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<td><strong>Author(s)</strong></td>
<td>Naswil Idris</td>
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Indonesian Experience On Developments In Telecommunications Technology For Distance Education

By

Naswil Idris
INDONESIAN EXPERIENCE ON DEVELOPMENTS IN TELECOMMUNICATIONS TECHNOLOGY FOR DISTANCE EDUCATION

Prepared for

SEMINAR ON TRAINING NEEDS IN THE USE OF MEDIA FOR DISTANCE EDUCATION IN ASIA
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DR. NASWIL IDRIS
HEAD OF COMMUNICATION AND INTERAGENCY COOPERATION,
UNIVERSITAS TERBUKA,
JAKARTA, INDONESIA
INDONESIAN EXPERIENCE ON DEVELOPMENTS IN TELECOMMUNICATIONS TECHNOLOGY FOR DISTANCE EDUCATION

I. BACKGROUND

1. History of Distance Education in Indonesia

Distance education started in Indonesia in 1955 with the establishment of a correspondence course for the upgrading of teacher competences. This course was largely theoretical in nature with the production of correspondence materials, and formal paper and pencil examinations. The end result was a diploma which could be used for the advancement of the careers of teachers. Despite its success in attracting participants, the course was later abandoned due to lack of funds. However, distance education as correspondence education was firmly established in the people's mind.

In the early 1970's, another trend started with the introduction of educational technology. At that time, oil prices were still low and Indonesia was still contemplating how to expand primary education in a country with a GNP US $200. Two experimental programs were prepared to test the feasibility of using radio programs for primary education. It was first intended to use radio programs for direct teaching. In 1974, before the start of the program, oil prices went up, and the Government decided to use a substantial amount of the additional oil revenues for education, especially primary education. The experimental program was subsequently revised since the Government could now afford to expand primary education in the conventional way by building schools and hiring more teachers.

There was still a problem of ensuring quality education in a process of rapid expansion. Many primary school teachers already in service had only one to three years of training beyond primary education. They were in need of in-service training programs to upgrade the quality of their teaching. Therefore, an educational radio experiment was subsequently revised to be used for primary teacher in-service training. This experiment was successful, and later, expanded to 14 provinces. The concept of distance education as radio education was born. Agriculture extension programs and other nonformal education programs also followed this trend of educational broadcasting.
At about the same time another program, initiated by the South East Asian Ministers of Education Organization (SEAMBO) was developed. This program was based on the use of self-instructional materials in combination with teachers, parents, and community resources. This more sophisticated and innovative approach has taken a long time to mature. However, the concept of distance education as self-instruction was developed. A similar program was developed for secondary schools ("Development" school).

In the early 1980's, access to tertiary education became an important problem for the Government. The number of new places at the tertiary level fell far short of the demand for those places. Hundreds of thousands of applicants could not enter decent government or private higher education institutions each year. In 1983 the government decided to establish an open university. The Universitas Terbuka was formally opened by President Soeharto on the 4th of September 1984. This university incorporated all previous experiences and new innovations, such as correspondence education, self-instructional materials (including kits), radio and television programs. The concept of multimedia distance education was born. This concept was supplemented with community resources (library, tutorials) and computer scored examinations.

Currently another experiment is planned, in which the Institute for Teacher Training (IKIP) in Jakarta will use self-instructional materials of the Universitas Terbuka to introduce an in-campus-off-campus teaching program. The off-campus teaching can use the Universitas Terbuka self instructionnal materials, and the on-campus teaching will use regular face-to-face teaching. The aim of the experiment is to reduce the cost per student, and to enable IKIP Jakarta to take in more students. If successful, this effort will blur the difference between "distance" and "regular" education, since both will be using the same delivery systems, but with a different mix. Thus, a more convergent concept of distance and regular education will hopefully be accepted emerge.

