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**Introducing
Distance Education in Science and Technology
by offering Special Programs**

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**For presentation at the Regional Workshop on Development
of Science, Technology, and Outreach Courses by Distance
Education, Colombo, Sri Lanka, 19 - 23 September 1988**

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S u w a r d i

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Abstract

Indonesia started distance education at the tertiary level in 1984 when Universitas Terbuka (the Indonesian Open Learning University) was officially opened on September 4, 1984 by the President of the Republic of Indonesia

The Mathematics and Science Faculty of Universitas Terbuka offers at present one study program in Applied Statistics and one in Mathematics. In both study programs not any laboratory work is involved, because it is understood that laboratory work as part of a study program in distance education will imply a number of problems.

Two types of special programs are being identified which seem to look promising in introducing study programs by distance education which include courses in science and technology with the involvement of laboratory work.

One type of special programs arises from the need of upgrading a large number of employees like secondary school teachers and field consultants to farmers of the ministry of agriculture. Recently Universitas Terbuka and the Ministry of Agriculture started to study the feasibility of offering by distance education a program at the diploma level (a non-degree program of six semesters at a conventional university) for the upgrading of field consultants to farmers of the ministry of agriculture. A preliminary study indicates that the need for facilities for laboratory work and field practice as well as manpower for tutors and instructors can be provided for. The main problem in conducting the program might be the organizing of the laboratory work and field practice.

The second type of special programs is related to the demand from high school graduates for relatively short training in certain skills which might increase one's chances in getting job. Preparations are being made for studying the feasibility of offering so called certificate programs. These programs will be relatively short programs of three to five semesters. Programs in Biotechnology, Food Technology, Computer Applications and Electronics will be studied. These program might be divided into two parts, the first part comprising the course work and the second part consists of laboratory work and practical exercises. Successful completion of the course work can be made a prerequisite for taking the laboratory work and practical exercises. Students who have completed the course work successfully will receive a certificate, and after having completed the laboratory work and practical exercises successfully one will receive a second certificate.

If these kinds of programs can be conducted successfully, the time will then be ripe to develop degree programs in science and technology.

Background

Indonesia started distance education at the tertiary level in 1984 when Universitas Terbuka (the Indonesian Open Learning University) was officially opened on September 4, 1984 by the President of the Republic of Indonesia as the 45-th public university in Indonesia.

Universitas Terbuka has now four faculties (departements), the Mathematics and Science faculty, the faculty of Economics, the faculty of Sosial and Political Sciences, and the faculty of Education.

The Mathematics and Science faculty offers at present two study programs, one in Applied Statatistics and one in Mathematics. In

both study programs not any laboratory work is involved. It is understood that laboratory work as part of a study program in distance education will imply a number of problems. Arrangements with local universities and may be other institutions in the provinces can hopefully be made to utilize laboratory facilities. Yet in organizing the laboratory work for the students a number of considerations still have to be taken into account, like the number of students taking the laboratory work and the unit cost for different kinds of laboratory work.

Two types of special programs are being identified which seem to look promising in introducing study programs by distance education which include courses in science and technology with the involvement of laboratory work. One type of special programs arises from the need of upgrading a large number of employees like secondary school teachers and field consultants to farmers of the Ministry of Agriculture. The other type of special programs is related to the demand from high school graduates for relatively short training in certain skills which might increase one's chances in getting a job.

Study Program needed by Government Institutions

Since 1984 Universitas Terbuka has been offering degree and diploma programs for secondary school teachers. The teachers take

these programs while in service. The teachers in science taking these programs are at present required to have had the necessary laboratory work in one of the existing training centers which offer opportunities for secondary school teachers in science to get their training in laboratory work. But not all secondary school teachers in science can get the opportunity to get the required training. The faculty of education of Universitas Terbuka is developing science kits which are expected to enable those teachers to experiment and to teach themselves at least the fundamentals of the required laboratory work.

Recently Universitas Terbuka and the Ministry of Agriculture started to study the feasibility of offering a distance education program for field consultants to farmers of the ministry of agriculture.

