

POLICY NOTE

ICT and Education

ICT IN SCHOOLS IN TURKEY

May 2005

ICT in Schools in Turkey

Background

The source for this policy note “ ICT in Schools in Turkey” is a rapidly growing body of innovative strategies and approaches being used worldwide. There is an array of experiences; good practices and lessons have been generated for the benefit of countries where ICT use in education has just begun.

It becomes all the more important to study lessons learned when you consider the investment in setting up ICT infrastructure and if we are to avoid re-making mistakes and losing good opportunities.

This note draws from the experience of fifteen countries in North America, Europe, Asia and Latin America. They are United States, Canada, Australia, Italy, Hong Kong, Singapore, Philippines, Malaysia, South Korea, Thailand, Indonesia, Argentina, Chile, Venezuela and South Africa. The focus is on the concerns cited in the ICR¹ and Impact Research Report, June 2004² on Turkey Basic Education project.

The first Section (I) covers the issues related to overall policy environment. (i) Education Environment, and (ii) Policy and Regulatory Environment

The second Section (II) deals with policy at the school management level. (iii) Policy and Strategy to help Schools integrate ICT (iv) Organization and Resource Management in Schools (v) Professional Development, and (vi) Curriculum and Content Development.

¹ Implementation Completion Report (SCL-43550) for the first phase of the Basic Education Project in the Republic of Turkey.

² Information Technology Classes in Basic Education Program - Impact Research (Final Report April-June 2004).

Section I: ICT POLICY IN EDUCATION

Executive Summary

The emphasis placed on developing ICT policy in education varies from country to country. Some countries piloted ICT use in schools and trained teachers without an ICT in Education Policy. Other countries have found it important to have a policy to serve as a framework and guide.

However, the enabling environment and restrictive regulations (e.g. censorship laws, legal and regulatory framework for internet) dealing with ICT use in education need to be examined in detail.

A diverse range of policies and strategies has been developed in several countries to integrate ICTs into schools.

(i) The key critical factor in successful integration of ICTs in schools across countries in Europe, North America and Asia is the creation of a responsive education system. A receptive education structure that is open to the evolving technological changes.

To make the education environment more responsive to the needs of the knowledge based society, some changes are suggested to the education system.

The first is a change of direction based on creating new knowledge and information rather than on rote learning. Up to now, the main function of school education has been to deliver knowledge accumulated throughout human history. But in a knowledge-based society, information is delivered and developed by the people. For as long as schools maintain the rote learning system of education, it will be difficult to develop new intelligence essential for a successful knowledge based society.

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

The third change is the introduction of a creative and self directed education methods. The new learning for the knowledge-based society is the living knowledge that takes in to account real life situations and problems.³

³ Some of the schemes used worldwide are Project work (Singapore), Learning Paradigm Shift (South Korea), eLearning Commission (European Union).

(ii) To optimize the value of new technologies in schools, it is important to give opportunity and resources directly to teachers and students to find new ways to use the technology.

As technology advances, unless it brings with it an attitude shift towards learning, computers can not be properly used to enhance education quality. The old models of traditional rote method of learning do not optimize the integration of ICT in education.

To get maximum value from new technologies, there has to be a shift in the attitudes governing education. Educators and teachers have to figure out new ways to take advantage of the fast evolving technology. It is imperative that we give space and resources directly to teachers and students to find innovative ways to use the technology. A good model of this is the Network of Innovative schools in Canada.⁴

(iii) A holistic approach to ICT in education policy that goes beyond a technological dimension.

The development of new multimedia technologies and the growth of internet in recent years has given students access to a vast range of information and resources. Successfully exploiting the potential of these new technologies depends far more on pedagogical and organizational issues than on the technologies themselves.

The introduction of ICTs has to be accompanied by far reaching reorganization of the learning structures. In addition, it is important that technological innovation is developed to serve education in diverse learning context, while respecting linguistic, cultural and social differences.

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

(iv) In the face of intense competition, countries can no longer rely on the accumulation of capital and labor to sustain economic growth. The capacity of the workforce

⁴ Network of Innovative schools (NIS)- Initiative of Canadian Federal Government. Details in section 3.

to generate new knowledge has to be continuously encouraged.

The ICT in Education Policy should be planned to complement other development strategies. ICT education policy should not be formulated in isolation. It should be considered and implemented to complement and support other development strategies.

I. EDUCATION ENVIRONMENT

Overview

A diverse range of policies and strategies has been developed in several countries to integrate ICTs into schools.

The policy for integrating ICTs has to take into consideration: (i) the role of ICT in National Education Policy, (ii) the existing education system and ICT infrastructure, and, (iii) the economic and social/cultural context. The national ICT infrastructure support (connectivity and accessibility) also has a critical effect on the long-term implementation and sustainability of ICTs in schools.

Components of Education environment to help integrating ICT into education include the following:

1. Create an Open and Responsive Education System

A receptive education system helps in the successful implementation of ICTs in the schools. The education structure must be open to the evolving technological changes.

To make the education environment more responsive to the needs of the knowledge based society, some changes are suggested to the education system.

The first is a change of direction based on creating new knowledge and information rather than on rote learning. Up to now, the main function of school education has been to deliver knowledge accumulated throughout human history. But in a knowledge-based society, information is delivered and developed by the people. For as long as schools maintain the rote learning system of education, it will be difficult to develop new intelligence essential for a successful knowledge based society.

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

The third change is the introduction of creative and self directed education methods. The new learning for the knowledge-based society is the living knowledge that

takes in to account many factors, such as real life situations and problems.⁵

The Project work - Singapore⁶

1. Teaching and assessment methods are reviewed and modified continuously to nurture thinking skills, creativity and to encourage knowledge generation and application

The *Project Work*, implemented in schools since 2000, provides students with an integrated experience to explore inter-relationships and inter-connectedness among different disciplines. It encourages the application of creative and critical thinking skills, and provides opportunities to develop communication, collaborative and lifelong learning skills.

Learning Paradigm shift - South Korea⁷

2. In knowledge-based society, work and education are integrated. Thus, knowledge is produced not by a small elite class but by a mass of active workers in the workplace.

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

eLearning Commission - EU

3. The eLearning initiative of the European commission seeks to mobilize the educational communities in order to speed up the changes in the education and training system for Europe's move to a knowledge based economy.

As Viviane Reding, Commissioner for education and Culture, remarked "The member states of European Union have decided to work together to harmonize their policies in the field of education technology and share

⁵ Korean Education and Research Information Service (*KERIS 2002 pp. 4-5*) is a government - subsidized institution, focusing on the use of ICT in education, developing curriculum content and teacher training. KERIS recommended a number of changes to the education system in South Korea.

⁶ The Pivotal Role of teacher in ICT learning environment. Lim Cher Ping, Assistant Professor, National Institute of Education, Singapore

⁷ Okhwa Lee, Chungbuk National University, Seoul, South Korea

their experience. eLearning aims to support and coordinate their efforts and to accelerate the adaptation of education and training systems in Europe.”

Effective Organization in schools - Malaysia⁸

4. The Ministry of Education (MOE) considers ICT as a means, not an end in itself. It assists more effective organizational structures in the schools (more autonomy to the heads of departments and teachers, more sharing among teachers, and less bureaucracy in the organization). It established stronger links between schools and society (open communication between schools and parents, and collaboration with industries and institutes of higher learning.)

2. The ICT in Education Policy should have the same vision as other Educational Policies and Initiatives

To make ICT an integral part of the education system and to ensure support for ICT programs, ICT in education policy should share the same vision as other educational policies and initiatives.

With a clear goal, ICT becomes part and parcel of education plans, ensuring its implementation. It also enables education stakeholders to examine opportunities for ICT in education.

In parallel, research should be done on the value that information technologies and new media add to the learning process. The objective is to increase the efficiency of learning for individuals and groups. The research work should integrate technological, cognitive, pedagogical and organizational aspects.⁹

It should be priority to take advantage of ICT to speed up necessary changes in education and training systems and that e-learning - learning enhanced by the use of Internet and new multimedia technologies - be available to all.

eEurope 2005 Policy

1. Successful integration of ICT into education and training systems is a main concern of EU leaders and an eEurope 2005 policy priority. Two key themes form the basis for EU’s strategy in this field: Enhancing Education and Training.¹⁰

⁸ ICT in Malaysian Schools: Policies and Strategies. Chan Foong Mae, Principal Assistant Director, Communication and Training Sector, Educational Technology Division, Ministry of Education, Kuala Lumpur, Malaysia

⁹ Technology Enhanced Learning is a strategic objective of the Information Society Technologies and a research priority. Europa.eu.int

¹⁰ The European Commission Initiatives such as the eLearning Initiative and the eLearning Programme play

ICT Integration plan - Singapore

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

Learning Paradigm changes in education system -- South Korea¹¹

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

3. ICT in Education Policy should be driven by a vision that targets a change in the learning paradigm

An ICT in Education Policy should be driven by a vision that can be translated into action. It should target at realistic and manageable goals that lead to successful programme implementation.

Realistic goals are observable and measurable. During the different phases of ICT integration, these goals can be assessed to identify gaps and adopt strategies to address them.

