought to introduce ICTs in 10-100 secondary schools in each country to help schools and ministries of education roll out and evaluate initiatives related to the procurement of computer equipment and Internet connectivity; teacher professional development; collaborative educational projects; and extensive monitoring and evaluation of the processes and results. Initially begun as a project within the World Bank Institute, the initiative is now led by the independent World Links NGO.

Based on this experience, 14 lessons were identified that should be of interest to the JFIT-funded ASEAN SchoolNet project:

Lesson #1: Computer Labs in Schools in Developing Countries Take Time and Money, but They Work

Schools squeeze as much use as possible out of poor connectivity through technical solutions such as store-and-forward e-mail, caching Web pages locally, extensive use of CD-ROMs, and pulling Web pages through e-mail. Teachers have also learned to manage their classes to work with these limitations.

Lesson #2: Technology Threatens the Existing Order

Introducing technology challenges many existing practices in schools, from budgeting and teacher training, to class management.

Lesson #3: Training, Training, Training

Systematic, on-going professional development of teachers is the core of any successful educational technology initiative.

Lesson #4: Technical Support can not be Overlooked

Getting the computers is the easy part - keeping them running (and using them effectively) is more difficult.

Lesson #5: Open Source Solutions are Viable Options for Schools

“Free” software has its costs, but is increasingly being used in schools.

Lesson #6: Lose the Wires

With many countries suffering from inadequate telecommunications infrastructure, wireless is the most effective way to connect most schools in developing countries.

Lesson #7: Get the Community Involved

Lack of financing is one of the greatest challenges to connecting schools in developing countries to the Internet. Part of the answer to this challenge is to share the facilities and the costs with the broader community.

Lesson #8: Private-Public Sector and Community Partnerships are Essential

A ministry of education cannot take on the task of equipping schools alone. It is simply too big a job. Governments will need to form strategic partnerships if they are to succeed.

Lesson #9: Link ICT and Education Efforts to Broader Education Reforms

It is very important to ensure that the planning of national pilot SchoolNet programmes is aligned with ministry of education goals and objectives.

Lesson #10: Noncompetitive Telecommunications Infrastructure, Policies, and Regulations Impede Connectivity and Sustainability

Because most developing countries charge by the minute even for local calls, reluctant principals with tight budgets limit the amount of time on the Internet throughout the day.

Lesson #11: Monitoring and Evaluation is Crucial

If we are to see what works, we need to ensure monitoring and evaluation is carried out thoroughly and regularly.

Lesson #12: Language is Key

The preponderance of English language educational content on the Internet complicates the use of ICTs.

Lesson #13: Technology Empowers Girls

A recent World Links study on the differential impact of ICTs on boys and girls showed that in areas such as academics and communication skills, girls have benefited more than boys, and feel empowered to do extensive research on teen-related information that is often taboo in their cultures, such as sexually transmitted diseases, teen pregnancies, and AIDS and its prevention.

Lesson #14: Technology Motivates Students and Energizes Classrooms

When schools are connected to the Internet, teachers taught to rethink their teaching methods, and students empowered to use technology, the impact can be profound. The use of computers energizes the students and makes the classroom a more interactive learning environment.

(See http://www.cid.harvard.edu/cr/pdf/gitrr2002_ch04.pdf for more information)

Based on the World Links experience, trends are all favourable for the roll-out of the ASEAN SchoolNet pilot project:

- Costs are coming down quickly
- Standardized e-learning platforms and practices are emerging
- Wireless technologies are becoming more pervasive and cost-effective
- Telecom liberalization is occurring (albeit slowly)
- An emerging experience on best practices is being shared across countries

SEAMEO's Network of Schools and Promotion of ICT as an Educational Tool

Dr. Rujaya Abhakorn
Southeast Asian Ministers of Education Organization Secretariat

The Southeast Asian Ministers of Education Organization Secretariat (SEAMEO), established in 1965, is an intergovernmental organization consisting of ten Member Countries in Southeast Asia and six Associate Member Countries outside the region. SEAMEO's seven areas of priority are: quality and equity in education, preventive health education, culture and tradition, ICT, language, poverty alleviation; and agriculture and natural resources. The organization's policy in the use of ICT involves establishing networks of schools that strengthen ICT for education, promote ICT as an educational tool, and conduct research and resources development on ICT for education.

SEAMEO is currently developing three projects that establish networks of schools to strengthen ICT for education: the Regional Coalition of Schools for Quality and Equity in Education (RCS-QEE), the SEAMEO Regional Schools Internet Project, and ICT and HIV/AIDS Preventive Education in the Cross Border Areas of the Greater Mekong Subregion (GMS).

In promoting ICT as an educational tool, SEAMEO has established four regional training centres and a collaborative teacher professional development project, entitled "the SEAMEO-Australia Project on Pre-Service Teacher Training and Teacher Professional Development in the Use of ICT in the Teaching of Mathematics and Science". The four regional training centres are the SEAMEO Regional Centre for Educational Innovation and Technology (SEAMEO INNOTECH) in the Philippines; the SEAMEO Regional Centre for Science and Mathematics Education (SEAMEO RECSAM) in Malaysia; the SEAMEO Regional Open Learning Centre (SEAMEO SEAMOLEC) in Indonesia; and the SEAMEO Regional Centre for Vocational and Technical Education and Training (SEAMEO VOCTECH) in Brunei Darussalam.

The organization also runs an ongoing research project connecting Southeast Asia and Europe e-Learning Models (CAE e-LEARN) and several resources, such as SEAMEO SEAMOLEC's Web CT Prototypes of Online Learning Courses, SEAMEO INNOTECH's multimedia collection, SEAMEO VOCTECH's Environmental Education Online, and the Journal of Southeast Asian Education "New Literacies in the 21st Century: Thinking and Information Technology".

APPENDICES

Guidelines for Case Studies for Both ICT Integration and SchoolNet

During the Experts' Meeting, participants discussed and brainstormed on issues related to the guidelines for the writing of case studies for both ICT integration and SchoolNet based on a guide set of issues. The key contents and the format of the guidelines were also discussed, leading to the following guidelines on writing the case studies and toolkit.

Objectives of the Case Studies

1. To document, synthesize and extract lessons learned in the use of ICT in schools and the setting up/impact of SchoolNets in selected countries in order to help improve planning, management and implementation of ICT for education programmes.
2. To provide tools for advocacy, as well as guidelines to policy makers and practitioners to support ICT in education initiatives.
3. To serve as benchmarks for implementing the project activities of the JFIT-funded Strengthening ICT in Schools and SchoolNet Project in ASEAN Setting, specifically the integration of ICT into national curricula of ASEAN countries, the development of the Startup toolkit and the operation of SchoolNets.