2. National Development and Distance Education

Indonesia's present population growth is estimated at 2.1% annually, which is still high for a population of 169 million. Assuming that family planning could reduce the population growth to 2%, the population still will double in 35 years. With such increases in
population growth and a slow growth in the economy, the prospect of a high economic growth rate like the one Indonesia experienced between 1974 - 1984 does not look too promising. Employment has been a continuing problem for the last few years. The baby boom generation of 15 years ago is entering the labour market. Sixty seven percent of the population lives in 7 percent of the over populated islands of Java and Bali. An estimated 24% of the population lives below the poverty line. In spite of spectacular progress in education, 88% of the work force has only primary education and therefore does not qualify for skilled jobs. For each two openings there are ten applicants, but only one has the necessary qualifications. It is in this development of human resources that distance education should have an impact.

In primary education and in nonformal education such as agricultural extension, nutrition and health education, the impact already has been felt. The Government has established a domestic satellite system linking all the islands together. One of the two most important purposes of the system is educational broadcasting and telecommunication. The system has been used for many types of informal and ad-hoc instruction, mediated by radio and television broadcasts. However, solid continuous use of the media for instruction, is still rare. The reason, perhaps, is simple: developing good instructional programs for radio, and especially television is difficult and relatively expensive. However, with the introduction of study programs in educational technology at various teacher training institutions the know-how for developing instructional programs is being developed.

Thus, the infrastructure for developing distance education on a large scale already exists: hardware, know-how, and experience. It is up to the Government to use this potential to the fullest. Much interest in distance education has already been awakened by existing distance education programs, but sceptics still refer to inadequacies of distance instruction to teach skills. A solid program to teach skills should be developed to show that skills could also be developed in the framework of distance education. The diametrical opposition between distance and face-to-face education should disappear to enable distance education to flourish. Decision makers should understand that distance education should, and could, have elements of face-to-face and hands-on experience, if necessary.

Distance education is particularly useful for developing countries. It can reach employed people who are in need of upgrading their skills and knowledge, and people who live far from educational institutions
who otherwise could not have access to education. It could do so with less cost if applied on a sufficiently large scale.

Apart from providing skills, distance education could also provide larger access to educational institutions to meet the demand for more education. For purposes of national stability distance education could also be helpful.

Distance education could be used extensively to help a nation develop its national resiliency. Nutrition, health, home economics, home industry, agriculture, hobbies, child nursing, and many other daily life activities could be enriched by distance education. These kinds of efforts are already apparent in many radio and television programs.

In short, if human resources must be developed on a mass scale using the most cost-effective means, distance education is the answer.
II. UNIVERSITAS TERBUKA (UT)

1. The Establishment of Universitas Terbuka

Universitas Terbuka is the Indonesian name for Open University. Since there are already some open universities in the Asian Region and in other parts of the world, it should best be called by the original name to distinguish the Indonesian institution from similar institutions in other parts of the world. Thailand has the Sukhothai Thammathirat Open University and India the Indira Gandhi Open University.

In 1981, the government started two distance education projects which later formed a part of the Universitas Terbuka. The two projects were intended to give in-service training to teachers of secondary and tertiary level institutions. In the 1950's the government also created correspondence education to upgrade teachers already in service. The link between distance education and teacher in-service training was not accidental, since the need for rapid expansion required the Government of Indonesia to establish "crash programs" for teacher training in order to keep up with the demand for additional teachers. There were subsequent needs for upgrading the skills of those teachers, which could only be met with distance education, since regular training was too expensive, and replacing the teachers for further training was difficult to do.

The decision to start the Universitas Terbuka came in late 1983, after some Government hesitation to establish an unconventional university for fear of low quality performance. In the meantime, the continued demand for university places and the slow increase of intake at the regular universities made postponement of the Universitas Terbuka impossible.

2. The Instructional System of Universitas Terbuka

The Universitas Terbuka decided to use print materials as its primary instructional delivery system. All content of the courses, as far as possible, should be put into print format. Other media should be used as a complement to printed materials. Certain course content such as language pronunciation could be delivered only by audio cassettes. In such cases, the only alternative was to use the appropriate media.
The reason for using print materials as the primary medium was the low price and the relatively simple process to produce. The short preparation time and limited resources available made this decision necessary.