As technology advances, unless it brings with it an attitude shift towards learning, ICTs can not be properly used to enhance education quality. The old models of traditional rote method of learning do not optimize the integration of ICT in education.

To get maximum value from new technologies, there has to be a shift in the attitudes governing education. Educators and teachers have to figure out new ways to take advantage of the fast evolving technology. It is imperative that we give space and resources directly to teachers and students to find innovative ways to use the technology.

a central role in building networks that share such experiences across Europe.

¹¹ KERIS has proposed a number of changes for effective ICT integration in schools in South Korea.

Network of Innovative schools(NIS) - Canada

In acknowledging that innovation is the key, the Network of Innovative schools (NIS)¹² - an initiative of the Canadian Federal government, recognizes and supports schools which have successfully integrated ICT into classroom in innovative ways. The federal government contributes up to \$ 10K per year to schools in the network to continue their innovative approaches and recognizes the capacity of these schools to act as models for increasing the application of ICT and internet in the classrooms.

Education Policy Vision broadens the learning paradigm
It consists of four main goals:

1. Enhance learning between school and the world around it, so as to expand and enrich the learning environment: Teachers and students can access a wealth of educational resources outside the school and collaborate with other educational institutions – local and foreign, and the community at large. With these new learning connections, students develop appropriate perspectives on working and living in an increasingly borderless and complex world.
2. Encourage creative thinking, lifelong learning and social responsibility: Students develop competencies in accessing, analyzing and applying information, and cultivate independent thinking. ICT-based learning strategies help to develop the ability to think creatively, cooperate with one another and to make sound value judgments.
3. Generate innovation in education: The integration of ICT-based teaching and learning approaches stimulates innovation and encourages new curricular and assessment methods to meet the objectives of education. In addition, provide schools with autonomy to use ICT resources flexibly to meet the needs of the students.
4. Promote administrative and management excellence in the education system: Encourage ICT usage to promote efficient communication within the school, among schools and between schools and the MOE. Use ICT to enhance

¹² Network of Innovative schools (NIS) – Initiative of Canadian Federal government. NIS also encourages participation in research, mentoring among teachers and schools and the sharing of innovative practices in integrating ICT into the curriculum and education system. NIS showcases its best practices in ICT thereby promoting science and technology in Canada. Schools and teachers are encouraged to engage in projects which demonstrate innovative ways of using IT in classroom learning.

school administration and effective decision making at all levels.¹³

The European Commission also has been very active in supporting and complementing the efforts of EU member states in this field. It has gained considerable experience in encouraging co-operation and exchange of good practice at a European level.

European Commission Initiative

Since its adoption by the European Commission in 2001, the Communication entitled , “Making a European Area of Lifelong learning a Reality” has been a guiding principle for the development of education and training measures across Europe. This document stress the need for EU member states to adapt their formal education and training systems to the demands of the modern environment, to break down barriers between different forms of learning and to give all EU citizens the chance to develop ICT skills.¹⁴

4. A holistic approach to ICT in education policy

A holistic approach to ICT in education policy that goes beyond a technological dimension.

The development of new multimedia technologies and the growth of internet in recent years has given students access to a vast range of information and resources. Successfully exploiting the potential of these new technologies depends far more on pedagogical and organizational issues than on the technologies themselves.

The introduction of ICTs has to be accompanied by far reaching reorganization of the learning structures. In addition, it is important that technological innovation is developed to serve education in diverse learning context, while respecting linguistic, cultural and social differences.

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

¹³ Based on the vision, “Thinking Schools, Learning Nation”, the blueprint for MP1 in Singapore

¹⁴ The report, adopted by the Ministers of Education in 2001, set a number of shared objectives to be achieved by 2010.

Key areas in Education Policy

The ICT plan for Basic education should focus on seven key areas: Research and development, use of innovative technologies in education and training, technology integration in the curriculum, teacher training in the design, production and use of ICT-based instructional material, infrastructure development, technical support and fund generation, particularly through non-traditional funding schemes.¹⁵

The other areas to consider are: Assessment of curriculum, learning resources, teacher development and physical and technological infrastructure.

ICT Plan - Thailand¹⁶

MOE's ICT plan focuses on ICT use in four areas – improving quality of teaching and learning, developing education management and administration system, building the capacity of education personnel, and developing educational ICT infrastructure.

5. ICT in Education Policy planned to complement other development strategies

ICT in education policy should not be formulated in isolation. It should be planned and implemented to complement and support other development strategies.

In the face of intense competition, countries can no longer rely on the accumulation of capital and labor to sustain economic growth. The capacity of the workforce to generate new knowledge should be continuously upgraded. Each country has to redefine itself to remain competitive and this requires it to move towards more value-added industries that produce high-tech and knowledge intensive products.

So equipping the workforce with the necessary skills for better job opportunities and for the competitiveness of the economy should be a major concern of employment policies. These initiatives should cross the traditional borders of school

education, higher education, vocational training and adult learning.¹⁷

A sustained, productivity-driven growth can only be achieved with a technologically literate workforce that is capable of critical and independent thinking.

Vision 2020 applications - Malaysia

1. Consistent with Vision 2020, seven flagship application were introduced in 1997 as part of the overall plan to jumpstart the country's leap into the ICT Age.

National Policies - Singapore

2. National policies to nurture the country's knowledge based economy and to work towards becoming a knowledge hub in the region and beyond have been formulated. Efforts in support of these policies include enhancing the national innovative system, entrepreneurship and educational capability (Toh, Tang and Choo, 2000).

Education Master Plan - Thailand

3. MOE's Education Master plan focuses on the use of ICT as a major tool for education reform. The strategy supports MOE's 2004-2006 mission to improve the quality and effectiveness of student learning.¹⁸ This strategy supports the decentralization of the MOE administration and management, from the ministerial to the schools and educational service area levels.

6. Identify and Document successful worldwide usage of ICT in Education to create awareness

Policy makers and stakeholders are more likely to support ICT in education policy when real life examples are identified, documented and presented.

By making policy makers and stakeholders aware of and updated on the benefits of ICT to education, advocacy for the acceptance of ICT use in education is strengthened.

¹⁷ This is a major issue of EU employment policies. European Employment Policies. Europa.Eu.int

¹⁸ It focuses on areas in e-education, e-Society and e-Government. The e-education and e-Society strategies provide for the use of ICT infrastructure in accessing information and knowledge to upgrade the basic capacity of the Thai society, reduce the digital divide and promote learning in the Thai society. The e-government strategy utilizing ICT for good governance, emphasizes improvement and development of the administration and management systems in all government organizations.

¹⁵ ICT Integration in education in Philippines. Victoria L. Tinio, Director of E-learning, Foundation for Information Technology Education and Development Inc., Manila, Philippines

¹⁶ Teacher Training and the use of ICTs. Pornpun Waitayangkoon, Assistant to the president, The Institute for the Promotion of Teaching Science and Technology, Bangkok, Thailand

For example, in United States students are using software from Blackboard Inc.¹⁹ that is changing the very notion of going to school. (See box). The technology does not replace classroom instruction, as many educational software and online schools do. Instead, Blackboard is designed to complement what happens in class. It gives students one centralized site on the net to get course outlines, lecture notes, and reading material. It also lets them take tests, hand in papers, watch videos, and participate in cyber-discussions that can bolster in-person lectures.

Students go online to get assignments, take tests, listen to Spanish language drills, and even join in a discussion of Dostoyevsky's *Crime and Punishment*. They can pursue classroom activity anytime and anyplace.

The students take for granted a technology that earlier generations of collegians may not even know exists.

ICT in Education Awareness- Singapore

1. Policymakers and stakeholder in Singapore are aware of ICT in education blueprints from other countries, some of which are : (i) United States' \$200 million Technology Literacy Challenge Fund to give American students access to computers. Over 6000 schools will be linked. (ii) Major programmes for ICT in education in Germany, France, Britain and Italy, including a programme in Italy to install multi media workstations and Internet connections in 15,000 schools by the year 2000, with an investment of about \$850 million. (iii) Finland, with the highest connections to the Internet in the world, has launched a five-year strategy in "Education, Training and Research in the Information Society".

Blackboard – United States

2. Blackboard's software is used in more than 2,000 schools including more than half of all U.S. colleges and universities. Blackboard is used to supplement not replace classroom instruction. It puts the course information on the net. Students can get their syllabus, assignments, reading material, and grades at a course's Web site as well as take tests and hand in papers online.

¹⁹ Big Program on Campus. Business Week, September 20, 2004

II.POLICY AND REGULATORY ENVIRONMENT

Overview

The emphasis placed on developing ICT policy in education varies from country to country. Some countries piloted ICT use in schools and trained teachers without an ICT in Education Policy. Other countries have found it important to have a policy to serve as a framework and guide. Malaysia and Singapore carried out pilot studies prior to launching ICT in Education Policies.

However, the enabling environment and restrictive regulations (e.g. censorship laws, legal and regulatory framework for internet) dealing with ICT use in education need to be examined in detail.

