

EDUCATIONAL TECHNOLOGY AND SYSTEMIC CHANGE IN EDUCATION

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Introduction

Human resources development has been decided as one of the foci of the second long term development plan in Indonesia. Education, in broadest sense, is the major human resources development. Education should not be conceived as mainly being the responsibility of formalized institutions such as schools, colleges, universities etc. Education takes place also in home environment and the social environment of the learners. This is especially true in the globalization era, where information is readily available regardless of its values.

During the previous 25 years development plan, the Indonesian educational system has made a substantial gains quantitatively. Universal access to primary school has virtually been achieved ; nearly all children between the age of 7 and 12 in Indonesia comprising a total number of more than 28 million children- have acquired access to six years primary education. The present foci of development in the schooling is to increase the basic educational requirement to nine years, and is called Universal Nine-years Basic Education (UBE). The UBE is considered as the necessary foundation in meeting the primary development goal of the creation of a broad based, skilled, flexible and technology-literate workforce.

It is generally agreeable that for the realization of the goal of education it will be necessary to have a program that starts with basic education and then looks beyond it to a cross sectoral initiative that deals with lifelong learning, vocational education and training at all levels, from initial training to in-service provision.

The primary concern in providing the education is on the provision of learning opportunity for every citizen by making available a wide variety of learning resources and techniques. Considering the socioeconomic-cultural diversity and the geographic conditions, the Indonesians must have the opportunity to choose from a broad menu of learning opportunities. In providing these opportunities, one has to seeks and create tools and techniques which are beyond the traditional way of thinking and doing. These tools and techniques are known as educational technology.

The Educational Technology Development

The fundamental concept of educational technology is to enable learners to learn optimally by the development and utilization of various learning resources that is suitable with their

conditions and environments. This concept entails the new challenges posed by a rapidly changing world. These challenges according to The International Commission on Education for the Twenty-first Century (1996) requires the development of the four pillars of the foundations of education to meet the requirement of learning throughout life. Those pillars are : learning to be, learning to know, learning to do, and learning to live together in harmony.

The application of educational technology concept varies according to the needs and the available resources. The initial development of educational technology was associated with audiovisual media. The First Five Year Development Plan decided in 1969 had stated the utilization of radio broadcasting for improving the quality of education. A number of feasibility studies and pilot projects were organized, and after being evaluated it was decided that radio broadcasting was best to be used for enhancing teachers' upgrading program in 11 of 26 [then] provinces.

This project is still in operation now, covering 17 provinces with around 300.000 participating teachers. In 1972 the media paradigm were beginning to be challenged. A project called IMPACT or known in Indonesia as PAMONG was launched for providing primary education for children in the rural and/or isolated areas. IMPACT (Instruction Managed by PArnts Community and Teachers) was designed, planned, developed, implemented by using instructional materials for small group learning or peer learning. This project is a respond to rapidly growing school enrollments and limited educational resources. The project was evaluated over several-year period and were determined to be effective and cost-efficient (Nielsen and Barnard,1983).

The launching of Indonesia's satellite domestic in 1976 provide a real challenge for education to use it. It was only in 1979 that with USAID's Rural Satellite Project assistance a project for using satellite technology for education was launched. The project, called SISDIKSAT (educational system by satellite) have been linking 10 Universities in the Eastern islands for sharing courses and resource materials.

To cater for the needs of adults who have no formal education during their childhood, a special program called PAKET A (basic functional literacy package) was introduced in 1978. This package is consisting 100 booklets divided into three series. First series of 20 booklets consist lessons in basic reading, writing, arithmetic, and Indonesian languages. Second series is comprising advanced readings and contains additional basic knowledge and skills concerning various aspects of life. Third series provide wider and more specific aspects of various areas of life.

The expected participation of this program in 1997 is 8,000,000 adults (17 years old and over). A pilot project of compensatory schooling for 12-17 years old children who cannot attend regular schools because of social-economic, and geographical constraints was introduced in 1979. The project is called SMP TERBUKA (open junior high school). The success of this project leads

the dissemination to 59 locations in 1992 with approximately 10,000 students. It is projected that by the year 2000 more than 3,000 sites to be operational with half a million students enrolled.

The need for access to higher education was felt strongly in PELITA III. A workshop on distance learning in higher education was organized in 1982 with the cooperation of the East-West Center and attended by representatives from several Open University operators. The workshop recommendation was used as a base for preparing the establishment of Indonesian open university. The Indonesian Open University (Universitas Terbuka = UT) was inaugurated in 1984. Currently UT is running three levels of distance learning : bachelor's level in eight program studies; diploma level in seven program studies; and certificate level in three subject.

