

E-LEARNING IN INDONESIAN EDUCATION SYSTEM*

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Introduction

Information and communication technology (ICT) that has been developed nowadays is responsible for globalization in which national borders are blurred by instant interaction and information sharing. In the era of globalization what happens in one country will give impacts, positive and/or negative ones, to other countries. People from different parts of the globe, to some degree, share one another various information, knowledge, science and technology. To some other degree, however, this will create what so called Digital Divide. Digital Divide is a term to describe gaps between the rich and the poor in the effective access and use of ICT (Wagner, 2002). All these create competition in every aspect of human life and the competition is perceived as of the main characteristic of globalization.

The proper way to win the competition in the era of globalization is by increasing the quality of the people through well-programmed human resource development. Education is believed as one of the important endeavors for improving the quality of human resource for it provides the potential human resource with the competitive competencies that comprise knowledge, skills, and attitudes needed for winning the competition as well as in national development.

Education in Indonesian is still facing some major problems and the most crucial ones are those related to access and quality. Concerning the access problem, the related-data indicates that since the launching of nine year universal education the gross enrollment rate (GER) at primary school (PS) level has achieved over 1.00 (100%) with the net enrollment rate (NER) of 0.94. This means, 6% of the children at the age group of PS have not been enrolled by the schools. At junior secondary school (JSS) level the NER is 0.55 which means there are 45% of the children at this particular age group who are not admitted by the JSS. At senior secondary school (SSS) which comprises general SSS and vocational SS the NER is only 0.315 which can be considered as low (Office of Research and Development, 2001). This situation depicts a picture of the access problem and indicates that the Indonesian education is still facing.

Data on the quality of education, such as the students' achievement, indicates that in the last five years the average result of school leaving examination, particularly in Math and Science at all school levels, and English and Economics at JSS and SSS levels has not achieved 6.0. Other studies indicated that the PS students just achieved 30% of mastery level in reading. They also encountered difficulties in

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comprehending mathematics story problems. During the economic crisis there were more than 3 million students who were dropouts every year (Office of Research and Development (1999).

Indonesian education system consists of formal education and non-formal or out-of school education. In the formal education there are three levels of education namely basic education (9 year basic education consists of 6 year PS and 3 year JSS), secondary education, and tertiary education levels. In the out-of school education there are packages A, B, and C, and courses or training. In regard to extending the access into formal education, particularly at the basic and secondary levels, these packages are treated as the alternatives. Those who, for some reasons, are not enrolled by or are dropouts from PS, JSS, and SSS can take packages A, B, and C respectively. This mode of educational practice has been operated and has increased the NER at the basic and secondary education levels and has overcome the access problem at PS, JSS, and SSS as well. Until recently, however, the education problem related to access has not been completely resolved.

Moreover, one of the education problems in Indonesia is the problem of quality. The related issue is how to provide every student with the learning materials and resources that can be accessed instantly and easily anytime and anywhere. This way will support their ability to do continuous lifelong learning faster which later on may be the only sustainable competitive advantage. In order to realize this it needs to change the teaching-learning process paradigm.

In traditional paradigm, teaching-learning process usually occurs in the classroom and the presence of teacher in front of the classroom is of its major characteristics. They are also responsible for the effectiveness of the teaching-learning process and are perceived as the most important learning resource. In the new paradigm, on the other hand, every student should be facilitated to undertake learning process whenever and wherever she/he needs. In this paradigm the presence of teacher in the classroom is not that important and teacher is no longer perceived as the only learning resource. The implementation of this paradigm will be successful if we utilize ICT or implement e-learning in education.

Indonesia realizes that in regard to improve the quality of its human resource both the problems of access and quality have to be taken into account in finding out their solution. One of the solutions to these problems is by using ICT in education especially related to the application of e-learning in the education system. So far there is no comprehensive study on the use of e-learning in the entire education system. However, we still can review the extent to which e-learning program has been developed and implemented in the education system.