As ICT in Education Policy is an integral part of the National ICT Policy, the MOE should work closely with other government organizations, especially those in charge of implementing national policies on ICT and Telecommunications.²⁰

Components of Policy and Regulatory environment to help integrating ICT into education include the following:

1. Define clearly the roles and responsibility of all Departments

Harmonized implementation of ICT in education programmes can be achieved by defining clearly the roles and responsibilities of all departments (within the MOE and other relevant ministerial departments) in the ICT implementation plan.

The ICT master plan should show clearly the different components of project activities, including budget allocation, manpower requirements and timetables.

In Turkey²¹, Computer Educatory Formators list problems essentially stemming from ‘uncertainty of their powers and responsibilities with no authority to impose sanctions.’ There is also a problem of coordination as only about one third of the formators meet regularly with the Provincial National Education Administrators whereas the rest meet with them ‘if need arises’ or have never met. The formators have frequently cited in their

complaints ‘lack of interest by school principals and teachers’. The lack of interest problem has to be considered in the context of uncertainty of powers and responsibility of the Formators.

In Turkey²², almost half (46%) of the computer education formators state that they come across expectations that do not match their responsibilities. The most common among the expectations that do not match with their responsibilities is “the demand for solving hardware problem.” The technical support service to be provided by hardware firms is expected from provincial educatory computer formators. This demand comes not only from schools but also from the administrators at the Provincial Directorate of National Education.

The circulars issued by the Ministry do not list “solving hardware problems” among the responsibility of the educators. The fact that educatory formators consider “solving hardware problems” both within and outside their scope of responsibility clearly demonstrates the uncertainty with regard to this issue. Further, one fifth of the Provincial Educatory Formators interviewed state that they have no “distinctive responsibilities.”

Multimedia Super Corridor- Malaysia

1. Although the specific roles of concerned agencies were not clearly defined when the Multimedia Super Corridor²³ (MSC) Applications were launched, the following general roles were designated:

- MOE as lead agency of the flagship applications.
- MDC as coordinator of the MSC Flagship applications
- A consortium short listed by the lead agency to deliver solution requested through the Concept Requests
- Central agencies with responsibilities for procurement and legal aspects, such as the treasury and the Attorney General’s chambers.

The MDC invited all government agencies and consortia involved to help clarify and delineate roles and responsibilities. As a result of this exercise, many of the

²⁰ Lim Cher Ping, Assistant Professor, National Institute of Education, Singapore

²¹ Information Technology Classes – Impact Research Report April-June 2004. The most important problems the provincial computer educators encounter in performing their duties. Section 3.1.3 Page 27

²² Impact Research Report. Section 3.1.3 pg 28

²³ Malaysia is implementing its “Multimedia Super Corridor (MSC)” project, as part of its aim to become a fully industrialized country by 2020. One of the aspects of the project is the “Smart School” initiative. This aims to include all 7,000 primary schools and 1,500 secondary schools by 2010.

implementation problems identified by the lead agencies and the consortia, such as manpower shortage, unclear government procedures and processes, and cross-flagship integration requirement were resolved.

2. The MOE appointed four sub-committees responsible for specific areas in the ICT in education master plan. To ensure effective policy implementation, the sub-committees were supervised and directed by the MOE Deputy Director, serving as Chief Information officer of relevant departments. However, frequent transfers of senior executives between departments affected the continuity of the work plan. - *Thailand*

2. Transform Education Policy into Action

Demonstration schools (from the first phase) should serve as models for ICT integration.

Phased implementation of ICT in education policy ensures that the implementation process is manageable and the development of best practices and lessons learned is gradual. It also provides opportunity for evaluation so that the policy can be revised and fine-tuned.

Demonstration of Pilot schools from the first phase could encourage their staff to share their experiences and expertise with staff from other schools and regions. Staff from Pilot schools could be posted temporarily in other schools that wish to start ICT integration. Alternatively, staff from other schools could be attached to these demonstration schools to observe best practices and immerse themselves in a culture that supports ICT integration.

Strong consideration should be given to deploying the Computer Formators to schools before the set up of IT classes proceeds, under phase II in Turkey.²⁴ This will enable the formators to better comprehend the system to be set up and the technical support to be received as well as to provide guidance to the school management on the deficiencies and wrongdoings that may stem from the procurement company.

MPI Phases in Singapore

MPI in Singapore consisted of three phases. Schools with a history of effective ICT integration were chosen as demonstration schools, also known as Phase I schools. Phase II schools were identified based on the school principals' evaluation of staff readiness for the new initiative. Schools were given the flexibility to decide on the pace of ICT integration.²⁵

²⁴ Impact Research Report – Information Technology Classes in Basic Education in Turkey. April-June 2004

²⁵ A four tier-fan teacher training model was put in place to acquaint teachers with ICT integration. This started

3. Filtering of undesirable websites from the internet

Filtering of undesirable websites from the internet is important to prevent their harmful influence on younger students.

Filtering is particularly important for young students who are unable to discern the veracity and reliability of the information.

Although an excellent idea, filtering is not fool proof and internet-savvy children can still get around it. Some schools adopt extreme measures such as keeping the students off the internet entirely unless supervised by teachers. However, such measures deprive students of essential tools for survival in the 21st century.

Internet Filtering - Singapore

1. One of the MDA's main concern is access to pornography on the internet, especially by children and minors. Its regulatory focus is on mass impact web sites that distribute pornography²⁶.

The three ISPs – Pacific Internet, Sing Net and Stab Hub have launched their own Family Access Networks (FAN) that offer services to filter out most undesirable or pornographic sites. They are the Cyber Guard Family Access, Family Online and Infinity Family Access respectively.²⁷

4. Educate students regarding the usage of Internet

The Governments have followed varied strategies to deal with students use of internet. However most have decided against censorship and encourage supervised use of Internet. For example, in order to promote the Internet use for education, business and entertainment, the Malaysian government decided against censorship of the internet.

In general, education is the main tool to prevent misuse and abuse of the Internet.

with 60 senior ICT instructors from the Education Technology Division (ETD) who visited schools to train and work with teachers. The instructors together with teachers and heads of ICT departments from Phase I schools went to Phase II schools. Together with Phase II school teachers, they went to Phase III schools

²⁶ The Internet code of Practice identifies what the community regards as offensive, that is, pornography, violence and material that might undermine Singapore's racial and religious harmony. It also spells out the obligations of the Internet service providers (ISPs) and content providers (MDA, 2003).

²⁷ Apart from filter provided by ISPs, there are commercially available software programmes that help to block out unsuitable websites. Software filters block harmful websites such as those on pornography, drugs and hate.

Internet Education

Education concerning the dangers of internet offers better protection than any software or hardware device. Schools and parents should guide students in surfing the Internet and discuss Internet issues with them. (Turow & Nir, 2000).

The students themselves prefer educational measures as apposed to restricted access to information and resources on the internet. Teenagers favor educational strategies over control measures, as shown in a survey conducted by the National Institute of Education (NIE) in 2001²⁸. A volunteer organization that support parents, teachers and students is the Parents Advisory Group for the Internet (PAGi)²⁹.

Schools should also allow children to share experiences online and give them opportunities to show teachers and parents what they know. Teachers and parents also need to be trained and supported so that they can educate students and children about Internet safety. Government organizations, volunteer organizations and schools can provide training and support.

5. Improving Access and Equity to narrow the digital divide

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

Investment in ICT facilities in schools will increase access to computers and the Internet, particularly for students from poor socio-economic backgrounds. School sometimes run evening IT classes or just keep computer labs open in the evening to give access to students, parents and other members of the community.

ICT Education Master Plan - Singapore

1. The ICT in education Master Plan helps to narrow the digital divide by increasing ICT use in the curriculum, lowering the student-computer ratio, enhancing student access to computers by providing more open access

areas, and providing cheaper access to the internet as a result of school-industry partnerships. All students, regardless of socio-economic backgrounds, have equal access to ICT facilities in the schools.

Government Support – South Korea

2. The government provided PCs and financial support to students from poor families, enabling them to learn how to use computers and the Internet. 500,000 children from low-income families were given opportunities for computer lessons and practice. In addition, outstanding students received free PCs and financial rewards.

²⁸ The items ‘discuss with children the dangers on the Internet’ and ‘learning more about the Internet’ (two educational strategies) were rated as most desirable by teenagers; while the items ‘stop child from using computer’ and ‘complain to Internet service provider’ (two control measures) were rated as the least desirable. (Lim, Khoo & Willimas, In Press).

²⁹ Parents Advisory Group for the Internet (PAGi) <http://www.pagi.org.sg/>. Volunteers assist in various activities such as exhibitions, workshops, talks and production of useful references on online safety, including handbooks and VCDs. These activities are usually carried out in public libraries, community centers and schools.

Section II : ICT AT SCHOOL MANAGEMENT LEVEL

Executive Summary

Sometimes integrating ICT in schools can mean just distributing computers, learning software and audio-visual aids to schools. The ICT is merely attached to the existing teaching and learning activities without any change in the traditional curriculum or learning objectives. The teaching strategies and student learning activities in the classrooms remain more or less intact.

