Disseminating New Technologies into Indonesian Schools

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Abstract

New technologies such as Internet and Web-based technologies have caused profound changes in the way the information is disseminated throughout the world as well as the way the commercial sectors performing their business. The educational benefits of the new electronic information technologies, and the Internet in particular caused an urgent need for the new generations in Indonesia to be able to be exposed to the interconnected world of the Internet as early as possible.

The objective of this paper is to assess the dissemination of new technologies into Indonesian school and to review the efforts performed in introducing and disseminating Information Technologies (IT). This is performed by literature studies and comparing the situation in Indonesian schools to those in the UK. Analytical assessment is performed to review the current status of the Indonesian schools students¹ use of computer technology and Internet

It can be concluded that the use of IT in education and the education in IT in Indonesia is in critical need to be performed and should be fully supported by the entire stakeholder of the education in Indonesia. The dissemination of new technologies to as many schools as possible throughout Indonesia will provide an Internet community of school students, as well as promoting the use of computer to the teaching-learning activities in classrooms and laboratories.

1. Introduction

The new technologies such as communications and computer, as well as television have caused profound changes in the way the information is disseminated throughout the world as well as the way the commercial sectors performing their business. It also provides opportunities and advantages for their use in many facets of life.

We can not ignore the global fact that as the technology becomes mature, it has rapidly changed the world from industrial society toward a knowledge based information society. The changes require people to have different knowledge and skills, which should be reflected in the effort to accommodate it in the educational system. The new worldwide approach to economy demands a person that is computer literate and capable of using new technologies to solve problems. These skills and knowledge can only be acquire by opportunity to learn and to experience with the new technologies it self.

On the other hand the use of Information Technology (IT) in education will provide better quality and cheaper provision of information, as well as quicker delivery of science and technology to students.

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The power of computer and computer connection can be very useful for students at all educational level. It also provides more effective approach to students understanding’s. Doughty (1996) shows evidence that early learning of study skills can make students more effective learner overall. Therefore the earlier a student exposed to computer, the better and more effective his/her learning of computer will be.

The development of the new technologies calls for critical issues of introducing them to the young generations in Indonesia as early as possible. Computer awareness has been introduced into high schools curriculum in Indonesia since 1984 by putting the introduction to computer as part of the Mathematics curriculum. However the implementation of the teaching in classroom were absolutely depend on the capability of the schools to provide capable teachers and facilities in performing it. The latest efforts to introduced Internet and computer network to schools has been pioneered by APJII (The Association Indonesia Internet Service Provider) to introduce computer network technology to more school students.

The objective of this paper is to assess the dissemination of new technologies into Indonesian school and to review the efforts performed in introducing and disseminating Information Technologies (IT). This is performed by literature studies and comparing the situation in Indonesian schools to those in the UK. Analytical assessment is performed to review the current status of the Indonesian schools students’ use of computer technology and Internet.

The paper is divided into 6 sections. The first section is the Introduction. The second section is addressing the Computer and Internet at Indonesian schools. The third section discusses the Efforts in Promoting the Use of New Technologies in Indonesian schools. The fourth section is dealing with the issue of computer literacy and computer systems curriculum in Indonesian schools. Section five deals with promoting quality education to strive for national competitiveness, and the last section concludes the paper.

2. Computer and Internet at Indonesian Schools

This paper discusses the major issues of disseminating new technologies such as computer and Internet into Indonesian schools. The reason is that many higher education institution in Indonesia has already been exposed to the new way of information access and information provision whereas it is necessary to promote this to schools. This is due to the fact that we are going to cover more portion of the population, which includes approximately 25 million students in junior and senior high school as well as vocational schools. It is assumes that many universities across Indonesia are on their ongoing effort to provide interconnectivity to the Internet, although they faced the difficulties to find financial resources for these programs.