All of those programs were made possible with the availability of trained and skilled personnel in the field of educational technology. When the PELITA I was started in 1969, there were only less than a handfull professionally trained personnel available. Therefore the first priority undertaken is personnel training. Training of six key personnel was done at the ABC (Australian Broadcasting Commission) in cooperation with McQuarie University, with funds provided by the Australian Government.

Immediately after the trainees finishes their training abroad, a series of in-country training programs were organized with the cooperation of IKIP Jakarta (Institute of Teaching and Educational Sciences) and RRI (Radio Republic Indonesia) with technical assistance from UNDP/UNESCO.

Academic training program was started in 1974 with scholarships provided by the USAID. Six key staff were sent to the US for Master's Degree in Educational Technology. In country academic training was started upon their return; an undergraduate program in Educational Technology was offered for the first time at IKIP Jakarta in 1976. A major project of training funded by the USAID was launched in 1977 by sending 20 Indonesian to Syracuse University for graduate study in Educational Technology. Syracuse University is also providing four teaching staff to work in Indonesia to initiate graduate level education in the field. Additional grants and technical assistance provided by the USAID under a project called Educational Communication Development Project was carried out by the Academy of Educational Development in cooperation with the University of Southern California. More then 50 graduate scholarships were provided under so called sandwich program.

Academic training in Educational Technology is currently offered by 19 IKIP's (public and private). Master's Degree and Doctoral Degree programs are offered at IKIP Jakarta and IKIP Malang. Total graduates at all levels so far are approximately 4,000 working in all sectors of education and training, be it public, private, business and armed forces. In all of those institutionalized educational technology programs mentioned previously, there are educational technologist in service; most of them are in the leading or key positions.

The phenomenal development and use of information and communication technologies, has set in motion a worldwide process of transformation of society. All aspect of live, and especially education, are increasingly affected by these development. Information networking and multimedia presentation are offering potentials and at the same time challenging not only educators but also many of us in other sector of development. In the field of education these challenges could not be overcome by educational technologist alone. It requires a comprehensive and interdisciplinary approach.

While in many parts of Indonesia the older technologies such as radio, television and electricity are not easily accessible, we have to prepare ourselves with the newer technologies in order to be able to survive in the global challenge. Within a few days a new satellite (Cakrawarta I) with direct broadcast capability will be launched and operated in Indonesia. A special channel is to be devoted for educational purposes. A major program called NUSANTARA 21 was recently inaugurated by President Soeharto, as the Indonesian response to the globalization of information.

Systemic Change in Education

The first systematic analysis of educational system in Indonesia was done in 1968 through a project called the National Assessment of Education. The assessment was used as the bases for the First Development Plan (PELITA I) started in April 1969. One of the mayor recommendation of the assessment was that to improve the educational system, one should start from the qualitative aspect of primary education. This should be done by revising the existing curriculum, upgrading all primary school teachers and supervisors using educational radio broadcasting, providing textbooks and learning materials for teachers after they are being upgraded, and reinforcing the school supervision.

It should be noted that the strategy recommended for educational reform was still using the traditional school paradigm. The radio component is just an additional input to the existing system, or modifying a part of the system's component. What is meant by systemic change is essentially a paradigm shift, which entails replacing the whole thing, which requires fundamental changes in other aspects of learning. According to Reigeluth (1995) a systemic change will include the nature of learning experiences, the instructional system that implements those learning experiences, the administrative system that support the instructional system, and the governance system that governs the whole educational system.

All of the mediated and open learning program mentioned previously, are in way a form of systemic change in education, although it is not as revolutionary as suggested by Reigeluth. Those concept of learning are based on the following characteristics: 1) it is based on the attainment of learning objectives as compared to the traditional time-based learning objectives achievement; 2) teachers (to be called tutors or facilitators) are not dispensing knowledge, but

facilitating and managing learning (assuring that learning is to happen); 3) learning does not depend on teachers, but on a variety of resources which are either specially designed and developed or using whatever is available from the environment, and 4) learning activities are organized cooperatively instead of competitively.

It should be noted that conceptually there are differences between open and distance learning mode. Open Learning is a system that eases access to education by reducing and removing the barriers between the supplier and the client, that is between the learning institution and the learner. This is achieved by removing irrelevant requirements and by accepting all who wish to learn or be trained, in a variety of mode such as independent learning, cooperative learning or peer-learning. To assure the quality of learning and to provide measures for learning accreditation, learning structures and scheme including basic learning materials are usually being provided. Other sources of learning are identified and learners are free to choose whichever sources are accessible. These sources are to include human, environment, hardware, software, tools and techniques, and different form of printed materials.

