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DISTANCE TEACHING FOR AGRICULTURE

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1. THE POTENTIAL FOR DISTANCE TEACHING IN AGRICULTURE

1.1 Farmers and Continuing Education

Farmers would seem an obvious client group for distance education programmes. They are by far the largest occupational group in most Commonwealth countries; they are geographically dispersed; they have generally had less access to formal education than urban-based occupational groups; as they are self-employed it is usually impossible for them to attend residential training courses for more than a few days at a time; and they are increasingly faced with new challenges and opportunities which require knowledge and skills which they do not have. Many current trends in agricultural technology demand a considerable understanding of ecological processes and relationships before the need for them can be recognised or their potential realised on the farm. Numeracy and literacy skills are needed to make efficient and safe use of modern inputs. At the same time, agricultural extension agencies are looking for cost effective ways of bringing agricultural information and knowledge to farmers.

Open learning provision for farmers varies from formal courses for which farmers enrol, on completion of which they receive a certificate, to programmes which require no formal enrollment but still offer farmers opportunities to learn through distance teaching media. Providers of distance teaching include universities, government agricultural extension agencies and non-government organisations. Objectives vary also, from the provision of specific technical advice and information, to a broad education in the principles underlying agricultural practices. However, a specific objective of much of this continuing education provision in agriculture is to bring new technology to farmers. The intention is not to offer formal qualifications which farmers can use as a stepping stone away from active farming, but rather to enhance the efficiency and productivity of their farming.

If the ways in which distance teaching media are used for farmers' continuing education vary, so do the potential learners. In any area, there are farmers with different mixes of enterprise, different access to resources and varying priorities (as between subsistence and market production, for example, or between farming and non-farm sources of income). The content, level, treatment and media appropriate for some farmers will be entirely inappropriate for others. Institutions need therefore to base their provision on a good understanding of the circumstances and needs of different types of farmer. This calls for careful audience research and a readiness to adjust content and media to cater for particular educational needs. The Punjab Agricultural University in India recognised this after it launched its "Integrated Course in Agriculture" by correspondence in 1971, for farmers in Punjab States: it soon became apparent that the content did not really meet the circumstances of small scale and marginal farmers. A separate course was therefore started in 1976, focusing on small scale agricultural technology and on diversification.

Other Indian agricultural universities offer courses on specific enterprises, thus defining the potential learners by the crops they grow or the livestock they keep. Gujarat Agricultural University reported 5,000 sugar cane growers enrolled on a sugar cane course in 1984/85, and a further 2,000 farmers on a wheat production technology course.

The Punjab and Gujarat institutions are among six Indian universities offering formal continuing education courses by distance teaching for farmers. These courses use traditional correspondence methods, with specially prepared course units despatched to students, who complete and return written assignments for marking and comment. There is also usually provision for face to face contact with tutors and other students: in Punjab, for example, a "personal contact programme" is arranged at District level, when students have completed about half of the twelve lessons that usually make up a course, and then at the end of the course students have an opportunity to spend two days on the University campus.

Correspondence courses rely heavily on print media and therefore on literacy skills among their students, not only for presenting self study materials but also for the completion of student assignments. Farmers with low literacy skills are naturally at a disadvantage. INADES-formation (see below, 2.2) discourages non-literate farmers from enrolling on its courses, although some do manage to complete them by studying with groups of literate farmers. The Indian Agricultural Universities usually restrict enrollment to farmers who have completed a minimum period of formal schooling. As other educational technologies have become more widely available, farmers with little or no literacy skill have been brought within the scope of distance education provision.

In places where literacy levels are relatively high, printed media can be used for continuing education. When the Lesotho Distance Teaching Centre (LDTC) was preparing to establish its basic education programme for rural adults, it conducted an extensive survey of media access in rural communities. This showed poor reception for Radio Lesotho in many parts of the country (which is very mountainous) and a high proportion of rural adults who could read. Consequently printed material became the mainstay of the non-formal education work of LDTC - in particular, self study booklets on a range of practical topics from crochet to vegetable growing and the control of cattle diseases. Later research showed, however, that the booklets had not been as effective as had been hoped. This seemed to be because of the general difficulty of learning practical skills with no interaction with either trainer or other learners, rather than any difficulty in reading and understanding the material. LDTC therefore changed its distribution policy to one of encouraging use of the booklets by existing rural groups (women's groups, farmers' organisations, co-operatives, and so on) and then began to arrange training sessions for the leaders of these groups in how to make effective use of the materials in group study.

In most Commonwealth countries, however, literacy rates among farming populations are not particularly high. In these circumstances, radio often offers a realistic means of bringing distance education to the majority of farmers. Various approaches have been tried for combining the penetration and low cost of radio broadcasting with the structured approach to educational provision used in correspondence courses. This has often involved a group focus for radio listening, with broadcast material specially designed - and sequentially structured - for such groups, with some supporting print material and a feedback system. Three well tried models are the radio farm forum, the radio school (or "school on the air") and the radio learning group campaign.

