Distance Education: An Economic and Educational Assessment of its Potential for Africa

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DISTANCE EDUCATION: AN ECONOMIC AND EDUCATIONAL ASSESSMENT OF ITS POTENTIAL FOR AFRICA

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ABSTRACT

Distance education includes the use of correspondence courses, the work of open universities, and education in-school and out-of-school based on broadcasting by radio or television. It is defined as an educational process in which a significant proportion of the teaching is conducted by someone removed in space and/or time from the learner. Many distance-teaching projects combine a variety of media, link correspondence teaching with a limited amount of face-to-face work, and use modest media like radio and print. The particular advantages of distance education are that it can reach remote audiences, can provide education without taking people away from work and, by economizing on the use of specialist staff, can in some cases reduce unit costs.

It has been used for teacher training, and for primary, secondary and tertiary education. Many African countries have been offering in-service training to teachers using correspondence courses; in both Tanzania and Zimbabwe this has been done on a large scale, training many thousands of teachers needed for programs of universal primary education. In primary education, the most important application of distance-teaching techniques has been in interactive radio, where radio is used for direct classroom teaching in a style which demands frequent active responses by the learners to the radio program. At both secondary and tertiary level "equivalence" courses have been developed, offering an alternative route to formal qualifications for students outside school or college.

Cost data are presented on all these applications. Teacher training projects with several thousand students have shown costs of between a quarter and a half of those for conventional face-to-face training; evidence on teachers' classroom performance suggests that the training is effective. Interactive radio is necessarily an add-on cost. Data from Nicaragua, Thailand and Kenya suggest that interactive radio compares favorably in cost and effectiveness with the provision of resources in the form of textbooks. At the secondary level costs per student for individuals working on their own, or in study centers with minimal supervision by an unqualified monitor, compare favorably with costs in conventional education. Data from Malawi showed that costs per successful student were lower than the cost per student in a boarding school, but higher than those for day schools. At tertiary level, open universities have shown economies, as compared with conventional education, once enrollments rose above a figure between 10,000 and 20,000. Distance teaching units, demanding a lower level of investment and attached to existing institutions, show economies with much lower enrollments and may do so with student numbers only in the hundreds.

It is argued that distance education's potential to increase access to education and reduce costs justifies further investment along with other strategies for education in Africa. Unless it is to be the basis for a parallel but inferior system of education, planning for distance education needs to be integrated with educational planning more generally, complementing other investment strategies.
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At the time of writing the first draft of this paper, Hilary Perraton was working in the Education Programme of the Commonwealth Secretariat; Clifford Block, Michelle Fryer and Peter Spain were at the US Agency for International Development; Lord Young of Dartington was Chairman of the International Extension College.

The first draft of most of the paper was written by the first four authors in a workshop in June, 1985. The first draft of the section on nonformal education was written separately by Michael Young.

Any expression of opinion in this paper does not necessarily represent the opinion of the World Bank, the Commonwealth Secretariat or the US Agency for International Development.
1. INTRODUCTION

The purpose of this paper is to assess the role which distance education can play in educational development in Africa. To see that role in context, we start with the educational problems that are today confronting African ministries of education and move on to consider the strategies that have been used to solve them.

The problems

Much African education can be criticised on grounds of quality, equity, access, cost and efficiency.

An education system of quality would have well trained teachers, skilled in subject matter and in pedagogy. They would work in classrooms with adequate space, ventilation, lighting and storage. They would have adequate supplies, including enough books. In practice many countries suffer from a lack of teacher training and scarce supplies. At the same time problems of equity persist. Rural areas are poorly served while some cultures restrict the education of girls and women, or of certain ethnic and social groups.

Despite these problems, access to education has increased dramatically over the past 25 years especially at primary level. From 1970 to 1980, primary enrolment grew by 98 per cent and 46 percent in the 11 Anglophone and 19 Francophone countries for which time series data are available (Office of Statistics, Unesco 1984). But problems of access remain and, as children move up through primary schools, so the demand for secondary education increases. Some secondary systems are already swamped with qualified applicants while, for those who finish secondary education, tertiary places remain scarce.

