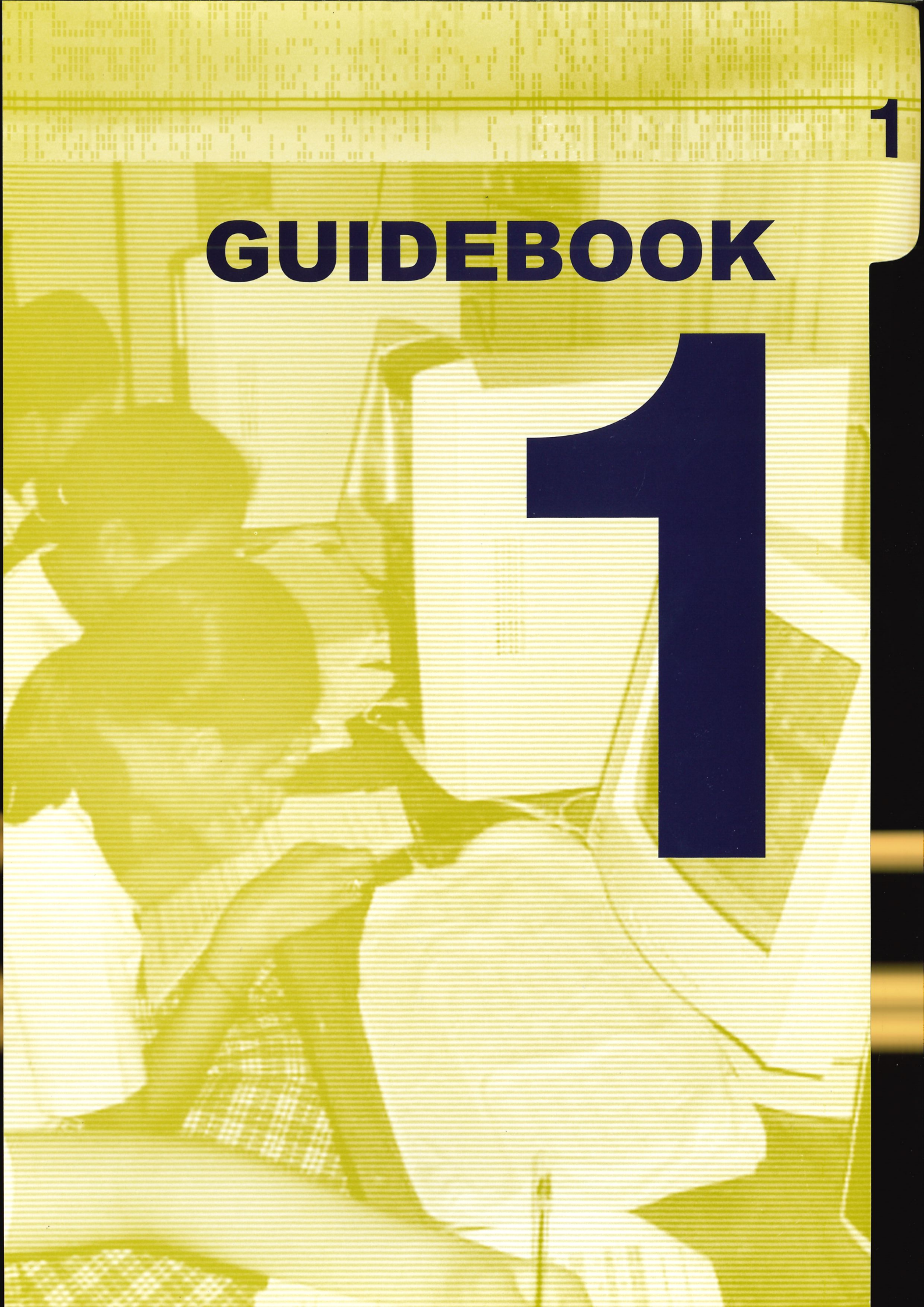


GUIDEBOOK

1



What are ICTs

Information and communications technologies (ICTs) are technologies used to communicate and to create, manage and distribute information. A broad definition of ICTs includes computers, the Internet, telephones, television, radio and audiovisual equipment.