Some Indonesian Education Indicators

Indonesia is the fourth most populated countries in the world after China, India, and United States. In term of geographic feature this is the largest archipelago country

that comprises 13,500 islands with around 6,000 of them are inhabited. According to 2002 statistical data (Ministry of National Education, 2003), the country's total population is 231,328,092 and the growth rate is 1.54%. Literacy (age 15 and over that can read and write) is 83.8%.

According to 2001 educational statistic (Office of Research and Development, 2001), the number of primary schools is 148,964; junior secondary schools is 20,721; senior secondary schools is 7,980; vocational schools is 4,435; public higher education is 76; and private higher education is 1,365. The number of teachers is represented by Table 1.

Table 1
Number of Teachers by School Level in 2001

School	Male			Female			
Level	Public	Private	Total	Public	Private	Total	Total
PS	1713082	129492	1842574	1644519	125749	1770268	3612842
JSS	151008	86157	237165	141827	64151	205978	443143
SSS	57940	61708	119648	51434	39636	91070	210718
Voc.	26916	58566	85482	16698	29535	46233	131715
Total	1948946	335923	2284869	1854478	259071	2113549	4398418

Table 1 shows that the total number of teachers of PS, JSS, SSS including the vocational SSS is 4,398,418. This number also includes those of public and private schools. If the number is compared with the number of students than the students-teachers ratio is represented by Table 2 that represents the number of students and teachers and its ratio by the school levels.

Table 2
The Students-Teachers Ratio by the School Levels in 2001

School	Public			Private			Total		
Levels	Teachers	Students	Ratio	Teachers	Students	Ratio	Total Teachers	Total students	Ratio
PS	3,357,601	23,853,943	7.10	255,241	1,847,615	7.24	3,612,842	25,701,558	7.11
JSS	292,835	5,465,467	18.66	150,308	2,119,240	14.10	443,143	7,584,707	17.12
SSS	109,374	1,721,342	15.74	101,344	1,217,172	12.01	210,718	2,938,514	13.95
Voc.	43,614	579,892	13.30	88,101	1,354,045	15.37	131,715	1,933,937	14.68
Total	3,803,424	31,620,644	8.31	594,994	6,538,072	10.99	4,398,418	38,158,716	8.68

We learned from Table 2 that the number of pupils/students at primary schools is 25,701,558; at junior secondary schools is 7,584,707; at senior secondary schools is 2,938,514; at vocational schools is 1,933,937; public higher education is 821,855; and private higher education is 1,407,941. The total number of teachers at primary schools is 3,612,842; at junior secondary schools are 443,163; at senior secondary schools are 210,715; at vocational schools are 131,715. The ratio of the total students-teachers is 8.69. At PS the ratio is 7.11, at JSS the ratio is 17.12, at SSS the ratio, and at vocational SSS the ratio is 14.68.

The number of continuing students at primary school to junior secondary school is 770,500, junior secondary school to senior secondary school is 956,400, and senior secondary school to higher education (college and university) is 814,3000. The number of drop-outs particularly at basic education level, consisting of primary school and junior secondary school is 960,700 and 377,600, respectively.

ICT in Indonesian Education

Indonesia is one of the countries that have given a great concern with doing serious efforts in reducing Digital Divide among its people through extensive use of ICT in various sectors (Yuheti, 2003). The government's policy on the use of ICT is based on the Presidential decree number 50, 2000 on the establishment of the coordinating team of *Telematika* of Indonesia. *Telematika* is an acronym that stands for *teknologi telekomunikasi, media dan informatika* which by its nature is the utilization of ICT in various sectors and aspects of life. The team consists of all ministers including Minister National Education. Tasks of the team are defining the government policies related to the implementation of *Telematika*, formulating the phases and priorities in its development, monitoring and controlling its implementation, and reporting the extent to which it is implemented to the President.