After two years of operation the Universitas Terbuka tried to introduce more materials in other media, especially for the transmission of practical skills, such as practice teaching and science laboratory skills. It remains to be seen how this effort will succeed in the future.

3. Management of a Network

The nature of the Universitas Terbuka organization is a network of participating institutions. Some participating institutions are serving Universitas Terbuka within the limits of their major responsibilities. The post-office is an example of such an institution. Other institutions must go beyond their major responsibilities to assist Universitas Terbuka. Such institutions are the regular universities, which give some of their staff and facilities to help Universitas Terbuka function. It is with the latter type of institutions that careful relationships were established. The regular universities did not receive overhead payments from Universitas Terbuka. The only material advantage of having Universitas Terbuka's Regional Offices within their campuses was the opportunity for their staff to earn extra income.

The institutions involved in the operations of the Universitas Terbuka were:

(1) the central office of the Universitas Terbuka which determined plans and policies, develop and produce course materials and examinations, and process student's data,

(2) the 32 Regional Offices of the Universitas Terbuka located in 32 universities which were responsible for the tutorials, student services and the supervision of examinations,

(3) the Post-Offices, which accept registration and fees, and distribute course and examination materials,

(4) TVRI (the National Television Network), RRI (the National Radio
Network) and private radio networks, which broadcasted courses and other information to students,

(5) the Center of Communication Technology for Education and Culture, which produced radio and television programs,

(6) newspapers and magazines which report useful news and other information to students,

(7) the Indonesian Public Telecommunication Corporation (Perumtel) and Telecommunication Industry (INTI) which assist the Universitas Terbuka in building telephone, telex, computer, and SSB radio networks, and Public Package Data Communication System (SDKP).

(8) the provincial and local governments which facilitate the operations of the Universitas Terbuka and in some cases, also gave additional funding,

(9) the Regional Offices of the Ministry of Education and Culture which facilitate the use of schools for tutorials, examinations and laboratory work,

(10) the Center for Library Development and the Provincial Libraries which provide library facilities to students,

(11) the Computer Science Center of the University of Indonesia which train Universitas Terbuka staff and operate the Universitas Terbuka Computer during the first years of operation,

(12) INDOSAT (Indonesian Satellite Company), for International micro computer network,

(13) CoSy (Conference System) Canada, for Project Share (Satellite for Health and rural education).

Managing such a diverse network requires frequent meetings and constant communications between the central office and the participants of the network. Informal agreements are as important as formal ones. Since speed of decisions is crucial, special staff members are assigned to keep the communication channels open.
The most important relationships are between the Central Office and the Regional Offices or between the Universitas Terbuka and the participating universities. In these cases the authority on some important matters such as the determination of who should be the officers of the Regional Office, rest with the Rectors of the Universities involved. Matters related to the administration and operation of the Regional Centers are also supervised by the Rectors. Within very broad guidelines, the Regional Offices have enough autonomy to implement the guidelines in their region. With this autonomy the Regional Offices are able to respond adequately to specific challenges in the operation of the Universitas Terbuka in their respective regions. This autonomy has caused some problems of consistency between national directives and regional implementation, however, those problems are minor in comparison with the benefit the regional autonomy has brought.
III. IMPORTANCE OF TELECOMMUNICATION FOR DISTANCE EDUCATION IN INDONESIA

1. Physical and Geographic Constraints and Telecommunication need.

Consisting of 13,677 islands, of which 992 are inhabited, the Indonesian archipelago sprawls along the equator for more than 5,110 kilometers, a distance almost equal to that of the United States of America from its west to east coast. With a total land area of 1,904,345 square kilometers and population of 160 million people, Indonesia ranks fifth in population among all countries of the world after China, India, the USSR and the United States. The 160 million inhabitants are spread throughout 50 thousand villages and cities. Some 80% of the population dwell in rural areas; the rest reside in the urban areas of Java, Sumatera, Kalimantan, Nusatenggara, Maluku and Irian Jaya.