While the learning medium may change from the textbooks to web-based books/software or from presentations in class to presentation via the Internet, the learning paradigm remains the same. For example, the learning paradigm adopted for certain concepts in the classroom is associated with the transmission of knowledge. The paradigm remains the same whether the concept is taught from a textbook, software or via the Internet.

Although ICT may make easy independent self-paced learning, the potential of ICT is not optimized if there is no shift in the learning paradigm. In addition to change in the learning paradigm, ICTs provide possibilities for changing the way children learn and teachers teach.

(i) Create ICT Vision and Strategy in Schools

The vision and strategy for ICT in schools should not be created by a single person or through a top-down process starting from MOE.

Sometimes schools do not have their own ICT vision and plan as the ICT infrastructure and training are generally directed and given by the Ministry. The school-level vision and plan (if any) are usually established by individual school principals. The school board takes all decisions on the purchase of ICT tools, a procedure that is usually met with some resistance from the teachers as they do not always share the same vision as the principal or the ministry nor do they feel a sense of ownership of the plan.

It is crucial to involve those who a stake in the outcome, including teachers, parents, students and the community, and allow them to assist in the creation of the strategy and ICT Plans by contributing their skills, knowledge and positive attitudes. An ICT vision that is accepted by all becomes a shared vision, which is critical to successful implementation of ICT in a school setting.³⁰

³⁰ Details regarding ICT vision and strategy created by individual schools in Singapore in Section 1.1.

(ii) Putting together an ICT Integration Plan

Once the vision has been successfully created and accepted, the next step is to put together an ICT integration plan, detailing how the teachers are expected to integrate technology in their lessons (Strudler & Wetzel, 1999).

An ICT integration plan provides a detailed blueprint of the steps and methods needed to translate the school ICT vision into reality. Developing ICT integration plans is no doubt a complex and time-consuming task, but they are usually worth the time required to put them together.

Most schools have ICT integration master plans³¹ that have been customized for their own school culture and environment.

a) To promote use of ICT in schools, the MOE should set guidelines without necessarily imposing these as rules or regulation to be adhered to.

Rules stifle creativity and lead to a technology-driven approach to ICT integration. School leaders should be given autonomy to decide on how to implement rules and guidelines based on their analysis of their schools readiness.

An increasing number of school leaders have realized over the last three years that ICT should not be integrated in the curriculum for ICTs' sake. Instead, they believe that teachers should explore ways by which to integrate ICT in the curriculum to enhance the learning experiences of the students.

b) To promote ICT usage in schools, school leaders should initially adopt strategies that make ICT a part of the daily routine or tasks of the teachers.

These methods may include using email as a mode of communication among staff, accessing the Intranet to download forms and using a word processor to complete lesson plans for submission. The aim is to increase teachers familiarity with ICT in education. For example, as different technologies mature, there are new ways to integrate appropriate and available technology into the curriculum delivery process as seen in the case of Khanya Project (see box) in South Africa³².

³¹ Section 1.2

³² Khanya Project (South Africa) section 1.6

(iii) Schools should be given some autonomy to select ICT resources that are most suitable to the needs of teachers and students.

Every school is different and each one should be given autonomy to select ICT resources that are most suitable to the needs of teachers and students. ICTs should not be put into place just for sake of using newer or latest technologies.

Schools should be provided with basic technology infrastructure and given the autonomy to decide on the kind of ICT resources and tools that they should acquire, based on their vision and analysis of their students learning needs. This allows the schools to have independence and flexibility in using ICT funds. By recognizing that every school is different, better ICT integration in the school curriculum is ensured.

Lastly, one major theme that emerged across countries is the need for strong, committed leadership to support the goals of technology integration. While virtually all administrators tend to voice their support for technology integration, it helps to have *believers in high places* – leaders whose knowledge and commitment goes well beyond the rhetoric of support. At the core of informed leadership is a person who has internalized the complexity of effective technology integration and who exercises his or her influence to ensure that the various enabling factors are in place or being addressed.

Champions³³ are dedicated persons who are motivated by the sense of satisfaction of contributing to the enhancement of student learning. They build a culture of innovation and encourage ICT use in teaching and learning. Champions can be identified at all levels and appointed officially. Their roles and responsibilities should be clearly stated. The role of champions in ICT in education programmes is important and they should have the support of their superiors and peers.

However, there is also a need to ensure that the long-term success of a programme does not depend solely on the abilities and actions of a few individuals. Care must be taken to ensure continuity in leadership.

³³ Lessons from Exemplary Colleges of Education: Towards a Model of Technology Integration. Neal Strudler and Keith Wetzel.

III. POLICY, VISION AND STRATEGY TO HELP SCHOOLS INTEGRATE ICT

Overview

Sometimes integrating ICT in schools can mean just distributing computers, learning software and audio-visual aids to schools. The ICT is merely attached to the existing teaching and learning activities without any change in the traditional curriculum or learning objectives. The teaching strategies and student learning activities in the classrooms remain more or less intact.

While the learning medium may change from the textbooks to web-based books/software or from presentations in class to presentation via the Internet, the learning paradigm remains the same. For example, the learning paradigm adopted for certain concepts in the classroom is associated with the transmission of knowledge. The paradigm remains the same whether the concept is taught from a textbook, software or via the Internet.

Although ICT may make easy independent self-paced learning, the potential of ICT is not optimized if there is no shift in the learning paradigm.

In addition to change in the learning paradigm, ICTs provide possibilities for changing the way children learn and teachers teach. An Australian study (Riffel & Levin, 1997) found huge variations in ICT usage from classroom to classroom and from school to school. Many teachers use ICT only as an addition to regular instruction or as a reward for pupils after their work is completed. In other words, teachers use ICT to extend traditional pedagogical practices. The challenge is to incorporate ICT into the pedagogy so that it becomes integrated with the learning process.

Components of Policy and Strategy to help schools integrating ICT include the following:

1. Create ICT Vision and Strategy in Schools

The vision and strategy for ICT in schools should not be created by a single person or through a top-down process starting from MOE.

Sometimes schools do not have their own ICT vision and plan as the ICT infrastructure and training are generally directed and given by the Ministry. The school-level vision and plan (if any) are usually established by individual school principals. The school board takes all decisions on the purchase of ICT tools, a procedure that is usually met with some resistance from the teachers as they do not always share the same vision as the principal or the ministry nor do they feel a sense of ownership of the plan.

It is crucial to involve those who have a stake in the outcome, including teachers, parents, students and the community, and allow them to assist in the creation of the strategy and ICT Plans by contributing their skills, knowledge and positive attitudes. An ICT vision that is accepted by all becomes a shared vision, which is critical to successful implementation of ICT in a school setting. (Costello 1997.)

Teachers need to know exactly how ICT can be used as a learning and teaching tool. Many researchers have pointed out that a school's ICT vision is essential to effective ICT integration (Kerr 1996; Anderson & Dexter 2000). Means and Olson (1997) suggested that teachers and schools develop a vision before they make a substantial investment in software and hardware.

ICT vision in schools - Singapore

1. In Singapore interviews were conducted by IDA with teachers, head of departments and principals offering various perspectives of their respective schools' vision of ICT use in education. In some schools the ICT vision was used as a benchmark for becoming a top academic and elite school in the forefront of the ICT integration. Other schools considered the vision as a guide to ensure effective deployment of ICT in teaching and learning³⁴. These visions are consistent with that of MOE where ICT is seen as an enabler to enhance teaching, learning, and administration in schools.

2. Putting together an ICT Integration Plan

Once the vision has been successfully created and accepted, the next step is to put together an ICT integration plan, detailing how the teachers are expected to integrate technology in their lessons (Strudler & Wetzel, 1999).

An ICT integration plan provides a detailed blueprint of the steps and methods needed to translate the school ICT vision into reality. Developing ICT integration plans is no doubt a complex and time-consuming task, but they

³⁴ For example, the Crescent Girls' School's vision is to deploy ICT to reach out to the community at large. The provision of a pervasive ICT environment to improve the quality of life for the teachers and students is the vision of Victoria Junior College.

are usually worth the time required to put them together (Hoffmann 1996).

Most schools have ICT integration master plans that have been customized for their own school culture and environment. These master plans address the following issues: (i) Priorities for the implementation of the ICT master plan (e.g. staff, students, content areas), (ii) evaluation standards and benchmarks to indicate effective integration of ICT, (iii) responsibility for successful implementation (e.g. ICT committees, administrative personnel, teachers, technical support staff), and (iv) funding requirements and time available to implement ICT integration efforts.

3. Set Guidelines to promote use of ICT in schools

To promote use of ICT in schools, the MOE should set guidelines without necessarily imposing these as rules or regulation to be adhered to.

Rules stifle creativity and lead to a technology-driven approach to ICT integration. School leaders should be given autonomy to decide on how to implement rules and guidelines based on their analysis of their schools' readiness.

An increasing number of school leaders have realized over the last three years that ICT should not be integrated in the curriculum for ICTs' sake. Instead, they believe that teachers should explore ways by which to integrate ICT in the curriculum to enhance the learning experiences of the students.³⁵

4. Translate ICT policy into a set of School-level Regulations and Procedures

Translate ICT in education policy and laws into a set of school-level regulations and procedure to provide a clear blueprint for the schools on the use of ICT.