Radio farm forums originated in Canada in the 1940s at a time when radios were not nearly as common (nor as cheap) as they are today. The basic idea was that groups of farmers would meet on a regular basis to listen to agricultural broadcasts, whose contents they would then discuss in relation

to situations in their own communities. The idea was to stimulate action to solve local community problems rather than to put across specific technical information about agriculture. As farms have got bigger, farmers better educated and radios more universal in Canada, the need for farm forums has vanished. The model has, however, been used in other Commonwealth countries.

A farm forum programme was begun in India in the 1950s on a local, experimental basis. At the end of the decade, a national project was launched, which reached its target of 15000 radio forums in 1966. Programmes are broadcast for the forum audience once or twice a week and are supplemented by visual aids and simple texts. Unlike the Canadian programme, the main purpose was to bring technical information to rural adults that could be applied in their homes and on their farms. Research in India in the 1970s showed that the agricultural knowledge of both literate and non-literate farmers in villages with farm forums was higher than that of farmers in villages without farm forums. The combination of regular access to agricultural information, group discussion, a structured sequence of content and feedback from farmers to broadcasters seems to have had a positive effect. Commonwealth countries in Africa with experience of farm forums include Malawi, Zambia and Ghana.

Farm forums have, however, declined in the Commonwealth in the past 15 years. A number of reasons have been suggested: the spread of individual radio ownership, a fall off in interest among group members after some months of regular meeting, the difficulty of maintaining regular production of good programmes with meager budgets, the lack of repair facilities for radios in rural areas and the expense of buying batteries. A recent initiative by the University of Ghana at Legon is reviving the model at a local level within the "Wonsuom" rural communication project, where listening clubs have been formed in 22 rural communities in the Central region. An important aspect of this project is that discussions within the clubs are recorded and material from these discussions used in subsequent broadcasts.

Radio schools offer a more structured learning opportunity than radio farm forums. They are widely used in Latin America for rural non-formal education, largely by non-government organisations. Listeners are encouraged to enrol on courses, which are then covered in a series of radio broadcasts. The amount of print material support varies, but radio remains the main medium. Group listening is a common feature of radio schools. Elements of the model have been used in Commonwealth countries. In India, for example, the Tamil Nadu Agricultural University runs a Radio Farm School on All India radio and has some 20,000 farmers registered for more than 30 courses.

Farm forums and radio schools reach relatively small numbers of farmers; and while they certainly attract farmers who would not enrol on correspondence courses, they probably leave out the less well educated, poorer members of the farming community. Radio learning group campaigns, on the other hand, specifically set out to encourage mass involvement. Such campaigns focus on a single topic, with carefully defined and restricted content; they run for a relatively short period of time (typically one to two months) during which large numbers of learning groups, led by volunteer leaders, meet to listen to and discuss a series of campaign radio broadcasts. The broadcasts and the supporting print material encourage discussion of the content in relation to local issues and are designed to promote action by group members to promote development activity in their community.

The undoubted success of the learning group campaign model in drawing large numbers of rural people into non-formal education programmes and in promoting learning and action rests on the careful preparation of materials and the long lead-in time for the recruitment and training of group leaders who then recruit their own group members. A common feature of these campaigns is a system for collecting, and responding to, feedback from the learning groups: group leaders complete a report form after each broadcast on which the group's reactions to discussion questions, and any questions they wish to put to the broadcasters, are sent in. One particular agricultural application of the model was the Botswana government's campaign in the late 1970s to explain, and canvass views on, a proposed major reform of land tenure relating to grazing land - "Lefatshe la Rona".

The main disadvantage of radio as an educational medium, even when used in group settings, is that the broadcast is ephemeral. For this reason, audio-cassette technology is proving itself as a distance learning medium in rural continuing education, as it already has in other settings. The cassette can be replayed as many times as the listener or the listening group wishes. The group has complete control over the timing of study sessions, which overcomes another major constraint of radio. The pacing of a series of programmes, and of each individual session, is also under the group's control: they can also replay the tape, or sections of it, as many times as they like. From the producers point of view, cassettes allow them to design material for specific groups within the farming population. This is an important consideration in continuing education for farmers because of variations within countries in climate, altitude, soils, crops and farming technology, all of which limit the feasibility of giving detailed practical recommendations in widely broadcast radio programmes. Cassettes also offer a means of obtaining feedback from learners and, because of the variation in group study times, allow more efficient field supervision of learning groups. Applications within the Commonwealth include the distribution of cassettes on various cash crops by Tamil Nadu Agricultural University to farmers and extension workers, the use of cassettes as a substitute for radio in a learning group project in western Botswana, and their use by agricultural input companies in Britain to keep their sales staff and technical representatives up to date with company news and product information.