Enrolments have grown in this way despite severe cost constraints. In Africa today, central governments spend up to a third or more of their budgets on education and still cannot meet demand. Real economic growth has faded in many countries, diminishing capacity to sustain, leave alone improve, current levels of education.

Meanwhile these cost problems are exacerbated by inefficiency. An efficient educational system would maximise the output from the resources it uses. It would avoid wastage through dropouts of students, trainees or teachers, or through repetition. In contrast, many African countries suffer a haemorrhage of dropouts, chronic and widespread repetition, dispirited teachers and systems that are poorly managed and under-funded. When quality, equity, access and resources are substandard, the money that is invested is in high proportion wasted. For each sixth-grade graduate, as much as 12-15 years' student participation in schooling is sometimes required. While the percentage of primary-school repeaters dropped slightly between 1970-80, the actual number of repeaters rose by 80 per cent in Anglophone and 31 per cent in Francophone African (ibid.).

Current educational investment strategies in Africa

The strategies adopted in response to these problems have been those of nations whose first concern was to expand educational opportunity. Major efforts to improve instructional quality and improve efficiency are more recent and of limited scale. We can distinguish seven major strategies:
capital investment, teacher development, new curricula, increasing instructional resources, improving management, changing language policy and running experimental projects.

Capital investment in the building of new schools, teacher training institutions, and universities has been a fundamental concern of both African nations and donors. In much of Africa, schools are now widely available at the primary level, although more sparsely populated nations notably in Francophone Africa continue to have low primary enrolment levels.

In teacher development the priority has been the production of great numbers of new teachers, to staff new facilities, particularly in rural areas. Given high turnover rates in the teaching force, initial teacher training continues to demand major resources. In recent years, the upgrading of teachers has become an increasingly important priority.

Changes in the curriculum have also been important. There are continuing efforts to indigenise, to modernise, and to make more relevant the content of African education through both curriculum development and the reform of school leaving examinations.

Many countries have tried to increase the resources available to teachers. These have included textbooks, of course, and in some cases other aids such as wall posters have been provided. Educational broadcasting, mainly on radio, has been used to support and enrich classroom teaching. Educational television has been used but, with the important exception in the Ivory Coast, on a more limited scale.

Recently, some donors and African nations have increased their attention to the related issues of more rational educational planning and of improved management procedures. Sector analyses are being carried out by several countries. Programmes for training managers have been developed. In some countries new management tools such as micro-computer enhanced management information systems are being put into operation.

Changes in language policy have sometimes been needed. Many countries have coped with linguistic diversity by adopting new policies permitting initial instruction to be in the mother tongue, with a national or international language introduced at higher levels.

Experimental programmes to improve the quality or efficiency of education through substantial changes in educational delivery systems, teacher/student ratios, or classroom organisation, have been limited in Africa, but there have been some such efforts. Liberia has experimented with a major reform based on the use of programmed texts and teacher guides combined with guidance from teacher aides and peers. Kenya has worked on the development of interactive radio for teaching primary school English. In a few countries, an educational research and development tradition has taken root, sometimes through the work of an institute of education.

A combination of these seven strategies lies behind the development and expansion of education in Africa. All are important. No one strategy is a panacea. And, as we have seen, problems remain.
The relevance of distance education

We can summarise the argument so far that educators in sub-Saharan Africa have confronted problems of increasing access to education, of raising its quality, of increasing equity, and of increasing its relevance, while wanting to hold down if not reduce its unit costs. In doing so they have used strategies which have relied upon capital investment especially in the form of educational building, upon teacher development, upon the use of external teaching resources, and upon the increased use of community resources. While enormous progress has been made in the last 25 years, major problems remain. In this paper we assess the potential of distance education to help solve the problems. We will argue that distance education has a limited, but potentially significant, role in addressing them and that it can complement the other investment strategies identified. Our conclusions are based on the achievements of distance education both within Africa and beyond.