Target Beneficiaries

1. Policy makers in ASEAN who are responsible for education and ICT issues, especially, but not limited to those within ministries of education.
2. School-level practitioners, especially at the secondary level, (administrators, teachers, technical support staff), and those involved in the pilot ASEAN SchoolNet project.

Guidelines in Writing the Case Studies

1. Focus on formal basic education, secondary education with particular emphasis on issues related to the teaching and learning of science, mathematics and languages (especially English).
2. Focus on computers, the Internet and related computer technologies within the broader range of ICTs.
3. There are a variety of "cross-cutting" issues that should be addressed throughout the case study, specifically:
   a) equity
   b) sustainability
   c) effectiveness (including cost effectiveness)

Each of these issues should be explicitly placed within its given context.

4. Style - case studies should be written in clear, crisp and simple language. Take note that the target audience is not researchers in academia, but rather busy policy makers and practitioners. The section on description of strategies, best practices and success/failure stories should be broken down into small paragraphs instead of long ones. Lessons learned should be bullet pointed.
5. Format - case studies should follow the same general format.
   a) Issue: identify and describe the issue formulated as a challenge/problem or need to be addressed.
   b) How and why issue was addressed; successes, failures, innovative strategies detailed here analytically – use research findings to support the analysis and as evidence.
   c) Lessons learned and specific recommendations given in bullet form.
6. Length: 1 to ½ page for each issue
7. Annexes:
   a) Attach bibliography using the following format:

      Author (family name first). Title. Place of publication, name of publisher, date of publication. No. of pages

      Example

      Villanueva, Carmelita. Strengthening Integration of ICT in Schools and Operation of SchoolNet in ASEAN Setting. Bangkok, UNESCO Asia and Pacific Regional Bureau for Education, 2003. 25 p.

      For website: Author. Title. URL

   b) Short bio of authors

Issues for Content: Case Study One on ICT Integration into Education

Component 1: Broader Environmental Context (covers internal and external factors that contribute to an effective programme on ICT use in education)

Issues:

1. Educational system responsiveness – Has the educational system been supportive of your programme in the sense that it has opened its doors to using ICT in schools and training of teachers, etc. whether systematically or unsystematically? Has there been or is there an ongoing educational renewal in the system and policy to pave the way for all the changes taking place including the use of ICT in all aspects of education? Is it easy to integrate ICT into the educational system and structure and are efforts being made to make it easy? Kindly elaborate here how the educational system and policy support in the areas of policy, budget, curriculum, professional development, research, etc. have contributed to the launching of your ICT programme as well as its expansion and acceleration in the future. And if there are snags and bottlenecks, also elaborate.

2. National ICT policy and information infrastructure support – Does the national ICT policy and master plan include the ICT for education programme as a component? How does the national ICT policy and plan promote or enhance your ICT in education programme and support its effective implementation? Is the national information infrastructure as a whole well developed enough to provide you with the necessary technical and infrastructure support required to implement your ICT for education programme? If yes, kindly identify which of these national information infrastructure elements have helped promote a more effective implementation (connectivity and accessibility – what kind of connectivity; speed; telephone lines; electricity; equipment, hardware, software, etc.). If none of these have really helped your ICT for education programme, what have your experiences been in dealing with infrastructure elements and how do you foresee them changing in order to support your ICT for education programme?
3. Economic and social/cultural context – Is the ICT for education programme responsive to social problems, various economic groups, as well as ethnic and cultural sensitivities? Please describe what strategies or provisions you have made in your programme to respond to and address these needs?

Component 2: Policy and Regulatory Environment (National, Sub-National, School Levels)

Issues:

1. Policy development:
    a. *Process used to develop policy before launching a programme* – Those countries which have formulated a policy on the use of ICT in education before launching the programme, why and how did the process take place? Why did the Ministry of Education (MOE) find it important to have the policy to start with and what were the objectives and elements of the policy and plan that contribute to the effective implementation of the ICT for education programme? Are the policies at the national level or are they also at the sub-national levels (provinces, states, regions within the country)? If there are policies at the sub-national level, who prepared them and what was the process taken? Do they follow the national ICT policy or not? How is the sub-national policy distinctive from the national policy? How are the policies being enforced? Is there a body to ensure its enforcement? Is there an accompanying master plan or work plan and strategy, and a budget? Please describe the strengths/weaknesses/omissions of the policy both at the national and sib-national levels and how it should be improved.
    b. *For those countries which have started a programme or activities on ICT in education without a policy first and later developed a policy* – How did you transform your ICT in education strategy and programme/activities into an actual ICT policy? Why did you find it necessary to develop a policy and why was a policy not developed in the first place? What process did you follow to develop this policy? What were the objectives and elements of the policy and plan that now contribute to the effective implementation of the ICT for education programme? How is the policy being enforced? Is there a body to ensure its enforcement?

Please describe strengths/weaknesses/gaps of the policy and how it should be improved.

2. Transforming the ICT for education policy into action:
   a. *Need for vision statement, blueprint with roadmap at the national level* – In developing the national and sub-national policy (if this applies), did you have vision statements and what was the basis for the vision statements? Were the purposes of ICT use very clear in these visions and roadmap? Did you transform the national policy into a master plan with timetables and output/outcome and roles/responsibilities? Is this roadmap being implemented? If so, how and if not, why? Are you finding having a master plan/roadmap useful in guiding and supporting your programme or is it only a "reference paper" and difficult to implement? Please describe strengths and weaknesses/gaps of the roadmap and how it should be improved?
   b. *Guidelines for translation of national level blueprint to the school level* – Has your country translated the national policy and blueprint to the school level? Why did you find that important and how the process take place? How do you translate a national policy and master plan into a school-level policy and master plan with all the necessary support and services required? What are the logistics required to implement the school level policy and master plan and how has the national MOE made provision for such support? Who is involved in the process and who will monitor whether the school level policy and blueprint are being followed or not?
3. Legal and regulatory framework dealing with the use of use of ICT in education including censorship)
   a. *Enabling regulations* – Is there a national legal and regulatory framework which has been designed to enable and promote (not inhibit) the use of ICT both at the general level and in education area? What are the laws/legislations/acts/directives which have been officially approved promoting the use of ICT in general and in education in particular?
   b. *Inhibiting regulations (including censorship)* – Do you have legal and regulatory framework and legislations which inhibit or enable the use of ICT in general and in education? Please describe such censorship laws and other inhibiting regulations and how they have affected an effective implementation of the ICT programme/activities and how do you propose to deal with or improve the situation? Is there a body enforcing censorship, and how do you enforce these legislations at the school level?
4. Macroeconomic impact of ICT in education including its impact on social development and poverty alleviation – Does your ICT policy and plan include an element or provision that will systematically address the issue of ensuring that the long-term effect of your ICT in education programme will contribute to workforce preparedness, improving the economic conditions, reaching the marginalized areas and bridging the digital divide, promoting social and gender equity? How are they integrated into the policy and master plan or blueprint and what activities/strategies are being planned or carried out to achieve these goals? Are you mobilizing other ministries and budgets in order to achieve these goals, since implementing activities to attain these objectives can be very expensive?