The ability for users to communicate, collaborate and exchange information online is especially important for schoolnets, and in this context ICTs typically refer to computers, computer networks and the Internet, and increasingly other devices that can be used as network or Internet access devices (such as hand-held PDAs and mobile phones).

ICTs and the Knowledge Society

Information and communications technologies (ICTs) are technologies used to communicate and to create, manage and distribute information. A broad definition of ICTs includes computers, the Internet, telephones, television, radio and audiovisual equipment.

The development of ICT will build an environment in which most knowledge is shared and more knowledge and information is created as the distribution of such knowledge increases.²

The ability for users to communicate, collaborate and exchange information online is especially important for schoolnets, and in this context ICTs typically refer to computers, computer networks and the Internet, and increasingly other devices that can be used as network or Internet access devices (such as hand-held PDAs and mobile phones).

ICTs are the key enabler of the knowledge society. Those who have easy and affordable access to ICTs and communication networks can participate fully, while those without have fewer opportunities, and remain trapped in pre-knowledge economy forms of economic activity.

The phenomenon of differential access to ICTs is often labelled the "digital divide." This is often assumed to be about the presence of ICT infrastructure and equipment. However, the ITU has identified three further drivers of ICT usage: language (ability to use

When the first national plan for ICT use in education was established [in Korea] in 1998, support was forthcoming from ministries due to the broad and mutually agreed understanding of the national vision, which was that ICT would be the basis for national growth in the future.³

Fifty per cent of Indonesians with a college degree are online compared to 0.5 per cent [of those] without.⁵

languages in widespread use on the Internet), literacy (specifically a culture of reading) and learning (level of educational attainment).⁴

Education is, therefore, one of the most important components in creating knowledge societies, economic growth and prosperity. Education is not only the means by which individuals become skilled participants in society and the economy, it is also one of the key drivers in expanding ICT usage.

ICTs in Education

Seen within the context of the transition to the knowledge society, the following are the broad reasons for developing the pervasive use of ICTs within education systems:

▶ **To develop knowledge-society attributes in students.**

This includes the development of higher order thinking skills, life-long learning habits, and the ability to think critically, communicate and collaborate, access, evaluate and synthesise information.

▶ **To develop ICT skills and competencies in students,** as preparation for operating in an ICT-rich workplace and society.

▶ **To address structural problems and deficits in education systems.** This can include using ICTs to enhance administrative and teaching efficiency, alleviate under-resourcing in specific areas (e.g., a lack of textbooks or learning support materials), address equity issues through enabling equality of access to knowledge, resources and expertise, or support teachers who may be under-equipped to deal with new teaching challenges.

Schooling traditionally stopped when work began. In the knowledge society it never stops.⁶

Because of the wide-ranging potential impact of ICTs, they are often associated with radical rather than incremental transformation processes. ICT-in-education programmes benefit from a strong association with curriculum change processes and other system-wide changes such as moves towards decentralisation, school-based management and learner-centred philosophies.

What Countries Say About ICTs in Education

Malaysia

Malaysians [need] to make the shift towards a more technologically literate, thinking workforce, able to perform in a global work environment and use the tools available in the ICT age.

Korea

The demand for workers to develop an ability to innovate is increasing, and a lifelong education will be required as the average duration of an individual's working life increases. The demand for high-quality education is on the increase.

The goal of adapting education to the information age is to foster a competent person who possesses the professionalism, creativity and problem-solving abilities necessary for a knowledge-based society.

Thailand

E-education...aims to develop the mechanisms for effective educational policy and management, improve and develop the ICT infrastructure of the nation to enable education for all, promote and develop the potential of human resources at all levels, accelerate the construction of educational knowledge and information and provide more access to the knowledge and information.

ICT should be integrated across curriculum subjects as a tool for developing decision-making, higher-ordered thinking and communication skills.

Singapore

The drive towards the knowledge-based economy calls for a responsive education system that will prepare the workforce for creating, acquiring, disseminating and applying knowledge.