One point of explanation is important. This paper concentrates on formal education and on equivalence. It discusses the role of distance education to give something like school or college education to those who cannot get to school, and to raise the quality of education within school. We have not examined the role of distance education for much less formal purposes - for adult education, to support programmes of extension in health or agriculture, or for political education. We do touch briefly, in Chapter 3, on a non-formal approach to secondary education, building on experience in Latin America. Such an education would fit well with programmes of adult education with those broader aims. But, with that exception, we have not addressed the difficult questions, whose existence we recognise, about the comparative importance of investing in school-type education or in other types of education, or of investing in the education of children or that of adults, or of using distance education for more or less formal types of education.
2: THE NATURE OF DISTANCE EDUCATION

Distance education takes more than one form. The term includes correspondence courses; it includes some radio education; it includes the work of open universities. More important, it includes the many schemes of which there is experience which yoke together different media, notably print and broadcasting, and support these pre-recorded teaching elements with some opportunities for face-to-face learning. We can define it as "an educational process in which a significant proportion of the teaching is conducted by someone removed in space and/or time from the learner. In practice distance teaching usually involves a combination of the media" (Perraton 1982, p.4).

The educational case for distance education rests heavily on these projects which combine the strength of different media - print for permanence, broadcasting for immediacy, face-to-face learning for individuality and feedback. Each medium can, in combination, overcome the weaknesses of the other. The empirical case for distance teaching lies in the fact that, in controlled experiments, differences have not been found in the educational effectiveness of different media. But practical convenience, and the need to cater for the differing psychology of different learners, show that there are advantages in combining them, rather than relying on any one medium.

Distance-teaching projects, in Africa and elsewhere, have varied in the stress they lay on different media and a variety of combinations have been found to work. In many cases heavy reliance has been put on print, with the logistic consequence that distance-teaching institutions have to set up and maintain a system for the distribution of printed texts. Broadcasting has also been important, but its potential is limited at higher levels of education where audiences are small and broadcasting hours scarce. Only if a radio channel were fully dedicated to educational broadcasting might this constraint be eased. While both television and telephone conferencing have been used for distance education, they are impractical for the immediate future in many African countries. Audio- and video-cassettes offer the possibility of supplementing print where the necessary equipment is available to learners.

Whatever the choice of media, effective distance education requires that arrangements are made for feedback from the learner. In some cases this is arranged at residential sessions; where distance teaching is used to support the work of schools, there can be feedback to a tutor on the spot, even if the instructional material is coming from a distance: in many cases, correspondence lessons are designed so that feedback comes from the tutor in writing. African experience confirms that, despite the considerable logistic difficulties, feedback can be built into distance-teaching systems.

Within the term "distance teaching" we include education both for those outside school walls - as with the long-established correspondence courses aimed at adults - and distance teaching used within school to support teachers, to extend the curriculum, or to change the style of teaching. Within these categories, of in-school and out-of-school, we can distinguish several models of distance education, which vary in their sophistication, in the emphasis they put on different media, and in the level of education at which they have mainly been used. They are set out in table 1.
### Table 1: Models of distance education

<table>
<thead>
<tr>
<th>Level</th>
<th>In-school</th>
<th>Out-of-school</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>Enrichment broadcasts (e.g. many school radio services)</td>
<td>Little African experience - some radio-based community projects in Latin America</td>
</tr>
<tr>
<td></td>
<td>Large TV projects (e.g. Ivory Coast)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inter-active radio (e.g. Kenya English teaching)</td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>Enrichment broadcasts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Large TV projects (no African experience but used in El Salvador and Samoa)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Correspondence courses - for learning centres (e.g. Malawi)</td>
<td>Correspondence courses (e.g. Ghana, Botswana)</td>
</tr>
<tr>
<td></td>
<td>to widen curriculum (e.g. Mauritius)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For small groups in remote schools</td>
<td></td>
</tr>
<tr>
<td>Teacher-training</td>
<td>Not used</td>
<td>Pre- and in-service training with correspondence backed by radio and vacation study (e.g. Swaziland, Tanzania)</td>
</tr>
<tr>
<td>Tertiary</td>
<td>Inter-campus links (no African experience but used by University of West Indies)</td>
<td>Degree courses predominantly by correspondence run by conventional universities (e.g. Lagos, Zambia)</td>
</tr>
<tr>
<td></td>
<td>Open universities (i.e. separate autonomous insts) - no African experience</td>
<td></td>
</tr>
</tbody>
</table>
Distance education in-school