5. Inter-ministerial collaboration/dialogue – Does the national ICT policy and plan involve various ministries? Is there a national committee of ministries to enforce/implement the national ICT policy and plan, and how active and effective is their collaboration? Is the MOE ICT for education programme actively collaborating with other ministries and do other ministries contribute to the effective implementation of the ICT for education programme? Please cite cases here where other ministries have contributed to effective implementation of the ICT for education programme. What are the strengths and weaknesses of this inter-ministerial collaboration? How should inter-ministerial collaboration be further strengthened?
6. Advocacy and obtaining support of policy makers and other stakeholders/heads of the various sections or bureaus of the MOE – How did your programme succeed in obtaining the support not only of the high level policy makers, but the middle level officials of the various bureaus of the MOE both at the national and sub-national levels? Please describe the strategies and techniques/tools used to convince and obtain such support and commitment (was there a systematic advocacy programme; did you gather research studies to show how ICT can modernize and revolutionize the teaching/learning process and educational system as a whole? etc.)

Component 3: Management and Financing (national, sub-national, school levels)

Issues:

1. Resources at the ministry level and at the school level needed to make ICT programme work
   a. *National and sub-national resources* – What types of resources have been provided by the MOE both at the national and sub-national (if applicable) levels to the ICT for education programme (funds, people, organizational structure, curriculum and materials, connectivity and hardware/software, part of in-service teacher training, etc.)? What have the priorities of the ministry been in providing these resources and why? Are these resources adequate? If not, why and in which areas should there be more resources provided? What should the main components be of a strategy for resource allocation for an ICT programme?
   b. *School resources* – What types of resources have been provided in the use of ICT in schools? What resources are needed for carrying out and sustaining the ICT programmes in schools? To which areas do the resources mainly go? Are these resources adequate? If not, why and which areas should be provided with more resources? What should the main components be of a strategy for resource allocation?
2. Resource/financial mobilization from within, from other donor agencies and from the private sector
   a. *How to fund ICT in education projects from government budget* – What are your experiences in deciding and mobilizing ways on how to fund the ICT for education programme? What are the sources of funding from the government budget both at the national and sub-national levels? Which budget line or component of the ministry of education budget is allocated to the ICT programme and how is this allocation determined?

Are there other government sources of funding that have contributed to the implementation of the ICT programme?

b. *Determining costs of ICT in education* – Has the ministry's budget for the ICT programme been broken down into budget lines or have the funds been allocated into different components and activities? If so, how were the various allocations determined and budgeted? How do you prioritize what to fund in varying amounts and what is the basis for prioritization?

c. *Developing a resource mobilization plan* – Are many of your ICT projects/activities being funded by other donor agencies and the private sector? Do you have a resource mobilization plan? Please describe how you mobilized funding from external agencies and the private sector? What is the ratio between external funding and government funding for your ICT for education programme? What kind of projects and activities are being funded by the private sector?

d. *Need for creative financial models* (e.g., Buy-Operate-Jointly Own) – Your country has various ICT projects which are assisted from various sources – some components or aspects are funded and implemented by the government, some implemented by NGOs; some by the private sector or the donor agencies. Have you ensured that these various components of the ICT project are all interlinked and owned by everyone concerned or is the reality that each component or aspect is only owned by whoever is implementing and funding it? How have you ensured that all these inputs are owned by all stakeholders and recipients of the project?

3. Strategy to ensure sustainability – What are the strategies that you are using so that such projects will continue and their sustainability is ensured when the external funding pulls out? Have you had experiences when the external funding was withdrawn and the ICT projects/activities also stopped? What are the benefits/advantages and disadvantages that you have encountered from externally-funded ICT projects/activities?

4. Harmonizing the ICT in education programme with other ICT and/or Education initiatives/projects – Have various external donor agencies introduced and funded ICT projects that are either very similar or contradictory in purpose and strategies in your country, i.e. teacher training projects from Intel, World Links or UNESCO reaching the same clientele? If so, how have you dealt with them and blended or harmonized these various projects so that resources do not overlap? Or have you not had to deal with this problem yet? What strategies and techniques have worked in harmonizing these various initiatives both at the national and regional levels?

5. Leadership and management of ICT in education programmes

a. *Need for champions at all levels* – Does your ICT programme have a champion? How was this champion identified and what are the qualifications of this champion? What are his/her roles, or in what ways does he/she champion the cause of ICT for education? Do you feel that there is a need for more than one champion and where should they be located?

b. *Distributed leadership* – Do you have an ICT for education office? Are all the functions and responsibilities related to ICT concentrated in this

office solely, or have you distributed the leadership of the ICT programme to different bureaus or sections of the MOE, i.e., departments for teacher training, curriculum development, EMIS and research and evaluation, planning, or bureaus or departments of elementary, secondary and higher education, field offices at the sub-national levels, etc. so that in each of the bureaus or departments, there is an ICT champion or leader/manager and ICT has become integrated into the different components of the education system?

c. *Continuous and ongoing change management at all levels* – Are all the training programmes, briefing, workshops, activities to develop/upgrade skills of managers, to engage them in projects/activities, in obtaining their advice and technical support being done on a continuous basis or are they one-shot and sporadic events? If you are able to sustain their continuous participation and support and change their attitudes, knowledge and skills in the process, what strategies and techniques have you followed to achieve continuous and ongoing change in attitude and behaviour of managers and leaders? Have these strategies/techniques been effective? How?

6. Dichotomy between educators and technologists – Has your project experienced the results of working with technologists alone to undertake many ICT education activities without the collaboration of educators, or working with educators alone without the help of technologists? If yes, what were the results and what lessons have you learned? If you have mobilized collaboration between educators and technologists together, in what areas and in what ways have they complemented each other and obtained the results needed?