More recent technologies offer other ways of overcoming the constraints of distance and literacy. Audio-conferencing, at present used in in-service training and higher education (see 2.3), becomes a real possibility as public telephone services, increasingly based on satellite technology, spread rapidly into rural areas. Several Commonwealth countries have plans to make public telephones widely available in rural communities before the end of the century. Audio-conferencing, where several participants at two or more locations have voice contact with one another, cuts down the need for travel and residential costs as well as reducing reliance on print and postal services, while allowing immediate feedback between students and remote tutor. Even without the added facility of audio-conferencing, rural public telephones allow farmers more ready access to advice from extension workers and the suppliers of agricultural services. There is certainly potential for the planned use of telephones as educational media, for example for maintaining tutorial contact. Facsimile transfer is yet another application of telecommunications technology which will have obvious attractions for distance teaching programmes as the costs come down.

Television made its debut as an educational medium for farmers on a grand

scale in 1975 when, under India's Satellite Instructional Television Experiment (SITE), 2,340 villages in six states were equipped with community television sets. Programmes were broadcast from two centres and transmitted via satellite direct to the receiving stations in each village. During the morning, broadcasts were for school students, to enhance and supplement classroom teaching. Continuing education programmes, including those on agriculture, were aired in the evenings. The Ministry of Agriculture, research institutions and the agricultural universities collaborated with All India Radio to use this facility for farmer education.

SITE ran for a year. It was undoubtedly a technical and logistical success but television proved rather an inflexible medium for agricultural education at the practical, farmer orientated end of the spectrum. The six states involved in the experiment were deliberately chosen to represent different climatic and agricultural regions. This inevitably limited the relevance of nationally broadcast material on agricultural practices and recommendations. The two production centres were in some cases thousands of miles from the reception areas: recording of material in the field that would look relevant to the farming audience was therefore impractical. In the follow up to SITE, which uses India's own INSAT series of satellites, the number of production centres has been increased substantially.

Television shares with radio the basic disadvantages of a broadcast medium: fixed viewing times, no user (or local tutor) control over pacing and sequencing, and the ephemeral nature of the broadcast signal. The rigidities of broadcast television have been tackled in some places by the use of video in farmer education. In two of Nigeria's Agricultural Development Projects (in Kano and Bauchi States), mobile video units have been a focal part of the process of educating farmers in improved agricultural knowledge and practices. Video programmes are produced on a fortnightly schedule, each based on a single topic relevant to the particular time of year, copied, and then shown both to extension workers and to farmers on a fleet of mobile units. It may be, however, that the future of video in farmer education lies in the placing of play-back machines and monitors in fixed locations (such as training centres, rural banks, co-operative stores). Now that the equipment (both for production and for playback) is becoming more robust, and with the availability of machines that will playback but not record (which are therefore less complex and so less likely to breakdown than the standard video cassette recorder) video may become more widely used. The bottleneck will be the expertise (and budgets) for producing good quality educational material.

In the short term, video probably has more potential in the more developed countries of the Commonwealth where there are more facilities for the production of video material and where there is now widespread ownership (or renting) of domestic video recorders. Farmers and their families can watch video cassettes in their own homes. The British Open University, recognising this situation, has used video in their recent venture into continuing education for farmers. This venture is of interest because the Open University (OU) had little previous experience in the field of agriculture. No agricultural courses have featured among its many degree level courses since it began operation in 1969. There has therefore been more than the usual degree of cooperation and collaboration with other institutions.

The OU's two initial items for farmers, produced in the early 1980s, related to two specific enterprises: dairy cattle and oilseed rape. They have both been designed to improve decision making by those responsible

for day to day management of those enterprises. The course on Health and Productivity in Dairy Cattle arose from collaboration between the OU, the Agricultural Training Board, and the Royal College of Veterinary Surgeons. The core text is supported by four broadcast television programmes, an audio cassette, three assignments to be completed and sent in for marking, and some other print material. Practising vets serve as local tutors to those who enrol on the course. The other offering, however, on Pest and Disease Management in Oilseed Rape, is seen as a self contained package which farmers or farm managers can work through entirely on their own and then keep as reference. In this package, a video cassette is included which explains the aspects of the topic that are conceptually difficult (such as crop sampling, pest life cycles and economic analysis of pest management practices). In addition to the video, the pack contains an audio cassette, three visual aid charts, and print material.

1.2 In-service Training of Advisory Staff

Another area of potential for distance learning is in the in-service training of technical and professional staff, both of publicly funded extension agencies and of commercial firms which provide services of various kinds to the farming sector. Most countries of the Commonwealth have large cadres of extension workers at field level, on whose efforts depend the success of agricultural development programmes. Their role includes the introduction of new technology, the conduct of demonstrations, giving advice on farm level or community wide agricultural problems and facilitating local development activities. Some countries have separate organisations dealing with livestock, forestry and arable agriculture; others have specialised agencies responsible for specific crops (particularly export crops); while others have an integrated extension service, with the field level worker acting as the channel by which farmers have access to specialist information and advice. At the same time, there are many agricultural banks, cooperative organisations, and firms or parastatal agencies responsible for the purchase of farm produce and the supply of agricultural inputs, all of which employ agricultural advisers who are in regular contact with farmers.