Within schools, some forms of distance teaching, notably those which rely heavily on broadcasting, have long been used. The aim of much school broadcasting has been enrichment - not to replace teachers, or take over their job of teaching, but to enrich it, bringing resources into the classroom that could not otherwise be available. More recently, broadcasting has been used with a more directly instructional role. In the large schools-television programmes of the 1960s the whole curriculum was offered, at either primary or secondary level, with a shift in the function of the teacher towards that of a monitor. More recently, projects have been run, using radio not television, to provide direct teaching in a limited range of subjects. These projects, based on the experience of teaching mathematics by radio in Nicaragua, have used "interactive radio" in which students are encouraged to respond directly and often to what is said on the radio.

Such broadcasting projects have tended to increase the unit costs of education; they were justified not as cost-cutting measures but as attempts to raise the quality of education. In the event, the large-scale television projects proved too costly to be maintained.(see page 10) In view of the limitations of mains electricity and the low densities of population in most African countries, this paper does not explore further the potential of television for education, but concentrates on the simpler media of radio and print.

Correspondence courses have also been used in-school, sometimes with a small amount of broadcast support, for three purposes. They have been used in countries with severe shortage of conventional secondary school places as a way of offering an alternative route to secondary qualifications. In Malawi and Zambia, for example, students regularly attend study centres, where they work on their correspondence courses, under the guidance of an untrained supervisor. Costs of such centres are lower than those of conventional secondary schools. Then correspondence courses have been used, on a small scale, to widen the choice and change the curriculum: in Mauritius, for example, correspondence courses with some broadcasting support were used to offer subjects in private secondary schools which would not otherwise be available, within a government programme to upgrade these schools. Finally correspondence courses have been used outside Africa to offer courses in small and remote schools which would not otherwise be available.

While these in-school methods could, in theory, be applied in teacher training or in higher education, there is little experience of their use at these levels in Africa.

Distance education out of school

Distance teaching out of school presents a different picture. There is little experience of using distance teaching at primary level: the evidence suggests that small children require the support of an institution like a school if they are successfully to learn a formal curriculum. Although in Latin America, family based groups supported by "radio schools" have offered an alternative route to primary education through group study based on radio and print, similar projects have not been established in Africa. We argue below that experience of this kind might be relevant, in countries which are still far short of universal primary education.
Box 1: The Ivory Coast Television Scheme

The government of the Ivory Coast ran a large-scale educational television scheme to extend primary education throughout the country. The scheme ran from 1971 to 1982, growing from 447 to over 5000 primary level classes. The intention was to provide direct teaching of the primary curriculum, rather than enrichment or support to teachers. Opposition to the project developed, however, and in 1981 the government decided to close down the scheme in response to criticism of the costs and the quality of the education provided.

The aim of the scheme was to reach all primary schools, to raise standards and to develop the curriculum. As the country lacked a television service this required the creation of studios, the building of transmitters, and the development of a nationwide service to maintain schools television sets, and deliver printed support materials. In villages with no electricity, battery powered receivers were provided, some with solar power chargers. A centralised production service was created and inservice training provided for teachers.

All programmes were in French: teachers were expected to prepare their students before each broadcast and supervise follow-up work, on lines suggested in the teachers' guide or students' workbooks. The expansion of the scheme meant that it eventually reached 84 percent of primary school children. It aims were also broadened with the introduction of out-of-school programmes, mainly for adults. While these were aimed at illiterate villagers, watching the school television set in the evening, there is some evidence to show that they were actually watched by a larger, and more educated, urban audience in their own homes.