Component 4: ICT in Schools – Policy, Visions and Strategies

Issues:

1. How to create school ICT vision/plans – If the schools under your programme have policies, visions and plans, why did the schools find it important to have these and how did the process of development take place? What are the elements of a school-level vision and plan and what are they based on?
2. Supporting policies that facilitate uptake of ICT in schools – How did your ICT programme immediately support the use of ICT in schools? What were the inputs/ingredients or elements/facilities/hardware/software, etc. that you put in place in order to ensure the use of ICT in schools as soon as the directive for ICT use is released? Or has there been a time lag between the policy, master plan and directive and actual use in schools?
3. Management of ICT resources in schools: need for SWOT analysis – Have your schools conducted a SWOT (Strength, Weaknesses, Opportunities and Threat) analysis? If so, how and what were the results? Were the results used for planning and managing the ICT resources in the schools? Have the results helped in effectively implementing the use of ICT in schools?
4. Translation of laws into school-level acceptable use policies – Have the national legal and regulatory framework and legislations/regulations dealing with ICT been translated into school-level guidelines and use? Who translated them and what were these acceptable school-level use policies? Are they being enforced and really used? How were they disseminated to schools and

advocated? Are there any problems being encountered in enforcing the acceptable use policies? If yes, what are these and how are you improving the situation?

5. Parents and community involvement – Please describe strategies and modalities used to mobilize the participation of parents and various groups in the community in the effective implementation of ICT use in schools. Which of these strategies proved to be effective and which failed? Which areas of the ICT programme in schools need the support and involvement of parents and community? Should they just be recipients or also promoters/contributors – in what ways?

Component 5: Technology Infrastructure and Connectivity

Issues:

1. Choice and mode of deployment of technologies based on geography, resource constraints, types of schools, etc. - Is your ICT for education programme able to penetrate and connect all schools at all levels across the country with ICTs for educational purposes? If not, how have you planned and prioritized the distribution and deployment of ICTs so that equitable use/benefit is ensured? Where are most of your ICTs and connections located? Who is most benefiting from your ICT programme? How did you prioritize? Is gender and social equity addressed in this deployment? What are the weaknesses and gaps of your deployment exercise? If found lacking, how will you improve the situation?

2. Connectivity options/alternatives – Please describe your various connectivity arrangements and the purpose/uses of each type of connectivity. What type of connectivity is most used and why? What, in your experience are the pros and cons of these various connectivity type? Please describe each in terms of coverage or reach, scope, capacity, accessibility, ease of installation and use, etc. Where and how are they being used? What is the cost involved for each connectivity type and which of these connectivity options have been found the most effective so far? Have you had any experience as to how to increase bandwidth at affordable rates?

3. Infrastructure that supports and delivers teaching and learning – What is the ideal blend of infrastructure and ICTs that promotes the most efficient delivery of teaching and learning both online and using a combination of online and offline learning? What are the right kinds of technology that can get the job done well? In your experience is the existing hardware, software and infrastructure support adequate to achieve the teaching/learning goals of your ICT for education programme? If yes, why? If no, why not? What should this mix of infrastructure, hardware and software comprise of? How do you go about matching the needs and goals of the programme to the infrastructure and ICTs required?

4. Emerging technologies; dealing with rapid development of technologies – How does your programme respond to emerging technologies and go about updating your existing ICTs with new ones as required? Is there a plan for updating and responding to the rapid development of technologies? What do you do with the old ICTs; how do you determine which new technologies your programme should acquire? Is there a budget allocated for this?

5. Donated computers – Has your programme received donated computers? From whom, how many and for what purpose - please also describe the conditions of the computers when received? Have they been used without any problems or if they have problems and are not usable, what specific problems prevented them from being used? What were the costs of using donated computers and how did you manage the process of receiving and repairing these donated computers? What are the advantages and disadvantages in receiving donated computers?

6. Open source – What software are you using to implement your various ICT activities, especially in teaching/learning and training? Are these paid for or have you tried using open source? What open source software did you use and for what purpose? Please specify the locations of this open source, whether it was easy to access and were complete instructions on their use provided? How do you assess the software's effectiveness and usability?

7. Guidelines on information security (e.g., viruses, hacking) – Has your programme experienced hacking or damages to your server and its applications because of virus attacks? If so, how have you responded? What software, actions, guidelines and procedures have you used in order to prevent hacking and security risks to your server, applications and contents? What are the sources of these guidelines on information security? Are these guidelines adequate? If not, what are the gaps and how should guidelines be enhanced?

8. Integrating of school management software with LMS; (allowing decoupling as well) – Does your programme operate on a common Learning Management System? What benefits do the schools get from using the prescribed LMS? Has it been responsive to schools needs? If not, does it allow decoupling as well? What are the strengths and weaknesses of the LMS and how can it be further improved? What are the advantages that you can get from having the options of decoupling from the LMS?

Component 6: Curriculum, Pedagogy, and Content Development

Issues:

1. Integrating technology into the curriculum (involves talking to curriculum development experts) – Is ICT being introduced as a separate subject or as integrated part of your various subjects? If ICT is integrated into the different subjects, which subjects and how did you promote and ensure the integration of the ICT lessons into the mainstream teaching of these subjects? Is ICT a part of the objectives and learning outcomes or standards of the national curriculum scheme/strategy of the MOE? To what extent? Please describe how it figures as part of the national curriculum and how this came into effect? Also describe how these national curriculum guidelines for integrating ICT into the different subjects are being enforced and monitored?

2. Shift in pedagogy as a result of integrating ICT in the curriculum – As a result of the use of ICT in teaching, learning and training, have your teachers' methods and processes of teaching, and students' way of learning changed? Do you develop and use ICT-based lessons that are not merely a replication of the traditional textbooks using the drill and practice or memorization method? Is teaching now more learner-centred, promoting creative thinking and problem

solving, independent learning and collaborative learning? Has the environment been developed for initiatives to access, assess, and transform the accessed information into knowledge, etc? Are the ICT-based lessons contributing towards a shift in the educational paradigm? Is the teaching of the various subjects using ICT more creative and does it promote critical and independent learning and problem solving more than those which do not use ICT? Please use evidence from research and studies to substantiate the effects of ICT use on pedagogy.

3. Content and services that support continuous improvement in curriculum practices – What sources and support exist so that teachers and curriculum developers can further improve their knowledge and skills in ICT-based curriculum practices? Where can teachers and curriculum developers access best practices, good examples, curriculum materials and information to support their work in this area? For example, are there information resource centers and clearing houses that provide resources and references materials? If there are clearing houses and information resource centres, are they used and is the information thorough and appropriate? Do the materials support ICT-based curriculum development and teaching? Is there a continuing programme for upgrading skills? Is there an online community of experts on this area which can be tapped for problem solving, etc? Have these been effective? What are their strengths and weaknesses and what is needed from these clearing houses in order to support further improvement in curriculum practices in ICT?

4. Development and selection of culturally sensitive content – Has your ICT for education programme ever encountered problems in development and selection of contents that proved to be culturally sensitive and politically incorrect? If so, how have you dealt with these problems? Have you developed guidelines for schools to follow in dealing with culturally and politically sensitive contents - localizing them to be more appropriate? Have these guidelines been enforced and if so, how?