In the sector of education there is also a program of *Telematika Pendidikan* or the utilization of ICT in education which also known as e-education. There is a working team who is responsible for developing a national program of e-education or that of the utilization of ICT in education which is directly accountable to the Minister of National Education. To implement the program the working team has developed a five-year action plan for the development and implementation of e-education 2001-2005. According to the plan during 2001-2005 the team will do the followings:

1. Develop ICT Networks for public and private universities as well as research and education networks in Indonesia.
2. Prepare master plan for the development of human resources on ICT.
3. Develop and implement ICT curricula.
4. Use ICT as an essential part of the curricula and learning tools in schools, universities, and training centers.
5. Establish the related-education programs including the schools' participation in global development learning and other networks.
6. Facilitate the use of internet for more efficient teaching-learning process.

The introduction of *Telematika* technologies and their application are crucial, and have to be started at the earliest possible age, without discrimination, and should be done at all levels and kinds of education. Thus, *Telematika* becomes an important part of the education system. According to Yuheti (2002), in the future the school curriculum and the curriculum at higher education will be gradually adjusted to this particular trend beginning from higher education and high school.

The success of the utilization of ICT or *Telematika* depends on the provision of infrastructure which includes the telecommunication network, the availability of

internet facilities, and the use of internet. In general the development of ICT in Indonesia is less extensive compared with the neighboring countries such as Singapore, Malaysia, and Thailand. The related-data from the center for Research and Application of Information and Electronic Technologies of the Office for Research and Application of Technologies indicates that in 2001 the conditions of infrastructure for ICT are as follows:

Public telephone line for 203,456,005 populations:

- | | |
|-----------------------------------|-----------|
| 1. The number of telephone kiosks | 228,862 |
| 2. The number of telephone booths | 345,307 |
| 3. Telephone patrons | 6,304,797 |

Internet:

- | | |
|--------------------------------------|---|
| 1. Internet service providers | 40 |
| 2. General Access Speed rate of ISPs | 15 KPBS |
| 3. Patrons of ISPs | 511,000 with 1,980,000 users (1 in 1% of the Indonesian population) |
4. The internet users comprise of 42% for commerce, 30% for higher education, 21% for government, 6% for research institution, and 1% for non-government offices.
 5. The users of internet based on their profession can be divided into: students 39%, workers 22%, managers 17%, assistant managers 5%, professionals 5 %, directors 4%, entrepreneurs 3%, and others 5%.
 6. The users of internet based on their educational background are: elementary school/junior secondary school 2%, secondary school 41%, college graduates 9%, undergraduates 43%, and graduates 5%. (Ministry of National Education, 2003).

In the application of ICT internet plays an important role. Internet is a large collection of computers in networks that are tied together that many users can share their vast resources (William, 1999). Internet is a set of computers that are connected each other that make them possible to send and receive messages in the form of text, graphics and sound worldwide. According to Kitao (1998), there are more than 15 million computers over the world connected to the internet and the number will increase 20% each year. Thus, internet is an effective medium of communication that teachers and learners can utilize as a mode of teaching-learning process.

Today internet has been utilized in almost every aspect of human life including in education. To apply the internet in education it needs the development of instructional courseware. The applications of internet in education are in the forms of: 1) Electronic mail, i.e., delivery of courses, sending in assignments, getting and giving feedback, and using electronic discussion group, 2) Bulletin boards, 3) Downloading of course materials or tutorials, 4) Interactive tutorial on the Web, and 5) Interactive conferencing using Multi-users Object Oriented (MOO) systems or Internet Relay Chat.

So far, there is no comprehensive data on the use of internet in Indonesian education available. We can assume, however, that the number of internet users increases every year. In 2003 the internet users in Indonesia are estimated to achieve 3 millions customers and the potential customers are 10 millions.

A case study has been conducted to collect data regarding the feasibility of the use of internet for education in Jakarta (the capital city of Indonesia) and its satellite cities. The data indicated that to some extent the utilization of internet in Indonesia is still limited to those who come from the middle socio-economic (SE) status family or higher that live in urban areas. This is due to the reality that using internet needs cost that only those from that particular SE status can afford to do that. The unit cost for using internet ranges from 50,000 to more 200,000 rupiahs (Siahaan, 2001b). This means unless the government provides the internet the opportunity to use the internet among the SSS students in Jakarta and its satellite regions will be unequal or limited to those from a certain level of SE status.