Educational, economic and political difficulties all contributed to the closure of the scheme. While it led to improved standards of spoken French, and perhaps to livelier classroom activity, there was much criticism of the quality of education achieved by children in the television classes. Opposition to the scheme built up, from parents and from teachers. (At the same time television here, as elsewhere, seems to have had some effect in reducing differences between rural and urban schools.) It had, however, to overcome five economic difficulties: First, it was an add-on project: the costs of television were additional to the costs of conventional schooling so that there were no savings to be set against it. Second, it operated at primary level, where unit costs are conventionally at their lowest and student numbers at their highest, so that its cost per student had the most difficult point of comparison. Third institutional broadcasting had to bear the major cost of a television network, instead of incurring only the additional costs required in countries where it could use an existing network. Fourth, television is up to ten times as expensive as radio. Fifth, while calculations suggested that the scheme might show economies, as compared with conventional education, these were not anticipated until the 1990s. Politically, the scheme had to contend with criticisms of heavy foreign influence - at least 11 donors and at one time over 180 expatriate staff were involved. It also suffered by having its Educational Television complex in Bouake, some 250 km from Abidjan, the seat of government.

The warnings - about add-on costs, about television, about the need for public and teacher support, about dependence - are important for other distance-teaching schemes, and have had their influence on them.
At secondary level, however, correspondence education is widely used. Whereas in the colonial period correspondence education was dominated by metropolitan and commercial colleges, many countries have by now established government-run indigenous colleges. These are the institutions which provide the courses mentioned above, for use in study centres, but the same courses are available also to private individuals working by themselves. Correspondence has also been important in teacher upgrading where it has enabled teachers to study without leaving their classrooms for a residential course. In some cases, such correspondence courses have been supported by radio. At tertiary level a small number of African universities (e.g. the University of Lagos and the University of Zambia) have launched degree programmes by correspondence, allowing students to do part or all of their degree off the campus.

As a very broad generalisation, the evidence suggests that these out-of-school distance teaching projects have unit costs per student which are lower than those for conventional education. In some cases costs per successful student are also lower, but dropout rates have sometimes risen to a level where this cost is dramatically higher than the cost per student. High completion rates have, however, been reported for several teacher training projects where the trainees were guaranteed qualified teacher status, and increased pay, once they successfully completed the course.

The economic case

The economic strength of distance education lies in its parsimonious use of well educated labour: instead of relying on armies of teachers, whose numbers must expand inexorably with increasing numbers of students, distance education records, multiplies and distributes packaged teaching, using a small number of teachers to produce course materials in print and through broadcasts. Economies of scale, impossible where staffing ratios are fixed, become possible. Of course that is not the whole story: a centrally planned and packaged educational system would not speak to the condition of individual learners and would not command the support of many educators. Packaged teaching, whether it relies on broadcasting or print, needs to be linked with some opportunities for face-to-face learning. But by taking some of the instructional responsibilities away from the teacher, distance education can bring a variety of benefits in its train. By reducing the need for trained teachers in a fixed staffing ratio, it can under some circumstances reduce unit costs. By distributing through the post and over the air it can reach new and remote audiences and so increase access. By the immediacy of its methods, it can change curricula more quickly than has been possible through conventional processes of diffusion and change.

Distance teaching is not, however, an all-purpose strategy of education, to be set as an alternative to the others we have identified. Rather its role is to complement the other strategies for educational development. It can, by permitting more intensive use of educational facilities, increase the productivity of existing capital investment. It can help with teacher development where it is used as a tool for teacher education. It can be used to bring external teaching resources into a community. And, where it brings those resources in, it may make it possible for a community to make fuller use of its own resources - untrained and locally based tutors or monitors for example - for the benefit of its schools.
3: THE EXPERIENCE OF DISTANCE EDUCATION

The evidence of these claims is to be found in the experience of using distance teaching at many different levels of education. It is, perhaps, most striking in teacher education. We examine this first, before looking in turn at the use of distance education in primary, secondary and tertiary education.