5. Ethical and political implications of using English as the lingua franca – Has your programme at the national, sub-national and school levels accessed materials in English from the Internet for use in training, teaching, and learning? How has the practice of using materials in English affected acceptability of content and materials and the attitude and behaviour of both teachers and students?

6. Intellectual Property Rights related to educational software – Has your ICT for education programme been using various software and applications following the international intellectual property rights conventions? How have these rights inhibited or facilitated the use of resources and educational software for your programme and activities? Have your schools observed these rights and if not, how do you deal with these violations?

Component 7: Professional Development (Pre-service and In-service)

Issues:

1. Policy on teacher training on ICT – Do you have a specific policy and master plan on teacher training on ICT? Is it related to the broader ICT for education

policy and plan or not? Many countries are realizing that they have developed their ICT in education policy from the technology perspective. The need to revise and overhaul the policy from the pedagogy-based perspective has been expressed by many. Are you finding the same situation in teacher training? What are the strengths and weaknesses of your teacher training policy and plan and how do you intend to improve them?

2. Need for teacher competencies and standards before training – Has your ICT for education programme developed a set of competencies or basic standards for teachers to develop in order to use ICT in teaching effectively? What are these competencies? How have these competencies served as benchmarks for formulating and evaluating teacher training programmes? Do you find these competencies adequate and responsive to the goals and objectives of the ICT for education programme?

3. Changing the mindset of teachers – What have your experiences been in changing the mindset of teachers so that they accept their new role within the ICT environment? Have you witnessed either a gradual or great change in the attitude and behaviour of your teachers towards a more favourable use of ICT in teaching? What factors have contributed to this change? What strategies and methods have you used to affect a more favourable mindset? What is the profile of the teachers who changed their mindset in support of ICT use?

4. Content focus of capacity building for teachers – What are the contents of your professional development programme? Does it focus on basic computer literacy or are you now upgrading skills on the integrated use of ICT for teaching? Are you training on basic ICT literacy from the perspectives of ICTs as pedagogical tools rather than as applications per se? To what extent does your training programme focus on the development of skills in the pedagogy-based and integrated use of ICT into the subject curricula and classroom teaching? Have you evaluated your training programmes? What have been the findings and evidences that your training programmes have been resulting in the integrated use of ICT in classroom teaching or that after training, teachers are able to use ICT in teaching?

5. Capacity building of all education personnel at all levels:

   a. *Training of other personnel* – Are you training other staff in addition to teachers? If so, who? Is there a plan for training all education staff? What are the purposes of training the others and what kinds of training are appropriate for them (what was the content focus?) What have the results been of training the others so far? How has the training of other staff contributed to the effective implementation of the ICT programme as a whole?

   b. *Training at all levels* – At what educational levels are you offering training – in-service and pre-service; primary, secondary, higher education and non-formal education? If not all, which teacher training service and educational levels are you reaching first? Why did you decide on this level? If you are reaching all levels, how do you ensure equitable provision of resources for teacher training and what methodologies or modalities does your teacher training programme use to reach all of these levels effectively? Describe the strengths and weaknesses of the path you decided to take and what kinds of improvements need to be made?

6. Incentive system and motivational strategies for teachers (accreditation and certification, etc.) :

   a. *Strategies to motivate teachers* – How are you motivating teachers to use and continue to use ICT in teaching and to join training programmes on ICT? What different incentives have you used to support teachers in their new roles and tasks? Which ones worked and which did not? Why? What were the results of using these incentives?

   b. *Access to facilities after training* – How do you ensure that teachers will use what they have learned when they go back to their schools? What facilities and continuing support has your ICT for education programme provided to ensure that teachers apply what they have learned e.g., facilities/ equipment, connectivity, appropriate software installed, materials, technical and help-desk support? Has this support been adequate and what more is needed to ensure continuing support?

   c. *Accreditation and certification* – Are you using these as one way of providing incentives for teacher to undergo training programmes? What kinds of certification and accreditation do you follow so that teachers find it beneficial to join teacher training programmes on ICT? Has the accreditation and certification worked? If yes, how? If not, why not?

   d. *Clearing houses and online training resources* – Has your programme established clearing houses/information centres and online training centres which teachers can access to further enhance the skills that they have developed and obtain further support in using ICT in teaching? Are these resources and sources adequate? How have they helped your teachers? What are the inadequacies of these resource centres and what should be done to improve them?

Component 8: Monitoring and Evaluation

Issues:

1. Documentation of benefits of using ICT in education (including the issue of methodology) – Have you ever tried documenting the experiences of your programme, especially as related to the benefits derived from the use of ICT? What were the reasons for documenting the use of ICT in education? What methodologies did you use to document and evaluate the use of ICT in teaching/ learning? Are these methodologies the most appropriate and valid for collecting data on the effectiveness of ICT use? What were the results of the evaluation or documentation? Have these been published and shared with those who will benefit from the results?

2. Assessing learning impact – What assessment methods, instruments and tests are you using in order to determine the impact of ICT use on learning? Who prepared them, for whom and how are they being used? Which of the different methods of assessing learning are the most effective ones? Please describe the pros and cons of each method, ease of application, reliability of method, etc. and the results so far. What are the gaps in the assessment methods that you are using and how should the methods be enhanced?

3. Programme evaluation – Does your ICT for education master plan include built-in programme evaluation? If so, please describe. When does evaluation

take place in the life of the programme? Have you already undertaken a programme evaluation? How many times? Please describe, including objectives, respondents, methodologies used, findings and recommendations. Have the findings fed back into the programme to stimulate more improvements and better planning and practice? What are the strengths and weaknesses/ inadequacies of your evaluation programme and how should it be improved?

Issues for Content: Case Study Two on SchoolNet Operations

Component 1: Rationale/Objectives

Issues:

1. Why SchoolNet? (objectives) – Why did you set up a SchoolNet? Describe the reasons and whether these reasons were found to be justified later. How was the SchoolNet initiated and who formulated the objectives of the SchoolNet? Are these objectives being accomplished? If not, why not?

Component 2: Policy and Development Support

Issues:

1. Is the SchoolNet integral to the MOE's policy and programme on ICT for education – Is your SchoolNet an integral part of the MOE ICT policy? If yes, in what way is it considered as an integral part and what statements refer to it in the policy and master plan? Is there a budget allocated for SchoolNet by the MOE? Did you find having your SchoolNet as integral part of the MOE ICT policy beneficial and worthwhile? If the SchoolNet is not under the MOE, how does it relate to the MOE ICT policy and support the ICT policy and master plan/programme?
2. Leadership and distributed leadership – Is your SchoolNet run by a champion and a steering committee that involve active participation by all stakeholders? Does the SchoolNet involve inter-ministerial collaboration? What have the roles of other ministries or departments been in operating your SchoolNet?
3. Awareness and advocacy – Is there a strong marketing and advocacy strategy and plan to convince school policy makers, administrators, teachers and students to join the SchoolNet? Please describe this campaign and its results.