[The main role of the ICT Masterplan is to]...lay the basic foundation and disposition among students to learn how to seek out new information, think critically and show initiative to meet the challenges of a fast-changing world.

The primary motivation for integrating ICT in schools is the belief that it supports students in their own constructive thinking, allows them to transcend their cognitive limitations and engages them in cognitive operations that they may not have been capable of otherwise.

The Value Chain for Educational ICTs

For ICTs to deliver meaningful results in an educational context, a number of related elements need to be in place. These can be thought of as interlocking pieces in a jigsaw puzzle, or as a value chain. One description of these elements as a value chain is:

ICT education in elementary and secondary education involves a revamping of curricula, the development and dissemination of educational content, staff education and the creating of infrastructure conducive to ICT.⁷

- ▶ Preparing all sectors of the education system to understand the investment in and value of technology
- ▶ Preparing schools to accept the technology
- ▶ Procuring and installing the technology
- ▶ Training teachers to use ICTs
- ▶ Developing and managing digital content
- ▶ Integrating ICTs into the curriculum
- ▶ Providing ongoing technical support
- ▶ Providing ongoing curriculum support
- ▶ Undertaking continuous evaluation and research⁸

In essence, this means that implementing ICTs in education calls for a holistic, system-wide approach with investment balanced appropriately in different areas, and implementation elements smoothly integrated. If too many elements are missing or under-resourced, the investment is unlikely to be successful and cost-effective.

Some non-government organisations, corporations and corporate foundations prefer to simply parachute computers into schools and not worry about whether the ICT facilities they help build in the schools are instructionally effective and sustainable.⁹

What is a Schoolnet

Schoolnets promote the development of knowledge societies by connecting schools to the Internet, building connections among students, teachers and schools, sharing information and resources and supporting e-learning in online, networked environments.

Schoolnet initiatives operate at the interface between ICTs and education. This is how one of the first country schoolnets to be created, Canada's SchoolNet, defines itself: "SchoolNet readies learners for the knowledge-based society. It champions lifelong learning and the creation of world-class educational resources through information and communication technology (ICT) and partnerships."¹⁰

This is a characteristically broad definition. Schoolnet initiatives can in some ways be seen as vision-based initiatives, with ICTs and connected schools being the common means to an end.

Organisationally, schoolnets exist in a wide variety of forms. A schoolnet could be a programme located within a government department or ministry, a multilateral government initiative or a non-government organisation (NGO) or project.

The term "schoolnet" has become an internationally recognisable generic brand name, and as such has been used in a variety of different contexts by for-profit companies (in the US, UK and India), international foundations and projects (such as the Global Schoolnet Foundation) and regional schoolnets (such as SchoolNet Europe and SchoolNet Africa), supporting school networking activities in defined geographic areas.

For the purposes of this *Toolkit*, schoolnets should be understood as country-level programmes, government or non-profit, that have the objective of developing and supporting the use of ICTs in schools in a developmental rather than market-driven way. Schoolnets also often have a strong focus on building a community of practitioners with a membership of connected schools and/or teachers.

Why have a Schoolnet

Schoolnet initiatives usually arise from the realisation that there is a common interest that is not being adequately addressed by existing institutional structures. As ICTs typically evolve far more rapidly than individual institutions and education systems as a whole, this is to be expected.

In the early stages of ICT adoption, existing public institutions are generally poorly equipped to bring to fruition the advantage that ICTs can provide for

education. There may also be roadblocks of various forms, such as high connectivity costs, a need for more resources than are available or equity concerns such as a possible digital divide in public education.

Co-operation between ministries is essential when ICT use in education requires national support. One ministry is not good enough to implement the policy because developing the infrastructure requires not only the public sector, but also the whole power of private industrial support.¹¹

Over and above the strong arguments for integrating ICTs into education generally, it is therefore often accepted that there should be a special, co-operative effort to develop ICTs in education in a structured way. This is important because ICTs in education:

- ▶ Have far-reaching impacts (e.g., on physical infrastructure, curriculum, teacher training, assessment and content development)
- ▶ Are complex and expensive, requiring the services and resources of multiple agencies for successful deployment and use (telecommunications companies, ISPs, content providers, school leadership, etc.).