The Ministry of Agriculture has more than 30,000 (thirty thousand) employees throughout Indonesia whose job is offering consultancy to farmers. Those employees have their educational background from a vocational school in agriculture at the secondary level. It is felt at present that the current development and the anticipated future development necessitates an upgrading of those field consultants for farmers up to what is called a diploma III level, which in a conventional way of face to

face educational system needs a tertiary level education during six semesters.

Two years ago ten academies were opened to offer the education needed for those field consultants. Each academy can enroll 30 to 60 new students each year. Thus 300 to 600 new students can be enrolled each year. That means that 50 to 100 years will be needed for the ten academies to deliver 30,000 graduates. It is recognized that distance education might be the only way to solve the problem of upgrading the 30,000 field consultants within reasonable time. It should be understood that 50 to 60 percent of the education of those field consultants consists of laboratory work and field practice. Universitas Terbuka cooperating with the Education and Training Division of the Ministry of Agriculture is doing preparatory work to design a distance education program which is hoped will meet the needs as mentioned above.

During the last week of the month June, 1988 a survey was carried out in 5 of the 27 provinces of Indonesia. The ministry of agriculture has in the capital cities of many provinces, among others; an agricultural information center, an agricultural training center for officials, a plantation training center, research centers for agriculture and research centers for plantations.

Many of those centers are fairly well equipped and have a sufficient number of qualified manpower. Several centers can be said to be very well equipped and to have a fairly large number of well qualified manpower. Also, land for doing experiments in farming is available.

The faculties (departments) of agriculture of the local universities are quite willing to assist the proposed program. It seems that the number of potential tutors and instructors is more than sufficient. Facilities for laboratory work and farming practice seem also to be adequate. The main problem to be particularly considered will be how to organize the laboratory work and farming practice, taking also into consideration that part of the students, who will be still in service, have their jobs in somewhat remote areas, while most facilities, tutors and instructors are mainly found in the capital cities of the provinces.

Nevertheless the parties involved are optimistic that a proper solution will be found to the above mentioned problems. Hopefully the diploma III program for agriculture field consultants can be started in the second half of next year. If the proposed program turns out to be successful, much valuable experience will be gained in conducting study programs which

require a fairly sound foundation based on science and technology by distance education.

Certificate Programs

The number of new students enrolled in most public as well as private universities in Indonesia is somewhat decreasing in the last two years, while the number of high school graduates seeking for relatively shorter term study programs or training shows an increasing trend. Many high school graduates might feel that enrolling in a university is insecure. They observe that only a low percentage of students are able to complete their study within the period of study designed for the study program, and that the drop out rate of students for many study programs is high. On the other hand, it is getting harder to get a job for university graduates, because it is getting highly competitive.

Universitas Terbuka just recently plans to start a study of the feasibility of designing short term programs of three to five semesters which might appeal to high school graduates. Students who successfully complete such a program will receive a certificate. The list of short term programs to be studied includes biotechnology, food technology, fermentation and destilation of natural products, computer applications and

electronics. Universitas Terbuka has gained some experience in designing and producing course material. That might not give any problem of great significance. But that kind of programs will only be of value if students get an adequate training in laboratory work or practical exercises. For this part Universitas Terbuka needs cooperation with local universities and other institutions. For certain programs the facilities in different centers of the ministry of agriculture might be proper to serve the needs of laboratory work or practical exercises. These type of programs might be designed in the following way. The program might be divided into two parts. One part consists solely of course work, and the other part consists solely of laboratory work and practical exercises. Only students who have successfully completed the course work are eligible to take the laboratory work and practical exercises. Students who successfully complete the course work will receive, let's say, Certificate A, and those who afterwards successfully complete the laboratory work and practical exercises will receive Certificate B.

Anticipating the Future

If special programs like those described in the two former sections can successfully be conducted much experience will be gained in organizing laboratory work and practical exercises. Not

only the open learning institution but society too will get confident that study programs involving laboratory work and practical exercises can really be conducted. The time will then be ripe to develop degree programs in science and technology by distance education.

In anticipating this future development the courses for the special programs should be designed such that credits achieved for those courses can at least partly be transferred to degree programs.

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