Teacher training

Distance teaching has been used on a significant scale in Africa for teacher training, as it has in other parts of the developing world. In Africa we can identify two phases in such work. The first phase came soon after independence in the 1960s. Newly independent countries, such as Botswana, Uganda, Kenya and Swaziland, were faced with major public demands for primary school places. There were not enough teachers to go round, and it was impossible to train them rapidly enough to meet the demands of expanding primary schools. If the unqualified teachers who had been pressed into service were taken out of the schools to be replaced by those with no more training and even less experience, then the last state would be worse than the first. Distance teaching, based mainly on correspondence courses was pressed into service as a stopgap measure. It has proved to be more than that. The Kenya Correspondence Course Unit, for example, started work in teacher education, branched into other areas, and more recently relaunched its programme for teachers.

Table 2 sets out enrolment figures for these (and more recent) schemes. They shared various features. First, they tried to integrate learning at a distance with study in residential teacher training colleges; students spent some time studying face-to-face and some time studying by correspondence while at work teaching in their schools. They were aimed at teachers with some experience, but few formal qualifications. They were generally modest in scale, with students numbered in their hundreds, or at most in the low thousands rather than in tens of thousands. And - a distinct weakness for those now concerned with their appraisal - the projects were not evaluated with any rigour. Thus, while we can point to the relative popularity of distance education to meet the demands of that immediate crisis of teacher shortage, we are short of hard data on project effectiveness.

The more recent distance-teaching projects in teacher education are on an altogether bigger scale. Impelled by public demand and by ideology in different measure Nigeria and Tanzania in the late 1970s, and Zimbabwe in the 1980s, determined that they would expand primary education at an unprecedented rate.

In all three cases the decision to expand primary schools posed new demands for primary school teachers. Correspondence courses linked with short residential sessions were adopted in these countries to meet this demand. In Tanzania trainees were recruited from among primary graduates; they were also required to have experience of teaching in literacy classes and already to be living in a community where there was a teacher shortage. They went to a residential college for an initial six-week course and then studied through correspondence and radio while they were working as teachers in the schools. Further residential courses were held at intervals as the trainee teachers worked through their course, and the students finished their work by attending a final residential session at which they took their qualifying examination. As table 2 shows, some 45,000 students enrolled on the course and, over a period of three years, 35,000 of these qualified as teachers.
<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Enrolled</th>
<th>Completed Course</th>
<th>Completed course and passed examination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Botswana</td>
<td>1968-72a</td>
<td>608</td>
<td>539</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>no exam</td>
</tr>
<tr>
<td>Kenya</td>
<td>1968-74a</td>
<td>8433</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7632</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>91</td>
</tr>
<tr>
<td>Kenya</td>
<td>1982-85b</td>
<td>3520</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Swaziland</td>
<td>1973-76a</td>
<td>600</td>
<td>580</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>no exam</td>
</tr>
<tr>
<td>Tanzania</td>
<td>1976-78c</td>
<td>45,534</td>
<td>37,325</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>35,028</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>77</td>
</tr>
<tr>
<td>Uganda</td>
<td>1967-70a</td>
<td>1000</td>
<td>948</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>876</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>88</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>1981-88d</td>
<td>9240</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>n/a</td>
</tr>
</tbody>
</table>

Notes:

a. Young et al. (1980) p.34
c. Mkuye and Matemu (1984) p.4
d. Gatawa (1985) p.8
We have two sources of information on the success of this project. First, the Tanzanian government was sufficiently satisfied with the outcome of the project that they propose further teacher upgrading courses, for teachers in service, to follow the emergency programme. Second, the project was evaluated, with comparisons made between the teaching performance and subject knowledge teachers trained through the system and those trained more conventionally. The comparison showed that the teachers trained at a distance did not compare unfavourably with the control group. Costs for the project were analysed in the same evaluation and appear to have been only about one quarter of the costs for more conventional training (Chale 1983).