ICT-in-education initiatives therefore work best when they are well-resourced and have a multilateral approach with the participation of a wide range of stakeholders and partners.

A schoolnet initiative becomes a recognisable focus and identity for such efforts, is an easily-marketable concept and reinforces the idea that ICTs have a transforming role to play, rather than being another “business as usual” process. Schoolnets can facilitate system-wide changes, broader than the mandate of any individual agency.

At a semantic level, the model of a network applies in several ways, from connectivity (networking computers) to fostering connections between schools, teachers and students (networking people). Schoolnets therefore also encourage the development of communities of practice and orient participants towards collaboration and co-operation.

Schoolnets also make excellent sense as a reactive strategy to increasing ICT adoption at the school level. The risks arising from unco-ordinated and unplanned investment in ICTs are substantial. These include increased cost and lower efficiency, unsustainable solutions, educationally unsound implementation and vendor-driven solutions that may not be appropriate for the environment or may increase the total cost of ownership. A schoolnet programme can provide best practices, appropriate standards and strong, visible direction for ICT implementation, while not impeding grassroots innovation.

[Canada’s] SchoolNet, Computers for Schools and LibraryNet programs...have been important catalysts and facilitators, bringing together the complementary needs and resources of federal, provincial,

Where are Schoolnets Located

Schoolnet programmes exist in a number of different organisational forms, depending on a number of country-specific factors. Where schoolnets are located can be a function of the following factors:

- ▶ What funding and resources are available for ICTs in education
- ▶ The extent of support for ICTs in education by political and education leadership
- ▶ The political and government structure (the levels of government involved in education delivery and degree of centralisation)
- ▶ The extent and nature of grassroots activity
- ▶ Any particular opportunities and/or obstacles present
- ▶ Other initiatives underway related to ICTs in education

Schoolnets typically have slightly different roles and can achieve different things depending on their location and the extent of government involvement. The most common forms of schoolnet programmes are these:

- ▶ Educational technology units located within the Ministry or Department of Education (e.g., Malaysia and Singapore)
- ▶ Initiatives within other government departments or government-owned organisations (such as the original schoolnet programme in Thailand housed by NECTEC)
- ▶ Non-government organisations (such as the Pilipinas SchoolNet project run by FIT-ED in the Philippines).

In some cases, connectivity and educational services are separate (as in Indonesia where WAN Kota is a connectivity service, and edukasi.net is an online portal and educational content service). Schoolnet programmes that have large operational and service components also often provide these in conjunction with private sector companies. Table 1.1 outlines some of the characteristics of schoolnet programmes emerging from their location:

In practice, Schoolnet programmes typically evolve over time, in the best case leading to increased institutionalisation of educational ICT competencies and practices and different organisational structures as needs evolve.

Table 1.1: Schoolnet characteristics

	Advantages	Disdvantages
Schoolnet programmes within government	<p>Can set policy, curriculum frameworks and make changes requiring official or legislative backing</p> <p>Can establish ICT vision and goals across entire education system</p> <p>Best prospects for long-term financial backing and sustainability</p>	<p>Slower to set up and slower to change</p> <p>Risk averse</p> <p>Can be impeded by cumbersome procurement processes and other government overheads</p> <p>Political requirements promote breadth over depth and all-or-nothing approaches</p>
Schoolnet programmes outside government	<p>Easy to set up on a small scale</p> <p>Innovative and can react quickly</p> <p>Grassroots, bottom-up approach responds directly to needs</p> <p>Easier to develop different types of partnerships and relationships with multiple players</p> <p>Advocacy role through small-scale pilots and demonstrations</p>	<p>Sometimes fewer resources available</p> <p>Can be dependent on donor agendas</p> <p>Process of institutionalisation within government can take longer</p> <p>Prospects for long-term sustainability uncertain</p>



Schoolnets in Some Southeast Asian Countries

Korea

Korea established the Korea Educational Development Institute in 1988, which was later turned into the Korea Education and Research Information Service (KERIS). KERIS runs the country's EDUNET, which connects all of the country's schools through broadband Internet access, and provides information and portal services. EDUNET aims to:

- ▶ Provide an effective educational information network by integrating disparate educational information
- ▶ Construct the foundation for cyber education
- ▶ Construct an educational information database for ICT use
- ▶ Promote the utilisation of the Internet for effective educational services

Within the Ministry of Education, the Department of Educational Information Planning and the Department of Educational Information Operation oversee the development of ICTs in education.