According to Hardono (2002), in the attempt to increase the equal opportunity to utilize internet PT Pos Indonesia provide the community with internet that they can access in 116 cities over the country. In addition, there is also a huge number of what so called *Warung Internet*, i.e., internet kiosks in every city that allow the local community who need to access information by using internet. There are also ICT centers (cyber-net) or computer laboratories in big universities that facilitate the students for accessing information through internets. This has increase the community's internet or ICT literate.

Directorate General of Primary and Secondary Education, Ministry of National Education, in the year of 2000 collaborated with the Indonesian Internet Providers Association has launched a program of SMU 2000. The program deals with providing the senior secondary school teachers and students with the internet services through which they can access information worldwide. The main regards of this program is to improve the quality of human resources particularly related to decreasing the number ICT illiterate among the senior secondary school teachers and students. Today the program has been extended to cover primary school, junior secondary school, and vocational high school teachers and students.

E-Learning Program in Indonesia

E-learning program in Indonesia has been developed under the umbrella of *Program Telematika Pendidikan* or e-education program. It is actually the utilization of all kind of technology for communication for creating, managing and distributing information. E-education is basically relates to the utilization of communication and information technology and media, such as computer, internet, telephone, television, radio, and audio-visual aids in education.

E-learning is defined by some experts in two ways. First, it includes all kind s of the utilization of ICT in instruction. Second, it is limited to the use of intranet and

internet in teaching-learning process. When we use the first definition there are some programs of e-learning that have been developed and been implemented in Indonesia especially at secondary education and tertiary education levels. At secondary education level it has been developed learning materials in some subjects in the form of e-learning. At tertiary education levels there are some samples of the implementation of e-learning; among them are:

1. Online courses provided by Petra Christian University, Surabaya.
2. Online tutorials provided by Open University.
3. Joint research program in which the collaboration is undertaken involving four universities, i.e., Bandung Institute of Technology, Bogor Institute of Agriculture, Gadjah Mada University, and University of Diponegoro, was done through the utilization of ICT.
4. Electronic or digital library network which is the network of electronic library that involves some Indonesian universities' library supported by CIDA project, McGill University of Canada, and Indonesia's Institute of Science with regard to improving the quality of their graduates.
5. Computer assisted instruction (CAI) learning materials that have been developed by the Center for Information and Communication Technologies for Education is the interactive learning materials by which the students can learn with minimum assistance from their teachers. By its nature CAI is off-line instruction program. However, it is potential for e-learning especially when it is uploaded in the website.

When we use the second definition of e-learning, however, it is an instructional content or learning experiences delivered or enabled by electronic devices mainly computers through internet. It also means that e-learning is an attempt to connect students and learning materials as well as resources from distance places through intranet and/or internet. In e-learning the interaction can be undertaken either with synchronous (direct) or asynchronous (indirect) one. As mentioned earlier, internet is a set of computers that are connected each other that make them possible to send and receive messages in the form of text, graphics and sound worldwide. In this context, internet is the important media through which e-learning is implemented.

In regard to making the implementation of e-learning in Indonesia is more extensive several efforts have been undertaken. Among the efforts that are closely correspond to e-learning development program are the development of software in Indonesian language, APEC Cyber Education Network (ACEN) and millennium internet road show 2001 (MIR 2001).

Until 2002 the Office for Research and Application of Technologies has developed Win BI (Widows in Indonesian Language) and Kantaya (Virtual Office). ACEN has also been developed by Office of Research and Development with regard to decreasing the skill gap between the Indonesian high school teachers and their colleagues from the APEC countries in using multimedia-based education. In regard to enhancing the community's awareness of the benefit from internet some private companies and Association of the Indonesian Internet Providers undertook a road

show supported by mass media of communication, local government and the network of school information.