The vision to introduce IT to the schools are paramount to the current situation in the global workforce as the parameter to evaluate a country nowadays are based on their connectivity, e-leadersship, information security, human capital, and e-business climate. Therefore it is critical to provide wider connectivity across the country, one way of performing it is to introduced connectivity from schools (which is spread out even to rural areas) to the Internet.
Computer awareness have been introduced to high schools since 1984, but the teaching and learning process are left to the schools to performed, depends on their access to teachers, computer as an infrastructure. Some privilege quality schools in big cities are capable of providing computer awareness to their students, although most schools are left untouched by the new technologies due to the lack of resources.

Some students from good schools for example having a good grasps of things happening in the modern world of the Internet. A recent case for example revealed this. On June 2000, a 15 years old Indonesian school boy were arrested for hacking the computer systems of two companies in Singapore. This case of the teenager hacker is considerably interesting for the fact that the student was just introduced to the Internet the year before. This is also the first trial case exercised by Singaporean court that relates to the implementation of cybernetics law to a foreigner.

The increasing number of the crime cases in Cybernetics world conducted by school and University students in Indonesian big cities triggered the Indonesian Minister for National Education to intend to ask for the Indonesian Institute for Sciences (LIPI) to create a format for the activity of the students and society at large who are interested in Information Technology in Indonesia. (Suara Pembaruan, 24 July 2000). However on the priority scale we absolutely need a greater common effort to introduce computer and the Internet to more students throughout Indonesia.

Talented Students with strong interest in the development of new technology should be supported in an extra-curricular school activities or external computer interest groups. Their keen interested should be directed by showing them the right attitude and moral values to judge whether their act is good or bad in the cyberworld. Those students can be the ones who lead the dissemination of computer technology in their schools. They can also be the leaders in the formation of the schools’ students’ Internet community in their own schools and in their environment. They can help in setting up the facilities and provide tutorial to their friends, in order to enable more students to be able to access the Internet and exchanging electronic mails, as well as accessing information. The talented student can act as the leaders of the Sekolah2000 program in his school, considering their interest in the program. Schoolteachers can direct their activity and encourage them to perform all of their actions based on their moral judgement.

This case should alarmed us to the fact that if provided with enough opportunity and exposure to the new technologies, there are many things that can be performed by Indonesian students in order to catch up and become part of the development of digital based world economics. The intelligent and local genius can become a big asset to the nation if only the firmware for them to develop themselves has been prepared. The right education direction and the understanding of the moral values appropriate with the development of this new millennium will enable the youth to reveal their strength and transform it into useful innovation and generate positive advancement rather than something destructive.

The problem in Indonesian education is very complex. It must be able support tens of millions of students, which covers the elementary, secondary, and higher education. No matter how bad the currents economic and political situation in our country, the education sector must kept activating.
Education is one of the vehicles that can transform the Indonesian people from traditional societies to be an active member of the competitive world of digital societies (Sari 2000).

The case of our teenager hacker in Singapore provides us a lesson to learn, despite the fact that his activity is not something that can be proud of. Provided with facilities, the computer technology and the Internet can be learn by anyone with intelligent, willingness, and determination to explore new things. The first one who achieves something will not always be the best, if he/she is unwilling to strive to the best and keep on his leadership.

From the point of view of the dissemination of new technology to Indonesian schools, the Sekolah 2000 program mentioned above should be given attention and supported by all of the stakeholders of the education in Indonesia. This program is relatively ambitious compares to the history of the dissemination of Computer and Internet at British schools, which can be traced back to the 1980.

Professor Somekh from Manchester Metropolitan University wrote that the introduction of new technology in British education have become the major component of the governmental policies since 1980. In 1995, the information highway initiatives has been introduced and were expected to support the vital task of keeping the British competitiveness in the 21-century. In 1997, the Prime Minister Tony Blair initiate a program called “National Grid for Learning” to provide a solution to fundamental problem of: how to individualise learning opportunities, to raise achievement for all to significantly higher levels, and to provide high quality mass education at a cost the country can afford. Using 100 Million poundsterling in the first phase 1998-1999, the government provides hardware, software, and connection to the Internet for 800 schools (Somekh 2000). It is predicted that by 2002 this program can be directed into providing infrastructure, service, and content for every schools, and by 2005 everything can be online. The timeline of the Computer Technology Initiatives in the UK can be seen in the Figure 1.