Malaysia

In Malaysia, the Ministry of Education established the Smart School Pilot Project with the Multimedia Development Corporation and a consortium of private sector companies. The ministry's Educational Technology Division is responsible for ongoing development of ICTs in education, working with other divisions such as the Curriculum Development Centre.

Philippines

The Department of Education (DepEd) has an Education Technology Unit. There is a draft ICT Plan for Basic Education, which has not yet been formally approved. A number of different government departments have been involved in equipping computers with schools, including Education, Trade and Industry, and Science and Technology.

The non-profit Foundation for IT Education and Development (FIT-ED) runs Pilipinas SchoolNet, which has been piloted through the Coca-Cola funded Ed.venture project. The vision of Pilipinas SchoolNet is to build a network of schools throughout the Philippines that will leverage the Internet and related technologies to improve teaching and learning and to better prepare Filipino youth to meet the demands of the knowledge economy.

Singapore

In Singapore, the edu.MALL portal is one of the schoolnet initiatives established through the ICT Masterplan. Edu.MALL is an online network that connects educators, communities and resources in the use of ICT in education. It includes a learning resource centre, forum and professional development area, organised around the metaphor of a shopping mall.

Thailand

SchoolNet Thailand was initiated by the National Electronics and Computer Technology Center (NECTEC) in 1995, as a dial-up connectivity network. Content providers such as Kasetsart University and later schools and teachers contributed to the development of the Digital Library. SchoolNet Thailand is becoming part of EdNet, which is a national educational network set up by the Ministries of Education, Science and Technology and ICT with the objective of connecting all schools by 2005. The Educational Technology Center within the Ministry of Education is scheduled to form part of a new National Institute of Technology for Education.

What Enabling Conditions are Required

These are some of the enabling conditions for a successful schoolnet programme:

- ▶ **A supportive policy environment.** In the best case, there should be a clearly articulated rationale for the use of ICTs in education, linked to national economic and social development frameworks.
- ▶ **A multilateral approach,** with a willingness by all role-players to create working partnerships where required.
- ▶ **A receptive educational environment.** The Ministry or Department of Education, school management and teachers should be open to new ways of teaching and learning with ICTs and prepared to invest time and effort in implementing potentially far-reaching changes.
- ▶ **Adequate infrastructure in schools:** sufficient computers with good Internet connectivity (in turn depending on electricity and telecommunications services).
- ▶ **Sustainable operating costs:** the ongoing costs for connectivity, equipment maintenance and support should be affordable for individual schools over a sustained period, or there should be provision to cover these costs centrally in the long term.
- ▶ **Technical support:** It should be possible for schools to have technical problems resolved within a reasonably short period of time. Technical support services should therefore be accessible, affordable, responsive and effective.
- ▶ **A critical mass of connected schools and teachers.** There should be a large enough existing or potential user base to build effective online communities, achieve economies of scale and justify investment in resources such as online content.

If not all of the enabling conditions are present, schoolnets are unlikely to be able to achieve their objectives on a large scale. However, pilot projects on a smaller scale are often able to work around constraints using strategies such as “selecting for success” or working in urban areas where there are fewer infrastructure and technical support problems.

Given sufficient resources, the use of ICTs in education also often develops through “virtuous cycles” (e.g., developing online content builds demand for connectivity and hardware), which increases the number of connected schools, which in turn creates more demand for online content. The enabling conditions listed above should, therefore, not be seen as prerequisites to any investment in schoolnet programmes, but rather as necessary components to be addressed in a broad strategy.

What do Schoolnets do?