These policies and procedures should be in line with existing laws governing ICT at the national level.

In Turkey³⁶, through the publication of "Equipment Acquisition and Application Handbook" under phase I of Basic Education Project, the ministry had communicated to the schools: the underlying purpose of setting IT classes, hardware structure, set up process and the actions to be made by school managers during the process. Additional circulars have been published on the issue on several occasions. However, the findings of the research indicate that these circulars and publications

³⁵ For example, in Singapore, most school leaders consider MOE's recommendation that 30 % of the curriculum time should involve ICT use, as a guideline rather than as a rule or regulation.

³⁶ Impact Research Report. April-June 2004. section 5.2. Pg 146

failed to sufficiently inform the schools. This situation stems mainly from factors such as initial distance of school managers to computer technologies, indifference to these circulars and publications and failure to communicate this information to a small number of schools.

Apart from informative activities, the school managers should not be left on their own during the IT setup. The set up must be completed through a process where the Provincial National Education Administrators are involved and the views of school managers are taken into consideration.

Smart School Integrated solution - Malaysia

1. One of the deliverables of the Smart School Integrated Solution was a set of school level ICT policies and procedures. These Policies also included critical security policies introduced covered authentication and passwords, backup procedures, installation of firewalls and use of licensed software.

National Education Act- Thailand

2. The National Education Act 1999 supports the use of technologies in reforming education. The Act serves as a regulatory framework for formulating major policies and plans, some of which are being implanted at both ministerial and school levels. A ministerial regulation issued in 2002 supports the policy for the production, development and usage of materials and other technologies for education. This regulation offers more freedom to schools to select quality education materials of their choice.

5. Encourage the use of ICT in Schools

ICT use in schools is more easily encouraged if school leaders use various means to provide support to teachers for the integration of ICT in the school curriculum.

These strategies may include sharing sessions on ICT use among teachers, peer teaching and team-teaching based on an apprenticeship model, and employment of more technology assistants to support teachers.

Strategies to encourage the use of ICT

a) Some schools have adopted the following strategies :
(i) planning contact time for teachers to share their experiences in using ICT in their lessons; (ii) initiating industry-teacher partnerships to deliver just-in-time ICT training for students and to develop instructional ICT-based materials for teaching and learning; (iii) peer-teaching of ICT-related skills based on apprenticeship model or just-in-time learning; (iv) collaboration with other schools to share expertise and experiences on ICT integration; (v) equipping teachers with a personal laptop so they would be able to make ICT use a part of their

lives; (vi) employing more technology assistants to support teachers in ICT use; and (vii) purchasing laptops so that teachers would not be constrained by the unavailability of ICT facilities (such as computer laboratories and media resource rooms).³⁷

b) The School leaders should encourage teachers and students to use the Internet to seek information related to their learning needs. The schools should be encouraged have their own websites.

Internet Teacher Training - Argentina

The Educ.ar³⁸ project in collaboration with the Ministry of Education is providing teacher training in the use of technology for education. Educ.ar is the official National Education Internet Portal aimed at democratization of education in Argentina. It provides high quality and interactive education content and services, integrating all the official academic subjects at all levels of the Argentine Education system. - *Argentina*

6. Adopt Strategies to make ICT part of daily tasks of the teachers

To promote ICT usage in schools, school leaders should initially adopt strategies that make ICT a part of the daily routine or tasks of the teachers.

These methods may include using email as a mode of communication among staff, accessing the Intranet to download forms and using a word processor to complete lesson plans for submission. The aim is to increase teachers familiarity with ICT in education. For example, as different technologies mature, there are new ways to integrate appropriate and available technology into the curriculum delivery process as seen in the case of Khanya Project (see box) in South Africa.

The school leader should be a role model and make ICT a tool in his/her everyday life. These measures ensure that ICT gradually becomes part of the school culture and also help “techno phobic” teachers to overcome their initial apprehension in using ICTs.

In Turkey, almost all school managers interviewed (97.8%) report that they use computers. A very small portion (2.2%) do not use computers for reasons like: not being interested in computers, not being used to

³⁷ These strategies are commonly used in Singapore.

³⁸ The education material offered by Educ.ar follows the regional curricula in Argentina and is organized by region, student age and subject level. The portal has two main sections (1) Basic Education (called Escuela), which includes Primary, Elementary and high School level; and Higher Education (called Educacion Superior) which includes College and University levels. www.educ.ar

computers or not having the opportunity to use computers.³⁹

Promote ICT usage by educators

a) Some ways by which school leaders have encouraged the use of ICT in schools: (i) sending out school announcement via email to all staff; (ii) requiring all teachers to submit their weekly lessons plans via email to their heads of the department (iii) uploading all forms (such as leave applications, transport claim, training development application and medical claim) on the school intranet for teachers to download; (iv) encouraging staff to communicate and share via email and other ICT tools; and (v) requiring the teachers to submit their daily class attendance via the online portal. - *Singapore*

b). In Khanya Project, ICT is being used to deliver curriculum at schools in the WC province. Facilitators visit schools on the project once a week to train teachers on the hardware and software. They remain accessible to the schools for at least one year till the educators are confident in the use of technology and are able to teach by the means of computers. A pooling of knowledge resource material is in progress for educators and students to access and share information. ⁴⁰ - *Cape Town, South Africa*

c) Educarchile offers to the Chilean educational community (i.e. teachers, students, parents and educational researchers) a number of digital resources such as lesson plans and activities, educational software, videos, slide-shows - which students may use to do their homework or teachers may use in the classroom⁴¹. - *Santiago, Chile*

³⁹ Impact Research Report. Section 4.8.1.2 Pg 112

⁴⁰ Khanya Project: Western Cape Education Dept, South Africa. www.khanya.co.za *Vision - By the start of the 2012 academic year, every educator in every school of the Western Cape will be empowered to use appropriate and available technology to deliver curriculum to each and every learner in the province. Starting with the poorest of the poor schools, Khanya aggressively works towards eradicating the digital divide and striving towards racial and gender equity.*

⁴¹ Educarchile: Santiago, Chile. www.educarchile.cl Educarchile also offers studies on different educational issues, such as weekly articles focused on education for its different audiences. It offers Web-based services such as Webmail and tools for making institutional (e.g. school websites.) or personal websites.

7. Management of ICT resources in schools

SWOT analysis and applying its findings to help optimize the use of ICT resources.

SWOT analysis is generally undertaken at department level in the MOE prior to developing the ICT in education policy. However, such analysis is usually not applicable to school situations due to budget constraints and centralized national policy.

Decentralization of education management to school level may encourage schools to do their own SWOT analysis in the next phase of the ICT in education policy.

SWOT Analysis – Malaysia

In the change management exercise, the heads of the pilot schools analyzed their school strengths, weaknesses, priorities and available skills and resources. This information together with the organizational structure of the schools was used to make the school change management plans. However, on-site monitoring of the schools implementation and adherence to their change management plans indicated poor compliance. Most of the schools cited lack of leadership, time and resources as reasons for not carrying out change management activities.

8. Appointing ICT Coordinator for Pedagogical Support

Appointing an ICT coordinator in each school helps to assure administrative and pedagogical support for the teachers.

This appointment should not be confused with that of a technology assistant. The ICT coordinator should advise teachers on ICT solutions to their teaching or learning problems, help teachers to acquire ICT resources, and conduct training need assessment of the teachers' ICT related capacities and advise them on their professional development.

Almost half of schools covered by Phase I⁴² in Turkey lack Educatory formators. The fact that there are no computer teachers in schools is given as a major concern by the schools.

In addition, due to norm staffing, the teachers were selected randomly or assigned to duty without individual consent. Some of the formators are close to retirement age as most of them have been selected from elder teachers.

⁴² Impact Research Report – Information Technology Classes in Basic Education Program, April – June 2004. Section 5.2. Pg 144-145

ICT Coordinator for Pedagogical Support

The emphasis should be on recruiting young teachers who have an aptitude and interest in ICTs and know sufficient English so they can follow developments in the field.

A teacher with ICT competency should be appointed ICT coordinator. He/She is responsible for the management of ICT use in the school. An ICT technician who is not an educator can assist and support the School ICT coordinator.⁴³

The ICT coordinator should also assist teachers in evaluating and selecting hardware and software and conduct needs assessment to determine additional hardware or software needs among the teachers and students.

⁴³ The ICT coordinator is a staff specialist whose main duties are to help teachers to coordinate ICT planning and development, provide administrative support by supervising computer facilities, order supplies, maintain software and hardware, liaise with hardware and software vendors and service personnel, and collaborate with teachers and school leaders in preparing hardware/software budgets, reports and proposals.

IV. ORGANIZATION AND RESOURCE MANAGEMENT IN SCHOOLS

Overview

Sound management and financing of ICT in education policy are necessary conditions for the effective integration of ICT in schools.

All countries face the technological challenge of buying appropriate hardware and software, getting adequate bandwidth for online learning, getting learning and teaching tools. However, successful ICT integration also depends on the quality of the tools, the learning environment and the participants themselves.