![Timeline](image)

**Figure 1. New Technology Initiatives in in the UK**
This vision probably is too ambitious to be implemented in Indonesia, which is deliberately still
struggling with the fundamental problem of literacy and primary education. The problem of promoting
democratization, law enforcement, and acceptance of plurality are still the main priorities to be solved.
The big task in providing quality education to the young generation for example by implementing new
technologies into schools all over Indonesia is also waiting to be performed. On the other hand, we fear
that our new generations must live in a very competitive world. We put aside the aim of providing a
high quality education in mass scale considering the enormous cost needed to touch the lives of the
new generation of the fourth most populous nations in the world. However the provision of at least an
interconnection from schools to the Internet becomes necessary as the Internet has became the
backbone of the new economy.

3. Efforts in Promoting the Use of New Technologies in Indonesian Schools

A program called the Sekolah2000 program has been set up since 1999 aiming to connect at least 50%
of schools in Indonesia to the Internet by 2002. The vision beyond the program is to accelerate the
creation of Indonesian student’s Internet Community. APJII is aiming to introduce Internet and
promoting the capabilities to use computer and to prepare Indonesian school students with capabilities
to benefit from the new technologies as the world economy has shifted towards the “New Digital
Network Economy”. The mission of this program is to introduce the Internet world to students and
teachers throughout Indonesia from primary to secondary education, including SLTP (Junior High
School), SMU (Senior High School), SMK (Vocational Schools), Madrasah Tsanawiyah and Aliyah
(Islamic based schools).

All the stakeholders of education in Indonesia should support the APJII program mentioned above.
The burden must be equally shared by the schools, the government through the Department of National
Education, the hardware and software vendor, bank as the provider of credits for example, and last but
not least the parents of the students. Shaping the quality of life of the future generation obviously need
dedication, contemplation, and concrete action in order to make the executable efforts to be come true.

The consciousness to be united to reach the common goal and putting the common interest on top of
private and group interests must be performed to empower our future generation. They should not only
become the object and spectator in the new world economy that is extensively supported by
sophisticated technologies.

Beside the problems of the interconnection to the Internet, the use of computer in Schools must be
given a greater attention. The use of the right model that can be controlled by student using the
computer, the use of simulation to minimise the use of laboratories’ materials and apparatus, the use of
computer in helping teachers in providing visual illustrations are the reasons of the need to disseminate
the new technology extensively to the schools.

The Indonesian Department of National Education has also performed some measures to promote the
introduction of the Internet to Vocational Schools. For example from June to October 2000 a national
competition for designing school web sites has been launched. The Indonesia Internet Service Provider
through Sekolah2000 program and Cisco Systems (Kompas, 3 August 2000) also supported these
programs. The best 8 web sites will become models for vocational schools in Indonesia to build their own web sites. The web sites will have the profile of the schools and some web facilities such as counters, search engine, guest books, etc. Figure 2 summarises some efforts performed lately to promote the use of new technologies into Indonesian schools.

![Efforts in Promoting the Use of New Technologies in Indonesian schools](image)

**Figure 2. Efforts to Promote New Technologies to Indonesian Schools**

There are numerous activities that students can do and enormous skills that student gained from the existence of new technologies around them. Students can be educated to benefit from learning in using productivity tools based on computers such as numerical processing, word processing, graphic design, Internet information access, control of equipment and instruments, desktop publishing, presentation, integrated work environment, electronic mail and file transfer, the Internet and WWW, etc (Doughty 1996).