As noted above, the range of activities undertaken by schoolnets is usually shaped by the organisational form of a particular schoolnet. It may also be determined by the range of ICT-related services available in the marketplace and the maturity of the education market, with Schoolnet programs seeking to provide services not otherwise catered for.

These are some of the functions, activities and services provided by Schoolnets:

Technology services

- ▶ Connectivity services, acting as an Internet service provider (ISP) for schools, or facilitating partnerships with ISPs to connect schools at preferential rates (Schoolnets that act as ISPs directly sometimes establish their own network infrastructure, and/or operate as virtual ISPs, using network infrastructure of commercial providers.)
- ▶ Supplying equipment to schools (purchased through government funding, sponsored through donor or corporate funding, or donations)
- ▶ Domain registration, allowing schools to register individual domain names under an appropriate umbrella domain for schools (such as the sc.kr domain for schools in Korea)
- ▶ Web site hosting for schools
- ▶ Developing appropriate software solutions for schools (such as bundled Internet servers like the Linux-SIS Linux server for schools in Thailand)
- ▶ Providing technical support and help desk services
- ▶ “Complete solution” implementation (connectivity, equipment, networking, software, training and support, such as in the Malaysia Smart School Pilot Project)

Content services

- ▶ Portal sites to direct teachers and learners to appropriate Internet content (ideally organised and searchable by grade and curriculum area or subject)
- ▶ Content repositories to host locally developed online content
- ▶ Content development at a professional level (developed by content specialists) or grassroots level (contributed by practising educators)

Fostering communities

- ▶ Facilitating the development of learning communities, where educators can interact with each other to share experiences and provide peer support
- ▶ Creating and supporting virtual communities that interact through e-mail (using mailing lists), Web sites (Web forums or blogs) or other Internet technologies (e.g., instant messaging and audio- or videoconferencing).
- ▶ Running periodic face-to-face workshops or conferences on ICTs in education (such as the schoolnet conference in Korea).

Collaborative projects

- ▶ Facilitating the involvement of schools and students in collaborative online projects such as ThinkQuest
- ▶ Designing and running collaborative projects on a country level, either original projects or localised international projects (such as ThinkQuest Singapore)

Professional development

- ▶ In-service training of teachers on ICT skills and using ICTs in teaching and learning (curriculum integration)
- ▶ School management training on implementing, managing and supporting ICTs in a school
- ▶ Training in participating in schoolnet activities such as Internet-based collaborative projects, sharing resources online and participating in virtual communities

Partnerships

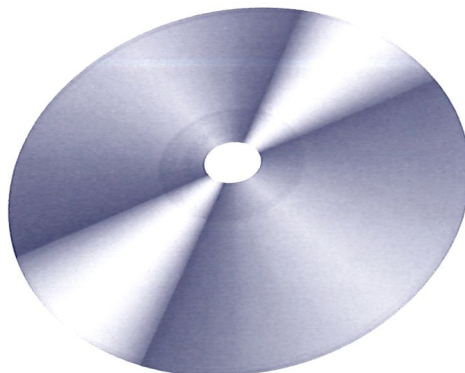
- ▶ Acting as an intermediary or bridge between various role players and stakeholders who share a common interest
- ▶ Facilitating investment in ICTs in education by corporate partners and donor organisations.
- ▶ Promoting industry partnerships, especially with the ICT industry, to expose schools to new and emerging technologies.

Experimentation, innovation and advocacy

- ▶ Conducting pilot projects across a range of environments and circumstances
- ▶ Developing and disseminating best-practice guidelines
- ▶ Advocating policy changes at various levels based on experience with pilot projects and best-practice knowledge
- ▶ Promoting and supporting innovation in the application of educational technologies

Curriculum and policy development

- ▶ Effecting changes in the education system that arise as a result of the introduction of ICTs in schools
- ▶ Contributing to ICT in education policy processes
- ▶ Redesigning the curriculum to leverage new teaching methods made possible by technology and to integrate ICTs into the curriculum (e.g., Singapore's MP2 initiative)
- ▶ Updating assessment processes to assess more accurately ICT-enabled learning processes
- ▶ Establishing competency frameworks for use of ICTs by learners and teachers
- ▶ Including ICT competencies in appointment and promotion standards for teachers
- ▶ Ensuring that ICT competencies are adequately embedded in pre-service teacher training courses



What is a Successful Schoolnet

What are the key performance indicators for schoolnets? In some cases, quantitative measurements may be easy to apply. However, in many cases schoolnets perform the role of catalyst, helping to bring about change in a system. The results of such efforts are often indirect and seen in shifts of policy, improved understanding of ICTs, changes in budget allocations or revised curriculum frameworks.