Components of Organization and Resource Management to help schools integrating ICT include the following:

Leadership and Management

1. Having a champion at all levels in the education system promotes ICT acceptance.

One major theme that emerged is the need for strong, committed leadership to support the goals of technology integration. While virtually all administrators tend to voice their support for technology integration, it helps to have *believers in high places* – leaders whose knowledge and commitment goes well beyond the rhetoric of support. At the core of informed leadership is a person who has internalized the complexity of effective technology integration and who exercises his or her influence to ensure that the various enabling factors are in place or being addressed.

Champions⁴⁴ are dedicated persons who are motivated by the sense of satisfaction of contributing to the enhancement of student learning. They build a culture of innovation and encourage ICT use in teaching and learning. Champions can be identified at all levels and appointed officially. Their roles and responsibilities should be clearly stated. The role of champions in ICT in education programmes is important and they should have the support of their superiors and peers.

However, there is also a need to ensure that the long-term success of a programme does not depend solely on the abilities and actions of a few individuals. Care must be taken to ensure continuity in leadership.

⁴⁴ Lessons from Exemplary Colleges of Education: Towards a Model of Technology Integration. Neal Strudler and Keith Wetzel.

ICT advocates in Thailand

1. In many cases, champions at the provincial, regional and national levels are identified through contests and competitions on ICT in education⁴⁵.

However, many champions are not sufficiently supported in their schools or provinces.⁴⁶ In this case, champions may not be willing to share their best practices and projects with other schools. Sometimes even the transfer of innovation to other classrooms within the same school structure encounters resistance, especially when it lacks the support of the principal or peer teachers.

2. Include ICT as an important component of Education Development Programmes

Including 'ICT in Education' as an important component in the development programme for administrator, supports the introduction of innovative uses of ICT in schools.

Research studies⁴⁷ suggest that in some cases, the schools administrator's ICT vision is not always supportive of classroom innovations using ICT.

In a study⁴⁸ that involved seven elementary schools principals in New South Wales, Australia; it was examined why some schools were more successful than others at implementing ICT, as measured by increased computer use by teachers over a 1-year period. Principals who exhibited an initiator style were more likely to be successful in implementing computer education on their campuses. For example, the school principals in this study were able to identify long term goals and implementation strategies for computer education and devise specific day-to-day tactics to

⁴⁵ These include the Outstanding Teachers Search, Software Contest, Website Competition, and Model Teachers Search.

⁴⁶ For example, while teacher champions are invited to contribute to other school or educational institutions to demonstrate their innovative projects, their routine workload remains heavy. Their contribution outside the school is not considered a part of their workload.

⁴⁷ The Second Information Technology in Education Study

⁴⁸ The Elementary School Principal as a Change Facilitator in ICT Integration – John Schiller

accomplish them. They persuaded their staff to accept computer education as a priority. The principals stressed classroom application of technology during staff meetings, organized staff training, ensured adequate time and resources for in-class computer use, and monitored teacher's progress by reviewing instruction plans and other written materials. These principals also spent time in the classrooms, observing and talking with pupils and teachers as they used computers.

Principal Training

At the school level, the principals or principal-to-be should undergo ICT awareness and best practices Training. The training courses should cover all matters related to school administration and management, including general use of ICT. In addition, the courses should also focus on teaching and learning using ICT.⁴⁹

3. Harmonize ICT in Education with other ICT and Educational Initiatives

To avoid the duplication of work and dilution of funds, there should be coordination of ICT in education projects with other ICT and educational initiatives and sharing of information on ICT.

The major projects in the roll out Master Plan should be properly coordinated. In addition, the plan should give due consideration to current trends and needs, such as, Open Source Software, Open Standards, computer aids, mobile phones and Internet access by means of satellite.

Smart School Master Plan - Malaysia

Major projects in the Smart School Master Roll-out plan have been properly coordinated.⁵⁰

The teaching of Science and Mathematics in English Programme was introduced in 2002 and implemented in 2003 in all schools in the country. The government recognizes that English is the language of the Internet and that students need to be able to access material from the Internet competently in order to keep pace with developments in science and technology.⁵¹

The Universal Service Provision Project helps to bridge the digital gap between rural and urban schools.⁵²

⁴⁹ In Thailand, the principals have to undergo training provided by the Institute of School Administrator Development.

⁵⁰ Current educational programmes involving ICT include the Smart School Project, the teaching of Science and Mathematics in English, the school computerization program, and the Universal Service Provision Project, all of which are part of MOE's goal to "provide equal access to quality education to every child, irrespective of background, religion or ethnicity."

⁵¹ The school computerization program is meant to provide every school with one to three computer laboratories (20 computers per laboratory), depending on

4. ICT in education projects should be education-driven, not technology-driven.

During planning and implementation phases there is usually a dichotomy between Educators and Technologists.

In that case, ICT in education projects should be education-driven, not technology-driven. ICTs should not be put into place just for sake of using newer or latest technologies.

To ensure that ICT in education projects are not just technology-driven, they should be managed by a team composed of educators and technologists.

Smart School Conceptual Blueprint - Malaysia

For example, a joint Ministry-Industry Task force wrote the Smart School Conceptual Blueprint in Malaysia.⁵³

The Smart School Pilot Project Teams was made up mostly of educators although several systems analysts were included to help monitor the technology infrastructure and support services components of the Smart School Integration Solution.

5. Schools should be given some autonomy to select ICT resources that are most suitable to the needs of teachers and students.

Every school is different and each one should be given some autonomy to select ICT resources that are most suitable to the needs of teachers and students.

Schools should be provided with basic technology infrastructure and given the autonomy to decide on the kind of ICT resources and tools that they should acquire, based on their vision and analysis of their students learning needs. This allows the school to have greater autonomy and flexibility in using ICT funds.⁵⁴

the student population. The goal is to have every school run ICT literacy classes.

⁵² The pilot project, involving 220 schools in Sabah and Sarawak, includes the provision of basic infrastructure, including electricity, telephones and other related equipment. The project will be expanded in to a nationwide School Net for the 10,000 schools in the country.

⁵³ The task force included MOE officials from various divisions (e.g. Curriculum Development Center, Teacher Education Division, Examinations Syndicate and Educational technology Division.) and representatives from leading ICT companies (e.g. Microsoft, Oracle, IBM, and Sun Microsystems).

⁵⁴ This is done in Singapore for better integration and use of ICT resources.

By recognizing that every school is different, better ICT integration in the school curriculum is ensured.

Resource Management autonomy at School level - Malaysia

Initially, the State Education Department did not make specific financial allocations for the pilot schools in the Smart School Pilot Project in their states and instead they utilized available funds.⁵⁵

As the project proceeded, the Ministry's Finance Division assigned special status to all pilot schools, thereby allowing them a certain level of autonomy in school expenditure.

The MOE should be encouraged to establish a standard budget based on school size and existing resources rather than to apply one formula for all schools.

In some schools, two types of budget are allocated; one is fixed cost which is based on school projects and activities, and the other is variable cost which is based on the number of students. Large schools receive more budget than smaller ones. It is the responsibility of the school administrators to manage their own financial resources and handle their budget constraint.⁵⁶

In many cases, the ICT infrastructure is dependent upon the volume of funding a school is able to secure and the amount allotted to different school activities, including administration, teaching and learning, and personnel development.

6. Mobilize Resources from Donor Agencies and the Private Sector

Financial support of the implementation of ICT in education is mobilized if school-industry partnership is an integral part of ICT Education policy. In addition, schools can explore and experience emerging technologies and pedagogies.

Partnership with the private sector, statutory boards and government bodies provide schools with opportunities and perspectives on how ICT can be integrated in the school curriculum to enhance the learning experience of students.

⁵⁵ The Pilot team helped out by requesting specific allocations to be set aside for the states to use, for example, for replacing equipment or for improving wiring in the pilot schools.

⁵⁶ Several organizations, such as alumni associations, parents-teacher associations, local communities or political groups, have become supplementary sources of funds for the school budget. Large schools generally have advantages in obtaining outside funding.

Resource Mobilization - Indonesia⁵⁷

In Indonesia, as the national budget for education is not quite enough to support ICT integration in education, the government encourages private sector involvement, with the MOE coordinating their participation. Examples of such companies are PT Indosat, PT Telkom Indonesia, Microsoft Indonesia and ISP of Indonesia.

7. Ensure Sustainability

Empower schools to look for their own funds and to identify expertise to promote sustainability. Prepare and disseminate guidelines on how to source funds.

The preparation of guidelines ensures that schools with adequate financial means can proceed on their own initiative, while complying with existing rules and regulations.

Smart School Project - Malaysia

The Smart School project in Malaysia uses a variety of funding strategies. The pilot project was implemented using federal funds, however it is planned that the schools will be empowered to use their own funds and expertise. Guidelines to enable schools to proceed have been prepared and will be disseminated to all Educational Departments.

⁵⁷ ICT and Education in Indonesia. UNESCO Policy makers workshop; Harina Yuhetty, Director – Center for Information and Communication Technology for Education (PUSTEKKOM), Jakarta, Indonesia

V. Professional Development

Overview

While teachers play a central role in the learning environment, they are often not consulted concerning changes to teaching and learning procedures. The teacher has a vital part to play in the teaching/learning paradigm shift, as the ICTs help in the development of higher level of cognitive skills in students.