The staff of these agencies are widely dispersed, by the nature of their jobs. In many cases, they have received minimal pre-service training. Even when a firm technical foundation has been laid in full time pre-service training, to certificate, diploma or degree level, they still need to be kept up to date with changes in agricultural knowledge and technology. There are sometimes significant changes that take place within an agricultural industry that require large numbers of personnel to learn new skills or information quickly. (The introduction of metrication within the British forestry industry is a case in point: to meet the need, the Agricultural Training Board designed self-study print material for forestry workers.)

In the past fifteen years, major projects have been undertaken in many Commonwealth countries to reorganise and strengthen agricultural extension services. These have meant changes in role for extension workers and new patterns of work. And as pre-service training is strengthened, often as an integral part of such projects, the older serving extension workers find that their qualifications do not enable them to compete for promotion within the service on a par with the more recent recruits.

In the past, extension services have relied on word of mouth and occasional residential courses for in-service training of their field

staff. Verbal instruction is, however, relatively inefficient unless backed up by print, self-study or reference materials; and residential training is expensive and consequently does not usually keep pace with training needs. Some agencies produce regular print material for extension workers, which feature developments in farming technology and broader developments within the field of agriculture. The monthly magazine, Agrinews, of the Department of Agricultural Field Services in Botswana is one example. Mobile video is used in Nigeria in the regular in-service training of extension workers. Audio-cassettes are distributed by British agro-chemical companies to keep their technical representatives and sales staff informed of new products.

Although these applications are not strictly distance education programmes, they do show the potential of media to allow agricultural staff to keep themselves informed of developments in their field. At present, however, formal in-service courses using distance teaching approaches seem rare. Much could be learned from experience in offering upgrading courses for serving teachers, who share many of the characteristics of field level extension workers. A recent example of an agricultural application comes from the Caribbean, where the University of the West Indies' audio-conferencing facility was used to hold two in-service courses for agricultural extension and other field workers in health, community development and related disciplines (see section 2.3).

1.3 Secondary, Further and Higher Education in Agriculture

The potential of distance teaching for offering equivalents to full time agricultural courses at school, college and university is limited by the difficulties of satisfying the practical component of the curriculum of such courses. At secondary level, the school farm has traditionally played an important part in the teaching of agricultural science, with agricultural science teachers, and often local extension workers, supervising practical work. There are thus few examples of distance teaching applied to the teaching of school level agriculture. Even if there were more provision, there would probably not be very much demand for this subject among the kinds of students who enrol for formal, school equivalent distance learning courses.

One institution which has offered distance teaching support for students following courses in agriculture at this level is the Lesotho Distance Teaching Centre (LDTC). From 1976, LDTC offered a correspondence course covering the Junior Certificate syllabus in Agricultural Science. In addition to the course texts and written exercises, which were assessed and returned through the postal service, face to face contact and some element of practical work was included by holding regular weekend courses. Local school teachers were recruited as part time tutors for these courses. A series of radio programmes was also broadcast. The radio programmes and the weekend courses became, over the years, more closely integrated with the phasing of the units of the correspondence course so that students could gain maximum benefit from them. As with other correspondence courses at Junior Certificate level, new students were brought together for an orientation course; this had been shown to increase the rate of successful completion of correspondence courses.

However, the popularity of the Agricultural Science course declined in the second half of the 1970s, at a time when other Junior Certificate courses offered by LDTC were showing increasing enrollments. Agricultural Science enrollments declined from 60 in 1976 to only 18 in 1979; and during that

time it had the fewest total enrollments of all Junior Certificate courses offered. In 1982, LDTC reported no correspondence course candidates for Agricultural Science. This is perhaps symptomatic of the low status accorded to agriculture in secondary schools by many students, who see secondary education as a way out of a future livelihood based on agriculture. Hence the greater popularity of mathematics, book-keeping and languages among correspondence students in Lesotho. On the other hand, the Agricultural Science students entered for the Junior Certificate exam achieved the highest pass rate for correspondence candidates.

If the question of practical work has limited the potential of distance teaching in school agriculture, it presents even greater difficulties in the case of formal Diploma and Certificate courses offered by post-secondary Colleges of Agriculture. In their residential, full-time mode, these courses generally require a high proportion of farm-based activity. Much of this will be on the College's own farm, while some Colleges also place students on other commercial farms for a period. In such courses, there is a constant interplay between theory and practice. This is the case whether the college is training potential farm workers and managers (as in England) or future agricultural extension workers, which is the primary role of agricultural colleges in most Commonwealth countries. The difficulty of achieving this degree of supervised practical work, and the disadvantage of not being able to show readily how principles learned in the classroom work themselves out in the day to day running of a farm enterprise, means that relatively few institutions offer distance teaching equivalents to their full-time residential courses in agriculture at this level.