In order to make the application of e-learning is effective there are five factors that we should take into consideration. The five factors are:

1. Learner. The system of e-learning should meet the learners' characteristics and needs.
2. Learning materials. The learning materials should be designed in the form of individual instruction in such a way every learner is capable of conducting self learning.
3. Learning atmosphere. In the application of e-learning the presence of teacher is minimized but the teachers should create the learning atmosphere that is conducive for the learners to learn.
4. Technology. Technology plays an important role in e-learning. When this is applied every part of information and communication technology, such as telephone line, personal computers with certain specifications, audio broadcasting and interactive multimedia should meet the needs to support the e-learning system.

E-learning is applied in education in three ways, i.e., as a supplement, as a complement, and as a substitute.

1. When teaching-learning process is undertaken in regular classroom and every student is free to decide whether or not he/she would take e-learning program for enrichment this means that the function of e-learning is as a supplement for teaching.
2. When teaching-learning process is undertaken in regular classroom and every student is mandated to take e-learning program to complement it, such as for enrichment, remedial teaching, doing assignment, etc., otherwise it will affect in his/her capability and/or grade this means that the function of e-learning is as a complement for teaching.
3. When the teacher undertakes the teaching-learning process through internet instead of the regular one in a classroom this means the function of e-learning is as a substitute for regular teaching-learning process. The learning material, assignment, assessment, and the result of the assignment can be accessed by the students through internet. This also means that e-learning is treated as a mode of instruction substituting the regular one in which teaching-learning process occurs in a classroom and by direct face-to-face contact between teacher and students.

There are some advantages of the application of e-learning in education. Among them are:

1. Enhancing interactivity. In a conventional teaching-learning process sometime we find the students who are reluctant or are unable to ask question to the teacher or undertake discussion in the classroom due to limited opportunity or some other personal reason. Through e-learning the process of teaching-learning is carried out through an electronic media in such a way the students have more time and opportunity, and feel free to ask question and/or to conduct discussion.

Thus, if this is designed properly it will enhance the interactivity of teaching-learning process.

2. More flexible. In e-learning, learning material, assignment, and evaluation are uploaded in the internet and/or website. This way will make the students easier to access them anytime from anyplace where they can use internet. They also can submit the assignment that has been done, take examination and get information on the grade in a particular subject through the internet. This means that the application of e-learning increases the flexibility of teaching-learning process.
3. Increasing the audience target population. Teaching-learning process applying e-learning will not be limited by classroom walls. This also enables the learner to undertake the teaching-learning process more flexibly in such the way the number of learners is potentially unlimited. Thus, the audience target population can be increased.
4. Easier to update the content. The content learning in the application of e-learning is designed for being uploaded in a website. This way makes the designer or in this case the teacher to update it periodically and/or whenever needed. Thus, the application of e-learning gives the students an additional advantage, i.e., updated content of learning.

In order to make e-learning is applicable in education it needs to provide infrastructures. The infrastructures are telephone line and personal computers (PCs) with external or internal modem. It also needs that every teacher and learner is capable of utilizing them in a more effective manner. The teachers need them for giving service to the students in facilitating them to learn whereas every student needs them to undertake learning, such as accessing the content, doing question-answer and discussion, accessing assignment and submitting its result, doing examination, and getting information on its results anytime they need to do. The coverage and the quality of the infrastructure, particularly the PCs, should meet a certain quality standard that make them possible to do speed access to all information needed the application of e-learning.

The implementation of e-learning in Indonesian education have been started in 2002 when the Center for Information and Communication Technologies for Education in collaboration with the Directorate of Secondary Education and Directorate of Vocational Education was developing e-learning under e-education program. The development and the implementation of the program also involved the Indonesian Telecommunication Company, Office of Research and Application of Technologies, Association of the Indonesian Internet Providers, Network of School Information, Detik.Com, and ICT Watch. At the preliminary stage, learning materials of mathematics, physics, chemistry, biology, electronics and information technology for Senior Secondary School and Vocational School have been developed. At tertiary education level, as mentioned earlier, e-learning has been implemented by the Open University in the form of online tutorials.