The population density of Java is approximately 750 per square kilometer, as opposed to approximately 84 per square kilometer for the rest of the country. Indonesia is rich in mineral deposits such as oil, tin, copper, nickel and coal while its fertile soil produces an abundance of agricultural and forest products. To ensure that those potential resources of wealth can be exploited to the benefit of all and result in improvement in the standard of living of all, patterns of development have been set up.

In this development perspective, Indonesia has been pursuing the "Trilogy of Development," namely, the equalization (equity) of development and its results towards the materialization of social justice, the pursuit of a sufficiently high rate of economic growth and dynamic, as well as healthy, national stability. Equitable development is intended to ensure that all members of society, particularly the people at the grassroots level, are enjoying the fruits of the development throughout the country. To achieve this aim, efforts have been made through the equalizing of development in agriculture, in the business world, in regional development, in work opportunities, and in greater social services provision. Telecommunications, as an element of infrastructure, undoubtedly play an important role in providing greater services in this field.

Despite the great distances, terrain and geographical constraints, the telecommunications sector has made strenuous efforts to forge links between islands in order to provide necessary services throughout the country.
2. Indonesian Telecommunications Systems

There might be some questions as to why Indonesia decided to introduce a satellite communication system. The extension of the microwave system even further eastward faces the problem of wide spans of water between islands. An example is the attenuation and phase problems inherent with microwave transmission over long stretches of water. One particular link in the Eastern Microwave System, between Poncoronakah and Tanah Jampea, has a 170-km transmission path crossing the sea. This is perhaps one of the longest single microwave hops over water in the world.

Despite the fact that terrestrial facilities have been constructed in a large part of the country, high quality telecommunication services were still lacking in the remaining part. Dense forest, high mountains, rough terrain, swamps and wide spans of water posed obstacles to the extension of terrestrial transmission network. It was realized that it would require a long time to provide terrestrial links to all parts of Indonesia while the potential demand for telecommunications services is steadily increasing.

The inadequacy of service in some areas was so great that the private sector developed its own networks. At one time, there were some 17,000 HF and VHF terminals operating under concessions granted by telecommunications authority. There were not only expensive and inefficient in the national perspective but caused the disintegration of national telecommunications management. Additionally, the cost of operation and maintenance presented an extra burden to the owners of such private telecommunication networks. On the other hand, this rapid growth of private telecommunication networks validated the internationally accepted observation that a very close relationship exists between economic development and telecommunication services. Although the economic development is most prominent, telecommunications are also required to support the national development in a broader sense. In this context, development in the telecommunication sector is directed toward supporting the other sectors of development, and hence materializing the "Concept of Archipelago".

The need for telecommunication services required by national development and the consideration of the availability of existing facilities led to a conclusion that an integrated national telecommunications system should provide both high quality and high capacity for telephone, telegraph, telex, radio and television network. Moreover, the system should be able to reach simultaneously all important population centers throughout the archipelago, integrating them into a single national telecommunication network. Also, it should
have a short construction time and lower cost compared to wide frequency band terrestrial system.

In order to materialize the ideas of having such a telecommunication system which is capable of uniting the whole archipelago, first there had to be:

1. A fairly good atmosphere for development in general, that is, having support from the government and the people;
2. The capability of managing the telecommunication company which was assigned to carry out the development in telecommunication sector;
3. The courage to embark upon the programs of development which would lead to the materialization of those ideas and ideals.

The development of space communication technology shows advantages to meet all the requirements. Furthermore, it is, without a doubt, future-oriented.

The project implementation was initiated on February 15, 1975, and 18 months later, the system became operational on August 17, 1976, on the 31st Indonesia Independence Day. The system was named PALAPA, which symbolizes Indonesian unity. It is derived from "Gajah Mada Oath", the declaration of the 13th century Prime Minister of the Indonesian Empire, who said he would not eat fruit PALAPA until the country was united. PALAPA has certainly played an important role in the telecommunication of the country, at least from the national telecommunication concept point of view.

The PALAPA Domestic Satellite Communication System has grown dramatically since then. Some 133 ground stations are operational at the moment. Beyond this number, PALAPA, also serves quite number of ground station for specific purposes, such as for television distribution. Another interesting point with the PALAPA is its regional role. Some neighboring countries rent transponders of PALAPA and use them for domestic services. This, indeed, shows aspects of telecommunications development in Indonesia, that is, to strengthen regional cooperation.