Two institutions which have done so have approached the dilemma of practical work in different ways. In Canada, the University of Guelph's Independent Study Unit offers a range of courses designed for farm workers and home gardeners, including the Ontario Diploma in Agriculture. This is specifically designed as a distance learning alternative for those who are unable to enrol on an equivalent residential course at an agricultural college. The practical element is included by stipulating that the student has a minimum of twelve months practical experience in agriculture before enrolling; and then ensuring that the learning materials (which include audio cassettes, film strips and print media) and the course assignments encourage students to relate their own farming experience and activities to the content of the component courses (of which 15 must be completed within a five year period to fulfill the requirements of the Diploma).

Guelph's approach gives the university very little influence over the nature and extent of the practical experience of students. In New Zealand, Lincoln College in Canterbury keeps a tighter control over the practical component of their Diploma in Agriculture by combining distance teaching with a residential element. Students spend two years studying by traditional distance learning methods and then one year on the College campus. This approach obviously restricts enrollment to those who can commit themselves to a year's full time residential study, but it does address itself to the fundamental constraint that the learning of new practical skills normally requires not only practice but also immediate feedback to students on their performance.

2.0 APPLICATIONS OF DISTANCE TEACHING IN AGRICULTURE

2.1 Overview of Applications in the Commonwealth

The general picture emerging from the survey of open learning institutions in commonwealth countries is one of largely under-exploited potential. (An account of the complete survey is contained in Chapter 3 of the main report.)

Only 44, or 14% of the 306 institutions participating in the survey indicated that they offer courses in agriculture. The proportion of these institutions from countries which depend largely on agriculture is surprisingly small. Only Zimbabwe stands out as an exception here, and developing countries outside Africa are very poorly represented, as the following table shows:

Institutions offering agricultural courses by country:

More industrialised		African countries		Other countries	
England	9	Zimbabwe	5	India	3
Australia	8	Tanzania	2	Guyana	1
Canada	6	Kenya	1	Papua New Guinea	1
New Zealand	3	Lesotho	1	Fiji	1
		Nigeria	1		
		Ghana	1		
		Zambia	1		

Even within these institutions, agriculture tends to occupy a comparatively minor role. Apart from the seven institutions which specialise solely in agriculture, the majority offer agricultural as just one of a wide range of other subjects. The exceptions are:

Guelph University's Independent Study Unit, Canada
(which offers 57 courses in agriculture and horticulture)

Olds College, Canada
(which offers 9 agricultural and 35 science courses)

Central African Correspondence College, Zimbabwe
(which offers 30 agricultural courses plus smaller numbers of courses in other subjects)

More than half the institutions combine distance teaching with more conventional, face-to-face activities, and this, combined with the fact that agriculture is usually taught along with other subjects, makes it difficult to provide information from the survey results which relates specifically to the distance teaching of agriculture. However, a statistical comparison of those institutions offering agriculture with the total number of institutions in the survey, does highlight some interesting differences.

We find, for instance, that (at the 5% level of probability) a significantly higher proportion of the agricultural institutions offer economics and business studies, mathematics, and sciences. These are subjects which might be expected to have a close affiliation with agriculture.

The institutions offering agriculture in the survey group provide courses at a wide range of educational levels, from primary and further, to continuing and higher education. There is, however, a tendency to focus particularly on the following levels:

further education (post-secondary, but not degree)	57% of agric. insts.
community education	41%
continuing education	36%
secondary education	32%

Primary, degree and post-graduate levels are each offered by less than 25% of the institutions. On the whole, this follows the general trend for all institutions in the survey with the exception of community education which features significantly more often in the agricultural institutions.

The use of media by these institutions follows the overall pattern for all institutions in the survey. Text based learning is predominant, and is used in nearly all cases, and, while both TV and radio are surprisingly little used, audio and video media do play an important role. Study centres, residential schools, telephone teaching and computers are all used by over a third of the institutions.

There are two teaching methods indicated in the survey which institutions offering agricultural courses use significantly more than is common for the average institution. These are practical work (employed by 64% of agricultural institutions) and the use of regional services (43%). These two elements are of especial importance to agricultural teaching at a distance, and will be further discussed below.

With these exceptions, however, the results of the survey yield little evidence to suggest that agriculture is receiving the attention it deserves, both as a subject of special importance to the developing world, and as one for which distance teaching methods would seem to be particularly appropriate.

To give an idea of just how much potential there is to be exploited in this field, we now take a more detailed look at three institutions in the Commonwealth which demonstrate some important applications of distance teaching in agriculture (a) for small-scale farmers, (b) for in-service training and higher education, and (c) for international post-graduate education.