The proper use of ICTs in schools can help gradually shift the emphasis from lecture oriented teaching and learning activities to the learning needs of individual students, including more situation specific ad-hoc instruction, small group instruction, and one-to-one tutoring.

The teaching staff needs under changing conditions should be assessed and training activities/programs developed accordingly. Often, teachers training programs focus more on basic literacy skills and less on the integrated use of ICT in teaching. Teachers are also more likely to integrate ICT in their courses, when professional training in the use of ICT provides them with time to practice with technology and to learn, share and collaborate with colleagues.

1. A centralized training administration system can help teaching and non-teaching staff to monitor professional development.

The system must be accessible to all staff via internet so they can track and monitor their own professional development and plan and apply for courses they need to attend. The system can also help supervisors to monitor the professional development of staff.

Training Administration System (TRAISI)

The training Administration System (TRAISI) was developed to document and monitor the professional development of education personnel under the MOE.⁵⁸ TRAIISI is an online system on the intranet that enables both teaching and non-teaching MOE staff to document their individual training plans. It allows staff to search online for training courses and to apply for admission. TRAIISI also helps to track training status and generate training statistics. - Singapore

⁵⁸ TRAIISI was designed and developed by Andersen Consulting in association with MOE 's Staff Training Branch.

2. Adjusting national level ICT competency standards for each school, depending on its socio-cultural context, helps ICT integration and acceptance.

In a study done in Thailand, according to some teachers it is difficult to measure the level of ICT competency in the production of teaching and learning materials because of constraints in existing ICT infrastructure.

Setting ICT competency standards can help ensure effective integration of ICT in schools. The ICT learning standards for the ICT curriculum should focus on basic understanding and skills, value and ethics, and effective applications of ICT in handling information, communications and developing problem solving skills.

However, these standards should not pose additional pressure on students and teachers.

3. Training education staff at all levels ensures that ICT use in schools is implemented in an efficient and complementary way.

Most professional development programs target only teachers and heads of schools. However, this should not be the case. MOE 's non-education staff can help and support teachers in integrating ICT in schools.

Many ICT based programs have stalled because of tentative leadership. Continuing training for policy makers and school administrators in technology planning and management is essential. The MOE can make essential that all education staff use ICT in their work and that all mid-level staff school acquire basic skills in using general software applications and the internet.

The schools capacity for autonomous technical maintenance must also be developed. The complexity of ICT equipment and tools puts pressure on the school staff to operate and maintain ICT facilities efficiently. Hardware, software and network maintenance, system administration and network security are basic skills that must be available at or near the schools. Various NGOs and technical training institutes provide technical support training and assistance to public high schools, but these programmes must be rationalized and institutionalized at all levels of DepEd.

The MOE's policy can encourage education personnel to use ICT in their work and require all mid-level personnel to acquire basic skills in using general office software applications, Internet and email.

4. Professional development is more likely to succeed if continuous training of teachers is a built -in process and is offered as a benefit to them.

Teachers are given 100 hours of in-service professional development each year in Singapore. Teachers are fully sponsored or highly subsidized for courses that are conducted by private training agencies. According to a survey by Soh (2002), teachers have received 30 to 50 hours of ICT -related professional development. The majority (84%) have expressed their interest in further ICT training above the minimum requirement. Given the positive response, the ICT professional development programs have been quite successful.⁵⁹

5. Incorporate online e-learning into professional development of teachers.

This type of training may include face-to-face tutorials with independent online learning. This allows teachers to experience different modes and strategies of instruction, especially online ones.

ICT training in Development Programs

In Singapore, the core module on ICT integration in the pre-service education programme focuses on the pedagogies of using ICT in the classrooms. Tutors employ a fully dynamic online learning environment to complement onsite activities.

The module had four major components: anywhere/anytime lecture, onsite laboratory tutorial, online independent hands-on session, and online asynchronous discussion.

There was a shift in the mode of assessment from summative to more formative, and in the orientation of delivery. The anywhere/anytime lectures were designed to complement textbook readings. The tutors coauthored a book 'Teaching and Learning with Technology' (Tan & Wong, 2003) to highlight and address key issues of ICT integration.

The online lectures consisted of instructional objectives, dynamic guiding questions and reflective activities (such as, online quizzes and hyperlinks to case studies) to enhance task orientation and encourage critical reflection among trainee teachers.

During onsite laboratory tutorials, there should be less didactic teaching and discussion of textbook concepts (these discussions can be carried out through the online discussion board). Instead, the tutorials should focus on collaborative activities among groups of trainee teachers working together on tasks. The tasks can be posted on the module website two weeks before each tutorial session.

⁵⁹ 77% of the teachers are looking for other ways to integrate ICT in education. 68% feel that ICT had encouraged class participation. 65% have found the preparation for ICT based lessons worthwhile.

To encourage greater learner autonomy, there should be independent online sessions that required trainees to work independently on challenging tasks. These can include identifying learning opportunities and problems associated with the use of IT tools within the school context, critiquing visual aids posted by their fellow trainees or tutors, and reflecting and commenting on video clips of classroom management issues. Teachers should be asked to work with their partners and classmates, bounce off ideas and explore ICT resources.

Trainee teachers should be expected to participate in intra- and inter-group online discussions. The online discussions will allow them to apply what they have learnt to their own learning and teaching experiences and to share their experiences and expertise in ICT integration in schools.

6. Having a recognition system for innovative and effective use of ICT integration in schools will motivate teachers to use ICT in teaching.

The schemes can be in the form of awards or grants for teachers, heads of department or principals. It can be at the school, regional or national level. The sponsors could be schools, higher education institutes, private companies or educational organizations.

HP INIT award to recognize teachers' use of ICT

Hewlett-Packard (Singapore) has sponsored the HP INIT award to recognize teachers' creative use of ICT in teaching. The award encourages the teacher to innovate in applying ICT to enhance learning and motivates them to move to higher level of ICT use.

In 2001, a new dimension was added - collaboration and networking among teachers and specialists. This provides teachers with a platform to reflect on their own learning experiences thorough innovative use of ICT, backed by strong pedagogical considerations.

Motivating teachers to use ICTs

Other than those teachers who taught the four subjects included in the Smart School Pilot Project, the rest of the teachers in the project's pilot schools were generally not motivated to improve their ICT skills.

However, since the Government implemented the new civil service scheme in 2001, encouraging and rewarding civil servants who acquire competencies in specific areas, there has been greater motivation on the part of teachers to acquire ICT skills and knowledge.

An Act is being drafted to establish the Institute for the Development and Promotion of Teachers, Faculty Staff and Educational Personnel, to supervise a system for incentives and ensure the achievement of quality on a sustained basis. - Thailand

National awards for outstanding teachers are a good strategy to encourage teachers' dedication. Support and recognition within and outside schools help to sustain

their perseverance and enthusiasm. However, other incentives related to the merit system of promotion could be more sustainable in the long run.

VI. Curriculum and Content Development

Overview

The necessary conditions (e.g., basic ICT infrastructure, ICT competent teachers, and clear vision) need to be present for a gradual shift towards more student-centered approaches for ICT-based lessons.

The pedagogical shift concerning ICT use in education has been gradual and is best reflected in the new educational environment. Descriptions of these environments vary, but they tend to include two important characteristics.

First, there is greater freedom in the choice of time and place. Students can choose their preferred activities and the time to learn them. The freedom to choose time, place and activity means that education becomes more individualized.

Second, knowledge is conceptualized as something generated or constructed by each individual. This changes the roles of the student and of the teacher in education. The student is no longer a passive recipient of knowledge.

The different types of ICT tools should also complement one another to meet the curriculum goals.

1. Education reform for integrating ICTs into content.

There have been a number of changes in ICT education due to the introduction of ICT related educational reform. In several Asian countries, a new ICT curriculum has been made compulsory from primary through secondary school.

ICT has been integrated in the curriculum as a tool for developing decision making, critical thinking and communication skills.

Students are expected to acquire specific ICT skills from primary school upwards, through learning (prior to starting a project) or integrating ICT in different subject areas. By the end of secondary schooling, most students would have acquired minimum competency in writing papers, spreadsheet construction, and sourcing information from CD-ROMs and online resources.

Before the implementation of the new curriculum standards, ICT was treated as a separate subject and offered as an elective course.

Mandatory ICT education - South Korea

Training in ICT literacy provides equal access to

information and reduces the information gap in public education. Since 2001 the Government has required mandatory ICT education for students from first grade to sixth grade. In the past ICT-related classes were elective subjects in secondary school and no other type of ICT training was available.

Furthermore, in every subject, more than 10% of classroom activities are encouraged to make use of ICT.

Training in ICT utilization should not be considered a special subject or a part of technical education.

2. Assessment approaches using ICTs in schools

Curriculum and assessment are interdependent and mutually supportive and both should be considered. There can be a greater role for formative assessment when ICT is integrated in the assessment process.