**4. Computer Literacy and Computer Systems Curriculum in Indonesia Schools**

Teaching information technology is problematic in Indonesia, as it requires a big amount of funding to provide the infrastructure. The study of IT requires access to expensive hardware, software, and communications cost. The technology changes rapidly and unpredictable. Many teachers lack qualification and experience in IT or computing.

At the moment in Indonesia, there is still an absence of standardized high-school computer curriculum. Some good schools can provide facilities for student to be computer and Internet aware, and even to manage open source Linux box in their school for example. On the other hand some other schools do not have such privilege.

The problem of introducing computer to the Internet to schools is not only the problem of developing countries such as Indonesia. Deek (1999) also stated that in the USA, there is still an absence of standardized high-school computer science curriculum. There is no coherent secondary-school curriculum for the general population. He also stated that there is no mechanism exist to train teachers
or to keep them up to date with the field. This fact shows us that there are some stages in disseminating new technologies to Indonesian schools. The history of the implementation of computer curriculum in develop countries can become a lesson to learn for Indonesia.

In the UK, the government’s Reform Act of 1988 has prompted unprecedented and fundamental changes in the way in which education is delivered and assessed. Information technology is firmly embodied in both the policy and strategies since then. The key feature of the Act are: the legal status of well-defined National Curriculum; National testing against specific criteria; significant increases in autonomy of schools. In essence, IT has a curriculum of its own (from age 5 to 16) with level description and programs of study. IT is also expected to be used in both teaching and learning of all subjects in the curriculum.

Computer as a new technology needs the embodiment of reading and writing culture. The facts that these new technologies are to key components which insist both parties to be active also. Indonesian students are lacking of the capabilities in writing their opinion and feelings compare to the students in the UK for example where children are encouraged to write their feelings is cards. The new Internet technology and email culture means that students should also able to provide a content in their writing. There is duplex - two way communication between students, teachers, and other parties that can be contacted through the Internet.

There is a need to design a high-school curriculum in computer science and supervised preparation of study program based on it. Gal-Ezer (1999) for example proposed some programs which emphasized on the foundation of algorithm and programming. Emphasis is also placed on demonstrating and practicing the studied material by solving problem.

For Indonesia, there is a need to provide separate computer curriculum at schools for students that have serious interest in it. Computer enthusiast in schools should be accommodated through computer curriculum that can direct them to achieve the best things that they can do. Performing this means that the students can get credit from what they are doing.

The quality of the schools is reflected in the skills and knowledge that can be gained by its students. A national policy to accelerate the dissemination of new technologies into schools is necessary to boost up the quality of education. Manan (1998) provides an example of a strategic approach to enhance the quality of schools through the intervention of national policy, i.e. enhancing the quality of teachers in English, Mathematics, and Science through selective support to schools with low quality. This approach should also be implemented to computer technology, which is currently being taught as part of Mathematics curriculum.

However, the curriculum should be flexible enough, because learning from the lesson of the case of UK, currently there is no national curriculum in computing. Crawford (1999) stated that teaching and learning IT are inherently constructivist activities. IT was identified as a discrete, mandatory subject that is different from other didactic teaching and other teacher centered strategies in traditional subject such as Mathematics.

On the other hand there are problems in promoting teaching and learning of IT. The problem in IT teaching and learning identified by (Crawford 2000) can be seen as follows.
1. The IT study requires expensive hardware, software, and connectivity to the Internet.
2. The technology changes very rapidly within three to five years.
3. Insufficient hardware
4. Lack of IT teachers qualifications
5. Teachers should learn new concepts.
6. It is difficult for the teacher to control the focus of the students' work.
7. Students may have more extensive IT skills than their teachers.
8. Confusion over curriculum content.

The constructivist approach to the new technologies education at schools is performance, for example by encouraging dialogue and collaborative learning. These approaches encourage the development of cognitive strategies and attitudes as well as memorising verbal or factual information, motor skills and intellectual skills. In this approach assessment is performed on processes as well as products. The teachers should be the facilitator and guide, rather than acting as an instructor. The teachers should also keep an open mind that students will not always learn what is intended by the teacher (Crawford 1999).