2.2 INADES-Formation: correspondence courses for farmers

INADES-Formation is a non-governmental organisation that currently runs correspondence courses in several African countries. The parent organisation, INADES, was founded in the Ivory Coast by a community of Jesuits with the general aim of fostering development in Africa. The training division, INADES-Formation, was established in the early 1960's. Its first correspondence course was launched in 1962, with extension workers the primary audience. In 1965, a course for farmers was launched, which has developed over the past twenty years into a series of courses offered in ten countries.

In 1969, the first national office outside the Ivory Coast was opened, in Cameroon. Since the, national offices have been opened in a further eight countries. Initially, these were francophone countries who took the French language course materials developed in Ivory Coast. In 1980, Kenya became the first Commonwealth country to join the INADES-Formation network, when a national office was established in Nairobi.

The correspondence courses offered by INADES-Formation in the various countries follow the same basic pattern. The courses for farmers are at three levels, with each level designed to be completed in one year and with farmers expected to commence with the first level and progress to the second. By this stage, they should have learned enough for them to make considerable improvements to their farming practice. The first level course, which deals with general agriculture and livestock husbandry, covers general principles of farming. The second level covers a large number of specific crop and livestock enterprises, from which the student makes a selection, plus a compulsory course unit on essential farm calculation. The third level goes on to cover management, marketing, credit and cooperative issues. In Cameroon, a fourth level course explores the themes of the third level in more depth.

In some countries, a further course is offered, on extension and the rural economy, which is intended for agricultural extension workers who are seeking to improve their communication skills and their understanding of development issues.

Basic course development and materials preparation is the responsibility of the international office in Abidjam, Ivory Coast. But national offices are closely involved in revision (course material is regularly updated and occasionally completely revised), in the testing of new material and in the development of course units to fit particular national needs. Translation is also done, where necessary, at national level. The Kenya office offers the farmers' courses in Kiswahili.

The teaching materials for each course comprise a series of booklets, each thought to require a month's study. When students have finished studying a booklet, they complete an assignment which is returned to the national (or, in some countries, a regional office) for assessment and comment. The assignments are structured in such a way that they test not only understanding of the material but also the students' ability to apply the principles to their own farming activities. On receipt by the national office, assessments are immediately marked and returned to the students, with detailed comments on any aspects of the material with which they have experienced difficulty. Students who have not done very well on an assignment, are advised to revise the booklet and attempt the assignment again. The first level course comprises ten booklets, all of which must be satisfactorily completed. In the second level, students study the compulsory unit on calculations and then choose a selection from units on a wide range of individual enterprises.

In 1986, the Kenyan staff of INADES-Formation, which included an agricultural staff of four, reported over 3,000 people enrolled on their farmers' courses. (The office also runs English language courses on development and on management, the latter designed for middle level managers of rural development projects. This has been developed in conjunction with another Kenyan agency, which indicates that the national offices of INADES-Formation are not restricted from forging their own local links). Although the primary audience for the farming courses is literate farmers, there is considerable interest among extension workers

in the courses and the course materials. Some of the students study on their own, others in groups. When students have completed three booklets on the particular course they are following, they are encouraged to attend one of the one or two day workshops regularly held in the field by INADES-Formation staff. These workshops give the staff valuable feedback on the course materials as well as providing an opportunity for practical demonstrations and for discussion of variations in farming practice and conditions.

The course offered by INADES-Formation in Kenya present a structured training for literate farmers who are interested in improving their farming. This improvement is based on a deepening understanding of the principles underlying the practice of agriculture. This is in contrast to the prevailing extension system in Kenya which, as in many other countries, provides farmers with blanket recommendation for improved farming practices without any long term educational strategy. The service offered by INADES-Formation is thus complementary to those provided by the government's agricultural extension agencies.

As well as the self study materials, INADES-Formation produces a regular newsletter and, in late 1986, was preparing to open its own audio-visual production unit in Nairobi.

2.3 UWIDITE: international cooperation in in-service training and higher-education

The three constituent campuses of the University of the West Indies are separated by a large expanse of ocean. They are in the three separate island countries of Trinidad, Barbados and Jamaica. The university also has a number of extra-mural centres in other countries of the region. Three of these centres are now linked with the three campuses through a permanent audio-conferencing network, which makes use of the national telephone systems and a communication satellite. Since 1983, this network has been used for a variety of educational purposes, under the University of West Indies Distance Teaching Experiment (UWIDITE), in addition to its use for university administration.

The audio-conferencing system enables groups of students and tutors at each of the locations to speak, and listen, to similar groups at the other sites. The facility also allows slow-scan video transmission via the same telephone link, which is used for the display of visual material during distance teaching sessions. Computer data transfer is also possible. Unlike most distance education media, the system allows immediate interaction.. The audio-conference room at each site can hold up to 20 people.