An initiative on ICT integration for formative and summative assessments was the Enigma Project.⁶⁰ It consisted of trial online examinations conducted in line with the goal to move towards a more ICT based assessment system.⁶¹

The trials demonstrated the feasibility of ICT-based assessment, but there were many technical, administrative and educational issues that needed to be addressed.⁶²

⁶⁰ This was undertaken by the ITAL Unit (Interactive Technologies in Assessment and Learning) in UCLES (University of Cambridge Local Examinations Syndicate).

⁶¹ In the first trial, papers from a Physics examination were transferred directly into a computerized format to determine whether a traditional paper and pen test format (multiple choice and short questions) could be administered through a computer. The second trial had two components: conceptual and analytical. The conceptual component was similar to the first trial, but questions in the analytical component were similar to those in a practical examination in science that require students to carry out a simulation.

⁶² Activities in the assessment process included the use of ICT in test administration, setting questions and manual and automated marking, and supporting teachers in using ICT-related materials in the classroom and in using electronic content (Harding & Raikes, 2002).

Other initiatives include exploring assessment modes in an ICT-based learning environment to measure students' skills in assessing and applying information, thinking and communicating.

While current modes of assessment remain relevant, ICT could facilitate assessment of pupil competencies in more than one subject area and in several skills. Such modes of assessment include project work, simulation software to assess students' ability to formulate and test hypotheses and self assessment software so that students can monitor their own learning.

3. Change in Pedagogical approaches to include the use of ICTs

ICT integration in the curriculum and school activities should lead to gradual changes in pedagogical approaches. An IDA survey with principals, heads of departments and teachers, noted a shift to more self-directed learning processes and learning environments. The shift in pedagogy was most noticeable when the goals were compared to the present status of ICT use.⁶³

A shift in pedagogy as a result of integrating ICT in the curriculum may not happen due to several reasons: (i) lack of ICT literacy among teachers, (ii) limited support infrastructure (i.e. PCs, LCD Projector etc.), and (iii) limited ability to develop ICT-based learning materials.

4. Redesigning the curriculum, assessment and new practices help increase the use of ICT

When ICT enters the school environment, the environment has to change to maximize opportunities and address the limitations of ICT.

⁶³ The key differences between the present situation and the goals :

- (i) ICT is used at present to support the curriculum, in the future there will be integration of ICT right from the planning of curriculum design;
- (ii) from a largely static content in print form, there will be a store of dynamic digital content;
- (iii) the one-size-fits all approach will change to mass customization and an ability-driven approach;
- (iv) teachers' skills in the use of ICT for teaching will move from basic to a wider range of competencies;
- (v) from a phased approach to the integration of ICT, schools will move to a sense of greater ownership of and accountability for ICT implementation;
- (vi) ICT provision for all will be more flexible;
- (vii) pedagogies will shift from being teacher-centered to being student centered.

A shift in pedagogical approaches could facilitate the building of a community of thinking and independent ICT-savvy students in schools.

Innovative practices in Science, Mathematics and language teaching

In teaching Mathematics and Information Technology in Thailand, a series of web-based CAI programmes have been developed to make mathematical concepts more interesting and meaningful to grade seven students. The teacher facilitates the students' learning with questions and comments and provides explanations. Students submit their work and discuss with the teachers via e-mail and the web board.⁶⁴

In teaching about electrical matters to ninth grade science class, the teacher uses Internet resources and services to enable the learners to develop basic knowledge and understanding of electrical equipment through website exploration and discussion.

ICT use in curriculum planning and design

The MOE in Singapore has incorporated ICT use in curriculum planning, design and delivery and is working with electronic publishers on a comprehensive repository of digital media content to complement existing resources like textbooks. This repository will allow teachers to use and customize content to meet the learning needs of students. Emerging technologies are being explored to increase the efficiency and to expand the scope and nature of assessments.

As both teachers and students use ICT as a teaching and learning tool, they gradually develop their ICT skills. Students learn more as they explore and update materials. Their thinking skills are developed as a result of the opportunity to select, analyze, and synthesize information.

5. Local Content Development

Established software developers can work with local companies to help develop high quality ICT-based resources. Local development of ICT-based resources is important to support the curriculum as it enhances the relevance and authenticity of resources for students and teachers.

⁶⁴ The quality of the students' questions and opinions is taken into account as part of the students' evaluation. Both teacher and students enjoy working together and modifying the pre-designed lesson plans, as necessary.

This also promotes the transfer of skills and technologies.

Partnerships with local content development firms

In Singapore, under the MOE-Local Industry Upgrading Programme, local partner companies established software houses to develop educational software and to facilitate the transfer of skills and technologies. The focus was on developing high quality software, especially in areas where suitable titles were lacking.

This helped to develop the base of talent required to produce educational software, and encouraged software distributors to provide value-added services to schools, such as proactive sourcing of educational software to match their needs and provision of after-sales technical support.⁶⁵

6. ICT or Digital libraries

Teachers who are provided with a recommended list of ICT-based resources (software and websites) have to spend less time to identify the most appropriate ICT-based resource for their lessons.

In addition, the teachers could be provided suggestions on the use of particular websites or software products for particular lessons. This can be especially helpful for novice teachers or teachers who are new to ICT in education.

In several Asian countries, local companies have established e-learning portals to provide services and materials to students and teachers. Most of these portals offer drill and practice materials to help students prepare for public examinations. Other portals offer a wide variety of services and materials to help teachers and students learn better.

⁶⁵ Many locally developed educational software packages are now recognized internationally, including the Active Primary Mathematics CDROM series (comprising three titles) which features sound pedagogy, innovativeness and content-rich activities. The MOE, project development specialists, and Times Media Private Limited collaborated in producing this package.

Smart School portal

The Smart School Pilot Project established BESTARInet, the Smart School portal, to enable the pilot schools and parents of Smart School students to access their own schools remotely.

The school's IT coordinator controls access with approval from the School Head

Respondents to an IDA survey cited these reasons for choosing courseware:

- (i) broadband interactive multimedia content for education (e.g. videos, simulation aids, and games) enhances students' understanding of subject areas
- (ii) learning can be independent, fun, flexible and self paced
- (iii) ICT tracking system for the auto grading of quizzes helps students to reflect upon their efforts and to develop independent learning
- (iv) There is a value added dimension to the creative processes of teaching and learning in all subject areas.

ICT portal for Educational Software

Although good electronic materials are not easily available in Bahasa Melayu, Science and Mathematics teachers are happy to access the Internet for Science and Mathematics materials in English, such as GetCyberEd.com, a portal provided by the consortium that developed the Smart School Integrated Solution. - *Malaysia*

Clearinghouse for IT Resources

The MOE has a compilation of recommended software that has been evaluated by the MOE Clearinghouse for IT Resources. Schools, however, have the autonomy to purchase software. Under the Educational Software Procurement Scheme (ESPS), schools can purchase any number of software titles in the ESPS list at a special educational price and directly from a locally appointed agent. The ESPS also allows teachers in primary or secondary school, to purchase one personal copy of each software title at a special educational price.

The Digital Media Repositories (DMRs) provide media clips, web pages and courseware snippets for multimedia resource-based learning. The Internet serves as a platform for delivery of materials in the DMRs. There is also a database of Internet educational resources for use in the local curriculum.

IPST website/E-library

Science, mathematics, and ICT education materials are mostly developed by IPST and are disseminated via the IPST Web Site and its e-library. NECTEC, in collaboration with IPST, has developed science, technology, and engineering content for the Digital Library, as a part of School Net services to secondary school students. The Digital Library covers more than 7,100 subjects in 10 subject areas. The MOE has developed a database for over 3,689,744 catalogues and the work is continuing. Database development, in the form of e-Book, e-Journal and Courseware, is also ongoing. In addition, there is a reference database to store electronic data from various colleges and universities. A recent project, Developing an Educational Resources Clearing House initiated by the MOE, is a database of resources produced by all ministerial departments and organizations, including curriculum and supplementary materials in eight subject areas. -Thailand

bilingual.

Using English in ICT application is a great barrier for many Thais. Only those who are capable of understanding English can become self-directed learners in the Internet. Those who are not are limited to Thai language programmes only.

It was proposed that if students were capable enough to master more than one language, it would move the country forward rapidly since the students could take advantage of their language skills and global technological knowledge.

7. Use of English

The ICT industry in several non-English speaking countries has regularly urged the Government to radically improve the standard of English competence in schools and universities. There has been much public debate on increasing the use of English in schools and universities.

The use of English in schools helps in using the global ICT resources (especially the internet) for teaching and learning.

Competence in the English language

Following the Government's decision in Malaysia to move fast into the ICT Age and transform itself into a knowledge-based society, there has been general consensus that school leavers do not have the necessary competence in the English language that will enable them to deal with challenges in the ICT Age. In 2002 the Cabinet made the decision to use English to teach Science and Mathematics.

Intensive training courses are underway to ensure that all Science and Mathematics teachers are fully equipped to teach these two subjects in English. The provision of an allowance to all Science and Mathematics teachers teaching in the English Language is a welcome incentive to all the teachers involved.

Using English in ICT application

While developing School Net in Thailand, the NECTEC noted that one key element for the successful use of ICT is the opportunity for schoolchildren to become