Television plays an important role in the "Concept of Archipelago". Unity in politics, socio-cultural conditions, economy and defense and security can best be achieved if there are suitable means to transfer information. At the end of 1986, more than 6 million television sets were registered in the country. This number includes those in the remote places which are normally provided for on a sharing basis.

Bearing in mind the "Concept of Archipelago" and pursuing the "Trilogy of Development". The National Development and also the telecommunication development are directed toward the survival of the
nation by having national resilience. The development of telecommunications should lead to the increase of the strength of all aspects of national resilience.
IV. CURRENT TELECOMMUNICATION ACTIVITIES WITHIN THE UNIVERSITAS TERBUKA

All possible telecommunication channels presently available to communicate inexpensively with students and regional offices are being used by the Universitas Terbuka. Apart from the postal services which were already adequately covered in the previous section, the following illustrates the Universitas Terbuka’s telecommunication system.

1. SSB radio (Single Side Band Radio)

Even though SSB radio is not designed for educational purposes, the Indonesian Directoral General of Post and Telecommunication in cooperation with Telecommunication Industry have established a team to develop a special model of SSB radio for educational purposes.

At least two very remote areas, Riau island (Tanjung Pinang) and Luwuk in South Sulawesi, were identified for pilot projects. Each place has 150 students. Working with the Directorate for Radio Frequency Control and Perumtel, special orders have been given to the Telecommunication Industry to design and produce local SSB links that fit to the conditions in those remote areas.

The results have been very good. The quality for voice communication is very clear. The distance between Tanjung Pinang (Riau Island) and Pakan Baru where the tutor is located is more than 500 miles. This distance can be bridged by SSB nicely. The same results have been obtained between Ujung Pandang and Palopo in South Sulawesi.

2. Point to Point Links (Audio Teleconferencing)

In areas where telephone lines were excellent, a point to point communication using amplified telephone conversations were used for tutorials. At one end the tutor talked from a microphone attached to the telephone and at the other end students could receive clearly the voice of the tutor through a loudspeaker, a form of Audio Teleconferencing (ATC). The students could respond to the tutor using the same arrangements. Telephones were, of course, used frequently for transmitting urgent messages to regional centres. The cost of long distance telephone calls is still expensive in Indonesia compared to that of more developed countries. A special rate was arranged by Perumtel (Indonesian Telecommunication Company) for the point to point tutorial telephone conversations.

The voice transmission between the two sites uses Perumtel’s regular telephone network through the Palapa Satellite. To avoid
connection difficulties Perumtel arranged a dedicated line and controlled by each earth station.

UT in cooperation with Perumtel identified two locations in the very remote areas in Kalimantan and Sulawesi island for the ATC links. The first location is in Tarakan a small island close to Sabah Malaysia. 200 students from this area could communicate with their tutor in Samarinda, the nearest Regional Center, 700 miles away. The second location is in Luwuk Central Sulawesi. Tutors from Manado (close to the Philippines) served 120 students in Luwuk, 500 miles away.

Tutorials are usually scheduled in the evenings after office hours. In the beginning of the project, the participation of students was quite high especially for Social Sciences.

3. SISDIKSAT (Rural Satellite Project)

Telephone lines were also used for satellite communications between eleven Universities in the Eastern part of Indonesia and the Directorate General of Higher Education in Jakarta. The system is similar to audio teleconferencing in its ability to communicate with all twelve points at the same time. However, in addition to voice communication, the system is also able to present still pictures (Graphics) and facsimile. Universitas Terbuka is using the system to train tutors at all of the eleven sites.

Originally this system was designed for improving the quality of 11 (eleven) separated campuses spread over more than 1,600 miles in the Eastern part of Indonesia. Two dedicated telephone lines through Palapa Satellite are used. This system facilitates Audio Conferencing for campuses, document transmission (facsimile) such as outline of lectures, time schedule, very important modules, and administration documents, and Audio Graphics (so called teleblackboard) to allow full interaction between lecturers and students.