In the UK schools, IT has its own curriculum with level descriptions and programs of study. IT is also expected to be used in the teaching and learning of all subjects in the curriculum. The IT provision and other aspects is being evaluated every four years by independent inspection teams, who will report to the office of Standards in Education, the school management and governors, and the parents of children.

5. Promoting Quality Education to Strive for National Competitiveness

The computer and communications technology does not only have modern connotation and solely regarded as an advancement of the science and technology. In reality in became the backbone of the world trade business that should be introduced early in many phase of education. It can serve as an empowerment tools for their future endeavor. We are at liberty to depart from the believe that the crisis in Indonesia today will be over one day. Subsequently the children, the future leaders in Indonesia should be prepared to live in the information-based world.

Promoting quality education by providing infrastructure and guidance for student to reveal their capability from the early age will empower them for the later stage of their life in the borderless world. There is no government that can stop the dissemination of Internet technology as the electronic bits that travels from country to country have no colour, smell, shape, and can not be stop at the customs. Kapitze (2000) stated that with appropriate support and guidance, it is feasible for students with technical 'cultural capital' to move from the margins to the center of technological innovation and educational change. This means that some effort to accommodate students and enable them move to the center of the innovation should be performed.

Government in this case the Department of National Education has a major role in promoting the new technologies in schools. It can be in the form of installing networks and computers for education, establishing a national syllabus for basic IT education, run pilot projects to demonstrate excellent practice, train inspectors and Quality Assessors to evaluate IT use, establish national purchasing deals
for learning and authoring software, fund maintenance for successful courseware, support Research and Development to improve learning, etc (Doughty 1996).

National competitiveness as a whole can be gained by having a human capital that is competitive. As the growth of computer and telecommunication has prosper and benefit many countries outside Indonesia, despite the fact that Indonesia are still in the middle of the financial crisis, the impact of the advantages of the new technology also should benefit the society at large in Indonesia.

Incorporating new technologies can help the teachers to perform their task more effectively. The explosive growth of telecommunications has caused the educators to deliver their instructional objectives by effectively incorporating the new technologies (Motiwala 2000).

Collins (2000) stated that there are five purposes of using the new information technologies in education, i.e. the publication and dissemination of information, such as through website, structured communications through email, collaboration through groupware, information and group handling through search engines, and specific applications for course delivery and support. The use of World Wide Web to accumulate information for example will save the effort to gain references for learning. Email discussion will enable students to communicate with other students from all corners of the world and open their perspective of the world itself. Groupware can help in promoting collaborations. The use of search engine will help the students to gain information on their fingertips. Distance learning is an example of how specific application can help in delivering courses to student who live in remote places.

As the latest United Nations Economic and Social Council has stated the key to expanding impact of IT in development, the use of the new technology to ameliorate the economic power of the society is critical to be performed in Indonesia.

6. Conclusions

As the world changed rapidly from an industrial society toward a knowledge based information society, there is a need for our student to be prepare early for mastering the new technology, skills, and attitudes toward new electronic based world economy. This paper has introduced non-government people initiated movements for provision of Internet connectivity to schools called Program Sekolah 2000.

Several problems identified in generating a mass scale of computer literate students throughout can be associated with the scarcity of hardware, software, interconnectivity, as well as teachers. Despite the fact that Indonesia is currently still in the middle of the financial crisis does not abolished the fact that concrete action is necessary to introduced them to the new technology in their early learning.

It can be concluded that the use of IT in education and the education in IT in Indonesia is in critical need to be performed and should be fully supported by the entire stakeholder of the education in Indonesia. The dissemination of new technologies to as many schools as possible throughout Indonesia will provide an Internet community of school students, as well as promoting the use of computer to the teaching-learning activities in classrooms and laboratories.
Reference