Component 3: Management, Organizational structure, Partnership and Financial Stability

Issues:

1. Co-ordinator/focal point and range of organizational structures – Who is the coordinator or focal point of the SchoolNet and where are they based, e.g., government, NGOs, private sector? What are the duties of the focal point? Is the focal point/coordinator acceptable to all parties involved? What is the involvement of the school administrators and other network members? How are they connected? What are the roles and responsibilities of the different actors/partners in the SchoolNet? What has the feedback been of the SchoolNet members to the coordinator/focal point leadership and support?

2. Required personnel involved in operating a SchoolNet – Who are the personnel involved in operating your SchoolNet? What are their qualifications and roles/responsibilities? Do you feel that you have adequate and appropriate staffing? If not, what kinds of personnel should be involved in your SchoolNet operations? Who is managing and maintaining the SchoolNet? What is the ideal staffing required to run and maintain it?

3. Budget required to operate the SchoolNet – What are the sources of funding for the SchoolNet (government, school fees, private, community, etc.)? Are the funds adequate? If not, why not? What are the funds spent on and which components do you spend most of the budget on? Which budget items do you need more funding for? Do you have a financial sustainability plan for scaling up the SchoolNet? If so, please describe and has the plan succeeded in generating funds?

4. Partnership in the SchoolNet – Who are your partners? What types of partnerships do you have (with government and intra-government partnerships, with telecommunication providers, with ICT equipment, software and content providers, NGOs and the private sector, etc)? What are the pros and cons of partnering with each of these types? What are their roles and contributions? What additional resources have they provided? Have their contributions enhanced the operations of the SchoolNet? In which ways?

5. Provision of SchoolNet operating guidelines – Has your SchoolNet developed guidelines for operating a SchoolNet at the school level? If yes, who developed the set of guidelines and what are its basic contents? Have the guidelines been enforced and used by the schools? Have they proved effective and have they contributed to the effective operation of the SchoolNet? What are the strengths and weaknesses/gaps here? In what areas could the guidelines still be further improved?

   a. *Selection of schools* – What are the criteria that you have used for the selection of schools to join the SchoolNet? How do you achieve a balance between reaching both the urban and rural areas, so you do not promote the digital divide? How do you ensure that you reach the primary, secondary and tertiary levels in an equitable way?

   b. *Activities and strategies* – What kinds of activities do you offer schools in joining a SchoolNet? What are the strategies followed to promote activities among schools?

   c. *Ensuring quick uptake in participation* – How do you ensure that schools which joined immediately participate in the SchoolNet activities? What strategies have you used to ensure cooperation and collaboration?

6. Institutionalization and sustainability:

   a. *Keeping the momentum* – After you have launched your SchoolNet and identified and mobilized pilot schools to participate, how do you keep the momentum of the pilot schools going and encourage others to join? What strategies have you used in order to sustain the active involvement of the schools, administrators, teachers, experts, colleagues, students, and parents in keeping the SchoolNet alive? Please share success stories in keeping participation alive and in building and maintaining a learning community. If you have not sustained interest, why not? What went wrong?

b. *Integrating into the MOE ICT for education programme* – Has the SchoolNet become an integral part of the MOE ICT for education policy and programme? If so, what strategies have you used to institutionalize the SchoolNet in the MOE ICT policy and programme? If you have not involved the government at the start of the SchoolNet, how have you generated interest for them to take over or integrate it into their programme? How have you generated a sense of ownership in the SchoolNet?

c. *SchoolNet maintenance and upkeep* – After the pilot project is completed, how did you face the challenge of maintenance and upgrading of facilities and equipment? Did you allocate finances to plan and undertake a roll out or scaling up to more schools?

7. Synergies with other national and regional SchoolNet programmes – Has your SchoolNet joined with other national, regional and international SchoolNet programmes? Which ones? What kind of involvement/participation did you have with others and have you found it worthwhile and useful to join with other SchoolNets? If yes, why – what have the benefits been? If not, why not? How can you further improve collaboration and participation with other SchoolNets?

Component 3: Infrastructure and Connectivity

Issues:

1. Startup phase and minimum core requirements – What are the basic facilities, resources and infrastructure which you put in place when you started your SchoolNet? How did you come up with the basic core requirements? Who were the people involved in deciding these specifications or core requirements? Was your budget adequate to meet these core requirements? Were the core requirements identified appropriately and correctly? If not, why not? What were the gaps in these core requirements? How did you go about obtaining your domain name and has the process of naming conventions facilitated a smoother access to your SchoolNet website?

2. Infrastructure and computer configuration in schools – How many computers are needed in the participating schools? How many computers are connected to the SchoolNet and Internet? What is the ideal number and capacity/ power of these computers to be able to join the SchoolNet? What kind of Internet connection is used in the school? What is the speed of the connection? How has the connectivity situation helped or impeded the effective participation in the SchoolNet? What resources are given to schools in order to participate effectively? Does SchoolNet provide a localized browser to schools? How many Internet accounts does each school have with the SchoolNet server and how much hard disk space is given to each school?

3. Location of server: centralized or decentralized? – Where is your server located? Is it centrally operated and located or is it decentralized to schools? Are you dependent on the central platform or are you independent of it? Or is it a blend of the two? Please describe the facilities/equipment needed if it is centrally located compared to when it is decentralized. What are the pros and cons of the two systems? Assess whether the system that you have followed

has been effective or not. What have its strengths and weaknesses been and how have you solved problems that occurred between a centralized and decentralized system? How do you plan to upgrade or improve on this system?

4. Operating system/application – What is the operating system you are using which connects to SchoolNet in each school or the platform used for running the SchoolNet? Is it a priced application or open source? Please describe and assess its effectiveness, its strengths and weaknesses and how it has facilitated the operation of the SchoolNet.

5. Payment and funding for connection – Do the schools pay for their own connection or does the national project fund the connectivity? Is there a time limit in the connection of the SchoolNet?

6. Connectivity options – Have you looked into several ISP models to find which best fits your requirements and capacity – have you tried other options or alternatives for connecting your SchoolNet apart from the usual web-based, such as video-conferencing, satellite, wireless, etc. Does the SchoolNet make alternative provisions for connectivity (like satellites) in order to reach remote areas? Please describe your experiences with the use of these other technologies in terms of costs, effectiveness, efficiency, etc. What are the pros and cons for each of these options and which ones meet your requirements? How has your SchoolNet project contributed to more widespread access and connectivity to marginalized or disadvantaged areas of the country as a result of using other connectivity options?