In 1986, a USAID Consultant initiated activities to improve the quality of audio graphics.

Aregon equipment for audio graphics was replaced by IBM Micro Computers (IBM Compatible). In cooperation with Universitas Terbuka, the USAID consultant conducted a micro computer demonstration in Ujung Pandang and Manado. The results were very good. Graphics and a Data was transferred clearly; much better than by the Aregon Graphics equipment. Now, based on this demonstration, Universitas Terbuka is interested in developing a micro computer network, (wide area network) for university administration and instruction.
4. Micro computer data communication.

Universitas Terbuka has a pressing need to establish a computerized data communication link between the head-quarters in Jakarta and 32 branch offices throughout Indonesia. This communication link will be used for student record keeping, testing, registration, instruction and UT internal management/administration for the UT's 150,000 students nationwide.

UT already has 2 years experience with pilot projects using micro computer data links in cooperation with Perumtel

(1) **Micro computer data link between UT office (Jakarta) and Ujung Pandang (one of the 32 branch offices).**

Equipped by micro computer and modem on both sides, Jakarta office and Ujung Pandang office could communicate by dialing-up ordinary telephone (via satellite). Perumtel charged UT around 5 thousand rupiah for a 3 minute long distance call. Data and graphics can be sent easily, but the transfer of data is easier during evening hours.

(2) **Micro computer data communication within Sisdiksat (Rural Satellite) systems.**

As mentioned before, micro computer links between Jakarta - Ujung Pandang and Jakarta - Manado were pilot tested with satisfactory results.

Special attempts have been made to extend this system to link the Universitas Terbuka office in a suburb of Jakarta to 32 branch offices through 11 campus studios. This is one of the ongoing projects which is supported by Perumtel.

(3) **Micro computer data communication through leased line telephone.**

In some rural area, UT students who worked for foreign company have access to leased line telephone (leased line telephone is Jakarta local telephone). One of them is in Soroako in the jungles of South Sulawesi. There are 200 students who take advantage of using Canadian mining company leased line telephone during weekends.

These students enjoy discussing printed material (modules) with the tutors in the Jakarta central office through a point-to-point link, without thinking about the cost of long distance call in Indonesia. Computer Graphics presentations are inserted during discussions.
(4) Project SHARE (Conference System)

The objectives of this Project are:

1) To establish a computer conference via satellite, for participants in universities in Indonesia and Canada.

2) To explore the use of computer telecommunication networks (computer conferencing) as a new medium to support various academic activities such as research, continuing education and project management.

3) To facilitate the interchange and evolution of ideas and information over a period of time between Indonesian and Canadian academic institutions in the areas of: biotechnology, medicine and computer networking.

4) To demonstrate the establishment of computer communications via satellite between an isolated community in Indonesia and project management centres in Indonesia and Canada.

5) To explore the feasibility of transfer of technology to Indonesia in this area as well as, joint development work.

6) To demonstrate the potential of improved communications and information flow among Indonesian institutions as a means of developing greater academic co-operation collectively and thereby, benefitting the students and communities that the institutions serve nationally.

(5) UniNet

Under the supervision of the Directorat of Higher Education, University of Indonesia in Jakarta is developing a micro computer network for 7 large universities including Universitas Terbuka. The network will be operationalized later this year.
V. CONCLUSION

The Universitas Terbuka is still a very young distance education institution. It is still encountering "growing pains". While the primary media is still printed study materials, the Universitas Terbuka fully realizes the importance and necessity of using a variety of telecommunication formats for all of its organizational functions. The experiments, demonstrations, and pilot projects using telecommunications and electronic media mentioned above represent a practical, experiential approach to determine the most efficient means of serving its students. This approach also solves another, very practical, purpose. It provides immediate solution to many of usual pressing problems facing an institution which is still in its infancy.

The Universitas Terbuka will continue to grow in size, and expand its programs. Growth and expansion necessitate even greater dependence on telecommunication and electronic media. Thus, it is clear that modern telecommunications technology is the key to a successful future for the Universitas Terbuka.