The main educational use of the system is in the university's undergraduate teaching: because there is some specialisation between the three campuses, students on one campus can gain access to staff expertise at the others without having to travel. The audio-conferencing facility is used both to teach courses entirely at a distance, and to enrich residential courses by allowing staff at distant campuses to contribute. In postgraduate courses, the system is used to maintain contact between students engaged in fieldwork on one island with supervisors and tutors on another. For example, most residential agricultural courses are held at the Trinidad campus: when students go back to their home islands to carry out field research, the system enables tutors to keep in regular contact with their students. This has led to improvements in the quality of

research and has saved time. Audio-conferencing also enables the students, when they have returned from their field research, to hold seminars with agricultural officers at the research site to discuss their findings.

The development of distance teaching courses has, as in other initiatives, prompted the careful preparation of new teaching materials, course texts and student assignments which are now in demand from students following residential courses. (This was noted also in respect of the INADES-Formation course materials, in section 2.2).

The inclusion of the extra-mural centres within the network has meant that system is also used within the continuing education activities of the university. These have included two courses for serving agricultural extension officers and others working in rural development programmes. A six week course in Integrated Pest Management used the system for one and a half hours per week, with two further two hour sessions for feedback and future planning, the slow scan video facility being used to assist students learn how to identify pests. Then an intensive two month course for community workers in agriculture, health and community development was held, which linked groups at the centres for eight hours each week.

Audio-conferencing made feasible by communication satellites, is being used to support agricultural education in other (non-Commonwealth) countries. In Peru, it is used for the in-service training of agricultural extension staff, as well as for staff meetings. In Indonesia, agricultural universities and teacher colleges have improved the quality of formal agricultural education by sharing expertise and teaching materials through an audio-conferencing system. The Indonesian system includes an experimental audio-conferencing facility in a rural community, powered by solar panels and providing, in addition, a public telephone service.

2.4 London University: international postgraduate education at a distance

A major initiative in international distance teaching at postgraduate level is being launched by Wye College, a constituent School of the University of London. The College has taught residential MSc and Diploma courses in agricultural disciplines for many years, which have proved very popular with students from overseas. At the same time, the University of London has long experience of offering external degrees. Until now, however, the University's external system has been primarily an examination system rather than a means of offering teaching; and enrolment on external postgraduate degrees has been limited to graduates of the University. The Wye College initiative removes these limitations.

From early 1988, Wye will offer an MSc and a Diploma in Agricultural Development. Entry requirements will be the same as for residential students pursuing similar courses - i.e. a good degree in a relevant discipline for the MSc, and a degree or higher technical qualification for the Diploma. Applicants who do not have the basic requirements will have the opportunity to sit a pre-registration examination.

The course is designed for professionals working in rural development programmes at a variety of levels, from area development projects to sectoral planning, and in a variety of specialities. The differing needs of students are allowed for in the MSc programme by the range of options from which students can choose, once they have successfully completed the

common core (which makes up half of the programme). These options include agricultural extension, quantitative economic analysis, livestock development and environmental impact analysis.

For many professionals in such positions, who are often in mid-career, with significant family responsibilities and holding key jobs from which they cannot easily be spared for the one or two years necessary to complete a full time Diploma or MSc course, an external degree offers the only realistic way for them of receiving such training. The course fees will be similar to those for residential students, but spread over up to five years, and without travel and residential costs, the external courses will cost about one third of the full time residential equivalents.

Students enrolled on the programme will receive core textbooks for each of the courses they follow (four for the Diploma, eight for the MSc). These texts are being specially commissioned for the new programme and are likely to appeal to a wide readership, in the same way that textbooks commissioned for Open University degree courses in Britain have established themselves as standard texts within their fields. For each course, students will also receive collections of readings, supplementary study material and a study guide which will include assignments. Students will be expected to complete three written assignments for each course: these will be sent to a tutor in Britain, not necessarily at Wye, who will provide detailed comments on them. It is not, however, intended to use these assignments in the formal course assessment: this will be by final examination only, to be taken in the student's own country, using the extensive network of examination centres built up over the years by the University of London for its external programme.

In the early stages, then, the study materials will be entirely print based. However, the possibility of using low cost microcomputers as a distance teaching technology is being considered. If it were possible to issue each participant with a microcomputer as part of the initial teaching package, assignments and exercises (especially for the economics, data analysis and management components) could be distributed on disc. As microcomputers will become increasingly important tools within agricultural development projects and programmes, and are already an important teaching tool and curriculum element in residential courses at this level, some means of introducing them into the external programme is probably essential if the programme is not to become regarded as a second rate option.

Another potential development within the programme offers an alternative way of introducing microcomputer technology to participants. The possibility is being explored of holding residential workshops for external students on a regional basis. These could include opportunities for hands on computer experience. Collaboration with overseas agricultural education institutions is also envisaged as a future development, with universities and colleges perhaps taking on some of the tutorial and administrative responsibilities of the programme for students in their area. They could also be useful sources of information and expertise on agricultural systems, projects and policies within a student's own area.

3. ISSUES

Four issues emerge from the above review and discussion which, taken together, represent a challenge to the effective exploitation of distance education opportunities in agriculture.