7. Support from other sources in connectivity – Is connectivity supported by the local telephone company in providing lower rates for the SchoolNet project? Has the SchoolNet tapped other private companies so that schools are able to obtain a reduction in costs for computer equipment, as well as for software and applications? Please explain how your SchoolNet programme has dealt with the high costs of connection and facilitated access to ICTs throughout the country.

Component 4: Curriculum Integration, Content Development and Knowledge Management

Issues:

1. Curriculum integration – Are the teaching/learning materials used in the SchoolNet integrated into the national and sub-national curriculum for science, mathematics and language? How did you ensure such integration? – Please describe the process that took place. What have the strengths and weaknesses been of this curriculum integration? What are the pros and cons of having your SchoolNet materials integrated into the national or sub-national curriculum?

2. Pedagogy and ICT integration – Have your teacher's methods of teaching changed as a result of participating in the SchoolNet? Has the quality of teaching improved after SchoolNet participation? Has learning also changed? If yes, how did teaching/learning change? What were the improvements made in the teaching/learning methodologies and environment?

3. Contents of the SchoolNet Website:

   a. *Target users of the site* – Who are the users of the website i.e., teachers, students, administrators, policy makers, parents, technologists or ICT specialists, and general ICT policy makers? How many teachers, students, etc. are participating in the SchoolNet? What is the rate of increase of participation? Why did you choose just a few, priority target users and are they being served well by your website? Do you want to expand the users to include parents and the community?

   b. *Contents of the SchoolNet website* – What are the different sections or contents and resources available on the SchoolNet website? How were the contents decided on? Are the contents appropriate to and supportive of the school curricula? Do you find them adequate and useful or do you need to add more contents and sections? How acceptable, useful and relevant have the contents been to the users? Have you evaluated or gathered feedback on the relevance and usefulness of the contents? If so, what were the findings? What will you do to improve the contents further?

   c. *Development of the contents of the site* – Who is managing the website? Who are the developers and contributors of resources? Is there a professional content developer being sub-contracted to develop and expand the SchoolNet website resources? Or are they being developed by teachers and students? If so, how much are teachers and students participating in the development of contents? How and how often are they updated? What strategies are being used to motivate teachers and students to contribute to the contents and resources?

   d. *Quality control* – How do you ensure that information and materials being uploaded on the site are of high quality and relevance? What strategies have you used for ensuring quality control of the contents contributed by teachers, students and others?

   e. *User-friendliness and interactivity* – What are the most accessed and used websites and which ones are not accessed and used that well? Why? Is it easy to find information on the site? Does it use meta-data for accessing information? Are there interactive learning projects on the site? Are there authentic learning opportunities on the site? Which are the interactive parts of the website? How much participation do these interactive sites get?

   f. *Educational software and courseware* – What educational software/ applications and courseware are available on the SchoolNet website? Were they procured or developed locally? If they were procured, from where and have they been effective? If they were developed locally, how were they developed? Have they been useful and effective? How have you promoted collaborative design and the development of software and courseware?

   g. *Linguistic and cultural barriers in the building and maintenance of learning communities* – Are there many languages or dialects spoken in your country? How have you dealt with making the contents acceptable and usable to your various target audiences? What kinds of software and applications or strategies have you used in order for everyone to understand and use what is uploaded on the SchoolNet website in different dialects/

languages? How have you also dealt with the problem of English not being understood by your users, despite being the major language used for many information resources on the Internet? How has the SchoolNet ensured the understanding and respect of the cultural diversities of various ethnic groups?

4. Providing resources to the community and fostering collaboration – Creating SchoolNet communities – Have you succeeded in creating a SchoolNet community? If so, what communication and community tools have you used in order to connect everyone in an interactive way? What are the community-building activities you have used to maintain the interest and participation of this community? Have these tools and activities been successful in keeping the community alive and running? If so, how did you achieve this? If not, why not?

Component 5: Services

Issues:

1. Helpdesk – Is there a helpdesk available not only to respond to enquiries and solve problems, but also train users on how to upload, navigate and search for information on the SchoolNet website? Who runs the helpdesk? What are the necessary requirements to make the helpdesk effective and responsive? Has this been very effective, responsive, up-to-date and quick? Have you evaluated or gathered feedback on the effectiveness of the helpdesk? What were the findings?
2. Troubleshooting and maintenance – Does your SchoolNet operate a technical unit for troubleshooting and responding to requests for help on problems dealing with equipment, infrastructure and connectivity? Who comprises this technical unit and how effective and responsive is the assistance they provide? How do the schools rate the usefulness and effectiveness of this technical unit? What are the strengths and weaknesses/inadequacies of this technical unit? How can it be further improved?

Component 6: Teacher and Personnel Training

Issues:

1. Skills needed – What kinds of skills are needed by the various people involved in the SchoolNet? How did you develop these various skills - what kind of training did you provide? Please describe objectives, duration, contents, methods used for the training. Did these training programmes help these various SchoolNet personnel and users perform their tasks more effectively and participate in the SchoolNet more? For example, did the training for teachers develop skills on how to integrate SchoolNet activities into classroom teaching/learning? Please share findings if evaluation has been conducted into the impact of training on the roles and duties of the various staff involved in the SchoolNet.
2. Preparatory skills training at the pre-service and in-service level – Apart from the training that the SchoolNet is providing for teachers to help them use the SchoolNet, is the ICT for education programme providing training courses to teachers both at the in-service and pre-service level on computer literacy and ICT integration? Has this training helped in preparing the teachers to

participate effectively in the SchoolNet programme? In what ways? What skills were developed during the training programmes which have facilitated efficient implementation of SchoolNet activities?

3. Teacher incentives and motivation after training – After the training, did you find teachers less inhibited in sharing resources and lesson plans? Have they learned how to add ICT-based teaching resources on the website and into their portfolios for further professional development? Skills needed – what kind of people do you need to start a SchoolNet programme and what kind of training do they need? Apart from training, what other incentives have you used to encourage teachers to share resources on the SchoolNet website and to participate actively?

Component 7: Research, Monitoring and Evaluation

Issues:

1. Research, monitoring and evaluation strategy and plan – Does your SchoolNet have a research, monitoring and evaluation plan integrated into the policy and master plan? Please describe this plan and how you have implemented it?

2. Key performance indicators – Have you developed a set of indicators to determine the success of your SchoolNet programme? If yes, what are these key indicators (e.g., indicators on ICT diffusion, extent of connectivity, educator adoption, learner/student impact, etc.)? How were these indicators developed? Are they being used for evaluating the project? Please share findings.