In this sense, a successful schoolnet programme is one that has contributed to the transformation of a country and its education system towards a knowledge society. The categories below suggest some intermediate indicators that can be used to measure the progress of schoolnets.

Access and sustainable usage

- ▶ An increase in the connectedness of schools (i.e., the number of schools connected, the geographic spread of connectivity in urban and rural environments and the effective bandwidth available)
- ▶ Evidence of usage such as e-mail volumes and Internet traffic
- ▶ Sustainable usage: progressive increase of usage over time, extending beyond the lifespan of pilot projects

Institutionalisation

- ▶ ICTs in education are not seen as a special activity, but become integrated into all aspects of the core business of Ministries and Departments of Education and schools.
- ▶ ICT skills and competencies increase across the board.
- ▶ E-mail and Internet services are used to carry out official functions.
- ▶ Schools and teachers regard themselves as part of a broader network constituted by the schoolnet.
- ▶ Decision-makers are convinced of the value of ICTs, and there is high-level policy support.
- ▶ Curriculum revision processes are cognisant of new ways of teaching and learning with ICTs.

Content

- ▶ There is active use of digital content in classrooms and by learners, with ongoing development.
- ▶ Online content has been developed or adapted locally, with some content in local languages.
- ▶ Teachers and students contribute actively to expand the content database.

Community

- ▶ There are active online communities of teachers using ICTs. Educators provide peer support and derive professional benefit from their participation.
- ▶ Students establish and participate in online communities for both educational and social purposes.

Learning impact

- ▶ Learners show evidence of improved motivation and performance attributable to use of ICTs in learning programmes and participation in schoolnet activities.

Continuous improvement

- ▶ Periodic evaluation and feedback leads to continuous improvement in implementation practices.

Resources

- ▶ The development of multilateral and public–private sector partnerships, leading to greater resources being invested in ICTs in education from sources outside education line-function budgets
- ▶ The involvement of teachers, students, parents or the local community in supporting school ICT resources, through fees, fundraising or other activities, reflecting a sense of ownership and commitment

Examples of Schoolnets

Table 1.2 lists schoolnets in Southeast Asia, and Table 1.3 lists regional schoolnets.

Table 1.2: Schoolnets in Southeast Asia

Country	Schoolnet Name	Website
Indonesia	WAN Kota e-dukasi	www.wankota.org www.e-dukasi.net
Korea	KERIS EDUNET Schoolnet Conference	www.keris.or.kr/english/index.jsp www.edunet4u.net www.schoolnet.or.kr
Malaysia	BESTARINet mySchoolnet	www.moe.edu.my myschoolnet.ppk.kpm.my
Philippines	Pilipinas Schoolnet at FIT-ED	www.pilipinasschoolnet.org www.fit-ed.org
Singapore	edu.MALLI	www.moe.gov.sg/edumall/
Thailand	SchoolNet@1509	www.school.net.th

Table 1.3: Regional schoolnets

Schoolnet	Website
Schoolnet Europe	www.eun.org
SchoolNet Africa	www.schoolnetafrika.net
ASEAN schoolnet	www.unescobkk.org/education/ict/v2/info.asp?id=10966

Further Resources

The Knowledge Society

“Towards Knowledge Based Economies in APEC”

November 2000, Report by Asian-Pacific Economic Cooperation (APEC) Economic Committee.

Available from www.apecsec.org.sg/apec/publications/free_downloads/2000.html.

Schoolnet Planning and Implementation

See Guidebooks 2, 3 and 4 for more detailed information on the topics in this Guidebook.