First, there is the question of providing group support and face to face contact with tutors. The evidence is clear: students learning at a distance learn more effectively and are more likely to complete their programme when they have opportunity to meet and discuss with other students and with tutors. This is particularly important with continuing education for farmers, whose isolation from other learners and lack of experience at studying makes it difficult for them to maintain motivation. Support of this kind can be provided by ensuring that participants study in groups (which has implications for recruitment onto courses), or by holding regular field days or weekend seminars at schools, colleges or research stations. In contrast to other subject areas, the infrastructure often exists for these activities in the form of agricultural training centres of one kind or another. These are commonly underused at present and would be suitable locations for seminars and practical instruction. Tutors from the distance teaching institution could run such seminars, or part time local tutors could be recruited for the purpose.

Second, there is the related challenge of catering for practical work in distance education programmes. Agriculture at secondary and undergraduate level, and in continuing education, is a highly practical subject. At postgraduate level, distance teaching programmes can be steered towards principles and the economic, policy, marketing and extension aspects of agriculture, and so the problem of providing for practical, on-farm work does not arise. At all other levels, however, students are expected to develop practical skills: furthermore, the principles learned in course texts are understood and remembered more effectively when their practical application is seen on the farm. If distance education courses in agriculture do not provide this, they will be seen as inferior to residential provision.

In continuing education, most students will be farmers. Careful design of course materials can help students see the implications of what they learn for their own farms. Course assignments can be built around the students' own farm activities, asking them to make and record observations which show the effect of certain factors on crop growth, for example. Radio programmes can feature farmers talking about their farms in a way which brings out the points covered in course texts. But in addition, agricultural training institutions can again play a valuable role in meeting this need. Trainers and extension workers based at such institutions are in an ideal position to supervise practical work and to run skill training sessions. Most institutions offering distance education in agriculture are not ministries of agriculture, which are normally responsible for rural training centres. If this resource is to be used more effectively within distance teaching provision, close collaboration will therefore be needed between agriculture ministries and distance teaching institutions.

Third, the inherent variability of agricultural systems and technology creates difficulties for curriculum design and the design of teaching material that is to be widely distributed. Again, the problem is more acute at the level of continuing education for farmers where education programmes aim to improve decision making on participants' own farms. INADES-Formation's approach to this is to concentrate on the learning of

general principles of agriculture in their first level course and then to allow students to select from a long list of crop enterprises those that are most relevant to their own area and circumstances. But even with a single crop, suitable varieties, expected yields, the incidence of particular pests and diseases, equipment available for land preparation and planting, and facilities for marketing will vary from area to area within a country. Distance education for farmers need to concentrate on those aspects of agricultural technology and practice which are applicable within the geographical area from which participants are to be drawn. They should perhaps also concentrate on developing an understanding of principles which can contribute to decision making in the particular situation faced by individual students. For example, while local extension services can recommend specific trees or grasses to plant on contour ridges between farm plots in order to reduce erosion, distance teaching programmes should rather explain the processes by which erosion occurs and the general principles involved in planting grass strips or rows of trees. This suggests scope for fruitful cooperation between distance teaching institutions and agricultural extension services.

The variability of agricultural systems leads on to the fourth issue: the particular requirements of agriculture in the preparation of distance education materials. Because of the essentially practical nature of the subject, it is necessary not only to have people with a thorough knowledge of their subject working on the materials, but also to have access to information about the agricultural systems in the areas from which students will be drawn and about the level of agricultural knowledge and technology of potential students. This calls for a greater degree of team work and more background research into the circumstances of potential students than in most subject areas. It might also seem to limit the scope for international collaboration in materials development. However it should be possible to combine subject matter expertise at international level with local knowledge of farming systems and populations.

Thorough testing of distance teaching materials is also particularly important in agricultural subjects, not only to check on the comprehensibility of print, visual and audio material but also to validate the relevance of the content in particular geographical areas. Here, too, local institutions can provide a valuable service to national or overseas distance teaching centres.

Turning more specifically to the scope for international collaboration, this would seem to lie in four areas: the provision of tutorial support and library, research and computer facilities for students enrolled on distance education programmes based in other countries (in return for a proportion of the student's course fees); the sharing of satellite facilities for telecommunications; development, testing and exchange of software; and training and exchange of experience in running distance education programmes in agriculture, particularly in the application of new information and communication technology. With respect to this last point, the opportunity for staff to study distance teaching programmes in other countries at first hand would be valuable.

Given the tremendous need for education at all levels in agriculture, and the existence of a more extensive infrastructure that could provide support for distance education programmes than in most subject areas (in the form of agricultural colleges, training centres and research institutions), it is perhaps surprising that there is so little distance teaching provision in the Commonwealth. As the examples described in section 2 show, the particular difficulties of teaching agriculture at a

distance can be overcome, both by programmes that use traditional distance education methods and by the application of more recent communication technology.

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