Distance Learning is essentially the separation between the instructors and the learners. This is achieved by various means, mainly the use of print, but other media and the new-technologies such as radio, television, audio and video cassettes, CD-ROM, VCD, interactive tutorials, computer mediated interactions, and so on. Essential elements are eases of access, specially prepared materials and student support, usually achieved through face-to-face interactions. The frequency of these interactions will depend on level, age of the students, access, need, and the availability of tutors. Where it is available, student support can be enhanced through telephone, two-way radio, e-mail and the internet.

There is no one system of Open and Distance Learning. The model is flexible and appropriate to the pertaining circumstances. These circumstances relate to infrastructure, the availability of human support resources and learning materials. Media selection for subject matter will be determined by academic/training relevance and student access. This flexibility is reflected in the variety of Open and Distance Education initiatives around the world that provide basic, secondary, tertiary, continuing and adult education as well as vocational training. The system is used in the countries of the North and the South with models that vary from the most straight forward and simple to complex and sophisticated interactive multimedia courses.

Strategy for Development

The Indonesian education sector strategy is to develop a broad based educational system using available manpower and technological resources, in order to produced trained personnel and reducing the gaps between the socioeconomic advantages and disadvantages. At the same time greater efforts should be done for protecting the cultural heritages and preserving the national

resiliency by mass media campaign, to counter the invasion of alien programs. This broad based strategy requires a coherent and integral cross-sectoral planning and execution.

This broad-based strategy and cross-sectoral approach necessitate the participation and commitment of all relevant institutions, and a clear cut definition of responsibilities. It should also be assured the continuation of activities beyond the project phases, which meant that responsibilities, from the very beginning are to be given to institution(s) with functional and structural assignment.

The use of advanced technologies are not meant to be a revolutionary inputs to change the present educational system, but rather as a compensatory measures which could not be met by the traditional technologies. The technologies used should be built into a system, which is not only measured by its direct effect to the learners (such as introducing inquiry learning technique), but more important is its ability to improve other components in the system (such as improving the concept of learning management). It is in this way that the application of educational technology will provide an added value. As far as budgetary problem is concern, this system should not necessarily add financial burden for its sustainment, which meant that budgetary reallocation has to be decided. What should be put in mind is that the use of advanced technologies should not marginalized the less fortunate learners who have little of limited access to the technologies.

There is a wide choices of technologies to be selected. The safest criteria for technology selection is :

1. considering only technology which is already available, and not to create specific technology by itself
2. optimizing the use of available resources by involving and cooperating with all parties concern
3. less demanding in term of costs, time and effort
4. easier access and/or wider coverage of services
5. availability of in-house personnel with minimum foreign expertise.

Considering the magnitude of the problems to be solved, and the limited capability in solving it, it is recommended that priority areas be decided. Once the priority has been decided, the implementation is to be done in phases. The phasing is applied to coverage, audience and subject contents. As far as coverage is concern, the early stages is to be implemented in the area where necessary infrastructure is available. These earlier activities are to be considered also as an action research aiming at the development of a variety of instructional system models. This phasing will require a long term policy commitment.

The main feature of the phases are as follows:

1. Preliminary phase : to be started as soon as possible by studying what has been done and organizing feasibility study. The study will include but not limited to economics feasibility, social soundness analysis, and technical feasibility.

2. Preparatory phase : to be next, featuring institutional set-up, preparation of operational plan, initial training of trainers, research design, securing wider and stronger commitment and participation from related institutions, and pilot production for modelling and promotional purposes, specification of hardware and software, and curriculum development. Moral support from the leaders of development and profesional agencies in each likely participating organization are also necessary to be secured.
3. First year development which features the assignment of responsibility for each institution involved, beginning in-country training including users training, initial installation of instructional set-up for teachers and students for field testing, and initial generation of software and instructional materials
4. Second year of development : utilization of instructional programs, increasing the program content, and routinization of professional training.
5. Third year of development : continuation of previous year's activities, and studying possible extension of utilization
6. Fourth year of development : continuation of previous year's activities, and preparation for a new sites and additional content
7. Fifth year of development : continuation and enhancement of previous year's activities, and summatif evaluation of the project's activities. It is understood that formative evaluation is incorporated in any activities and phases.

What has been described here is an educational-led approach. Although in many cases, the workable approach is the technological-led one. It is expected that this paper with all of its shortcoming, could serve as a stimulating exercise and to be followed up with comments, discussion and suggestion for follow-up.

References

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