3. How to collect evidence of success – Have you implemented your evaluation plan and undertaken various means of gathering evidence to show the successes of your SchoolNet in order to secure additional funding resources? If so, what were the methods you used in gathering evidence? What have the results been? Please share findings.

SchoolNet Toolkit Outline

How to use the booklet – this will be a four page document/ booklet

- Context for which this toolkit was developed
- Users
- Purpose of the toolkit
- Descriptions of different guidebooks meant for different target audiences

Guidebook 1: Basic concepts and definitions (for everyone)

- What is a SchoolNet (definitions)?
- Why have a SchoolNet?
- What are the characteristics of SchoolNet programmes?
- What are the functions, activities and services provided by SchoolNets?
- Where should a SchoolNet be located? (Positioning of SchoolNets in relation to country educational ICTs landscape)
- What are the enabling conditions required for a SchoolNet programme?
- Why is there a need for a champion and leader for SchoolNet?
- Some examples of country-level SchoolNets and regional SchoolNets
- How do SchoolNets add value added to country education systems?
- How does one measure the effectiveness or success of SchoolNets (key performance indicators)?

Guidebook 2: Planning an Overall SchoolNet Programme (for policy makers and high level managers)

- Programme/project planning
  - Objectives and defining outputs
  - School selection/participants
  - Training
  - Resources
  - Personnel
  - Etc.
- Financial planning
  - Cost of ownership
  - Budgeting and cost projections

- Partnerships
  - Types of partnerships – pros & cons of different types
  - With government and intra-government partnerships
  - Telecom providers
  - ICT equipment, software and content providers
  - NGOs
  - Private sector
- Change management
  - In the education system
  - In schools
- Curriculum integration
  - Mapping ICTs to national curricula
  - Integrating ICTs in curriculum change processes
- Professional development
  - Competencies for educators in using ICTs (summary)
  - Professional development models
- Making technology decisions
  - Connectivity options
  - School technology options
  - Procurement options
  - Maintenance options
  - Support options
- Sustainability in schools
  - Technical sustainability
  - Educational sustainability
  - Financial sustainability
  - Social sustainability
- Broadening and extending SchoolNet impact
  - Scaling up: moving from pilots to large-scale projects
  - Building professional skills and delivery capacity within the education system (above school level)
  - How do you ensure sustainability and institutionalization of SchoolNets?
  - How do you embed ICT teaching/learning materials in mainstream curriculum?
  - How do you ensure that pre- and in-service teacher training will provide adequate knowledge and skills for teachers to participate in SchoolNet?
  - Documenting and sharing best practice
  - Embedding lessons learnt in policy
- Evaluation and assessment
  - Evaluation of ICTs in Education
  - ICT Diffusion and usage

- Extent of connectivity
- Educator adoption
- Learner/student impact

Guidebook 3: SchoolNet Management Guide

- Administrators guide
  - Formulating SchoolNet activities and services
  - Developing school technology plan for SchoolNet
  - Fund-raising
  - Training of all those involved in the SchoolNet operations
- Embedding in curriculum in schools
- Teacher motivation and incentives
- Collaborating with other partners and schools
- Technology choices
- Technology Needs Assessments
- Hardware – computers (quantity, quality, power/capacity)
- Network (LAN) architectures
  - Technical options – LAN centralized server/proxy server, etc.
  - Thin-client/fat-client
  - Wireless/wired
  - Notebooks
  - Handhelds
  - Alternate access devices
- Software
  - Generic application (productivity) software
  - Educational software (content-rich and content-free)
- Software Platforms
  - Open source software
  - Language support
- Connectivity
  - Types of connectivity services
  - ISP models
  - Domain names and naming conventions
  - DNS
  - E-mail
- Procurement options

Support, maintenance and troubleshooting

- Helpdesks
- Documentation
- Maintenance options

- Training
- School-based or university-based or service contract to local company

Training

- Types of training
  - ICT literacy
  - ICT integration
  - Technical training
- Training models
- Identifying and training trainers
- Delivery and managing training courses

Online services guide

- Portal sites (resource directories)
- "Push" services using e-mail
- Content hosting
- School website hosting
- Applications hosting
  - Mailing lists
  - Collaboration tools
- Server hosting
- Platform dependence / independence

Creating SchoolNet communities

- Promoting collaboration
- Communication and community tools
- Community-building activities
- Workshops and conferences

Feedback, assessment and evaluation

- Usage indicators
- Measuring participation
- Evaluating impact

Guidebook 4: Practitioners Guide (Teachers, Content Developers)

- ICT integration
  - Mapping ICTs for entry into school subjects curriculum
  - Integrating ICTs in subject lessons
  - Developing lesson plans or developing portfolio of lessons
  - Using SchoolNet lessons for teaching in the classroom
- Assessing learning outcomes

- Choosing software
- Finding and adapting content
- Collaboration
  - Joining SchoolNet website and how to upload materials
  - Joining telecollaboration
- Creating SchoolNet communities
  - Using communication and community tools
  - Community-building activities
- Professional development
  - Teacher and staff training – what skills are needed to train them on website development, telecollaboration, troubleshooting, etc.
- Developing Content
  - Web development tools
  - Quality control
  - Localisation/adaptation
  - Language issues

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Agenda

7 July 2003, Monday

8:30 a.m. – 9:00 a.m.	Opening ceremonies
9:00 a.m. – 9:15 a.m.	Introduction of experts; presentation and adoption of meeting objectives and agenda
9:15 a.m. – 9:45 a.m.	Presentation of the Strengthening ICT in Schools and SchoolNet Project in the ASEAN Setting and how the case studies fit in
9:45 a.m. - 10:00 a.m.	Break
10:00 a.m. - 12:00 p.m.	An overview of the existing situation with regard to the use of ICT in education and the operations of SchoolNets by the experts in their respective countries: short presentations
12:00 p.m. – 1:30 p.m.	Lunch
1:30 p.m. – 4:30 p.m.	Discussion and formulation of the following: • Framework of case studies • Rationale/objectives of the case studies • Content outline • Style of writing; presentation and format • Method of collecting information • Timetable or work plan

8 July, Tuesday

8:30 a.m. – 9:30 a.m.	Presentation of Master Plan and Work Plan for documenting experiences in use of ICT in education and operations of SchoolNets agreed upon the previous day Further discussions
9:30 a.m. – 12:00 p.m.	Discussion and formulation of the SchoolNet Startup Toolkit: • Framework • Rationale/objectives • Target users • Content outline • Method of data collection • Writing style, presentation and packaging • Timetable
12:00 p.m. -1:30 p.m.	Lunch
1:30 p.m. – 2:30 p.m.	Continuation and finalization of master plans and work plan for developing the SchoolNet Startup Toolkit
2:30 p.m. – 3:00 p.m.	Assignment of writers and closing