In the school year of 2002/2003, Ministry of National Education started piloting open senior secondary schools by using e-learning as the mode of its delivery system.

There are seven districts in six provinces that the government involves in piloting of the open SSS. The district of Bogor in West Java Province, Pematang in Java Province, Benkalis in Riau, Surabaya and Malang in East Java, Samarinda in East Kalimantan, and Pangkep in South Sulawesi are those involved in pilot project. In this pilot project e-learning is treated as the supplement for printed material in the form of modular instruction.

Vocational schools have started implementing e-learning in 2002. According to the Director of Vocational Education under Ministry of National Education it is targeted within 5 years every vocational school has been connected by e-learning networking system. In order to support the achievement of this target within three years every vocational school teacher is mandated to take training on the use of ICT, and every school should provide the students with the 90 minutes per week subject of ICT.

There are some constraints in the implementation of e-learning in Indonesia namely those related to the government policy, the infrastructure, the curriculum, the financial aspect, and the human resources (Yuheti 2003). On the policy constraint, there is no national policy that facilitates the implementation of e-learning, mainly related to its regulation, budget, infrastructure, human resources, etc. Related to the infrastructure constraint is characterized by:

- 1) Unequal distribution of ICT facilities all over the country, e.g.:
 - Lack of investment to develop the telecommunication infrastructure.
 - Low density; overall 3% or 3 telephones per 100 people of Indonesia.
 - Most lines are still concentrated in the cities; most rural areas are not reached yet.
 - The majority of the populations do not have access to telephone lines and to information.
- 2) Lack of backbone with sufficient bandwidth, e.g.:
 - Internet bandwidth for international is 670 Mbps, outgoing 170 Mbps and Incoming 500 Mbps.
 - Local bandwidth (Indonesia Internet Exchange or IIX) is 231 Mbps peak.
 - Physical connection in IIX is 2.5 Gigabit (2450 Mbps).
- 3) Limited access to ICT facilities, e.g.:
 - Public internet kiosks: 43%
 - Offices: 41%
 - Residential: 12%
 - Campuses: 3%
 - Schools: 1%
 - The projection of internet users in 2003 is 10 millions people (2% from 200 millions people of Indonesia).

So far e-learning has not been integrated in the national curriculum. This means that the integration of e-learning to education has not been constructed yet. In terms of finance, the main constraint is the low budget provided by the government for education. Indonesia with more than 200 millions people and more than 13.000 islands needs a lot of financial support from any possible sources (i.e. central and local government, private sectors, international donor/agency). At the school level,

the financial constrain makes it difficult to invest in the procurement of hardware and software, maintenance, and the other operational costs. In term of human resources, the constraints are due to the limited number of teachers who are computer literate and the limited number of qualified personnel.

In regard to making the implementation of e-learning more extensive the government through Ministry of National Education is developing a master plan of the use of ICT in education which includes the implementation of e-learning in education. The master plan covers six aspects, i.e., hardware, connectivity, human resource, content, curriculum and policy. It is expected that in the near future the implementation of e-learning in the Indonesian education will be more extensive particularly with the main regards to increasing access and improving the quality of education.

Conclusions

Indonesia has given a great concern in implementing the program of e-learning under the umbrella program of *Telematika Pendidikan* or e-education which by its nature is the utilization of all kind of ICT in education. The implementation of e-learning in Indonesian education is either as a supplement, as a complement, or as a substitute for regular teaching-learning process. To date some subjects of the senior secondary school and vocational school curriculum have been developed in the form of e-learning. In the near future this will be expanded to some subjects of the junior secondary school curriculum. At the tertiary education level, there are some universities that have implemented e-learning especially as supplement for their regular teaching-learning process. In regard to extend the access into schools Ministry of National Education have been piloting Open Senior Secondary School in seven districts of six provinces by implementing e-learning. The constraints in the implementation of e-learning in Indonesia are related to the government policy, the infrastructure, the curriculum, the financial aspect, and the human resource. In regard to making the implementation of e-learning is more extensive the government is developing a master plan of the use of ICT including e-learning in education.

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