Although the Zimbabwe teacher training project was conceived in the Mozambique refugee camps before independence, and did not derive directly from the Tanzanian experience, it has important similarities to it. On independence, Zimbabwe expanded primary education, with the number of primary school students rising from 850,000 to 2 million between 1980 and 1981.

Zimbabwe launched a training programme, the Zimbabwe Integrated Teacher Education Course (ZINTEC), consisting of three phases, lasting over four years in order to train the primary school teachers needed. The first phase is a four-month residential course in a teacher training college which introduces students to both pedagogical and subject-discipline material. Students are assessed at the end of this phase to see if they should continue to phase two, which places them in schools where they teach over the next forty months (ten school terms). During this time they have full classroom responsibility but also study by correspondence, by listening to a weekly radio programme, and by attending day seminars once every two weeks and two-week residential courses after every two terms. Students' teaching practice is examined in the last two terms of this phase. The third phase is a residential course designed to consolidate what students have learned. In this phase, too, students take the examinations which will give them qualified teacher status. Evaluations of the project are not yet available but the Zimbabwe authorities are said to be sufficiently impressed with the progress of ZINTEC to be planning to extend its methodology to other programmes of teacher inservice education.

We can summarise, then, that distance education for teacher training has a record of success in Africa which is important both in planning further inservice training and as a demonstration of the potential contribution which similar methods can make or other types of education.

Primary education

As we saw, there is little experience of using distance education at primary level for students out of school. Neither correspondence nor radio lends itself to the needs of young children who cannot get to primary school, although there is important experience outside Africa of offering basic education to adolescents and adults through distance teaching.

There is, however, important experience in using distance-teaching methods, based firmly on radio, for supporting and improving the work of primary schools. The breakthrough here, for in-school distance education, has come with what has been called "interactive radio". This is an application of radio to primary education that has improved learning and, perhaps as important, created classrooms filled with children who are excited about their learning and motivated to continue.
Tanzania resolved in 1974 to move as swiftly as possible to universal primary education in 1977, despite shortages of teachers and of resources. The country's previous policy had been to concentrate on the development of primary and adult education so that, unlike other countries in the region, there was no large surplus of secondary school leavers who might be pressed into service as teachers to staff the primary schools. Instead, Tanzania expanded teacher training by using primary school graduates, with some experience of adult education, and training them on the job. They worked under the supervision of their head teachers and, after an initial residential course, combined primary school teaching with receiving training through correspondence courses.

Estimates suggested that the country was short of about 40,000 primary school teachers and it was obvious that conventional training would not get that many into the schools in time. Instead, some 45,500 trainees were recruited to a pre-service distance-teaching course. Correspondence courses were developed, using the resources of the National Correspondence Institution, which had been established mainly to provide opportunities for secondary level education outside school, and of teaching training colleges. Arrangements were made for trainees to spend a limited period of time in residential colleges; it was not intended that all training should be done at a distance.

Trainees had to have completed primary education, to have taught in literacy classes for two years, to be between 17 and 28 years old and to live in an area where there was a teacher shortage. At the outset they spent six weeks in a residential college and were then posted to schools. While working in the schools, with teaching responsibility for 22 periods a week, they were expected to follow correspondence courses and listen to linked radio programmes. There were some opportunities for them to meet and discuss their work with their fellow trainees in study centres. Their work in the classroom was supervised by head teachers. Trainees were examined each term, with a final, nationally organised, examination at the end of their three-year course. Of 45,534 students who started on the course between 1976 and 1978, 37,325 completed it and 35,028 (77.2 per cent of those who started) passed their final examinations, gaining qualified teacher status.

An evaluation of the scheme examined trainees' subject knowledge and classroom behaviour and compared them with a control group of trainees attending a regular teacher training course. While the trainees performed slightly less well in academic knowledge than the control group, they performed better on measures of classroom behaviour (Chale 1983, pp. 196-8). The combination of a practical classroom apprenticeship with study at a distance appeared to be an effective way of responding to a critical teacher shortage. Tanzania has, since then, continued to use similar methods for the upgrading of its teacher force, and Zimbabwe has worked on similar lines.

There are, of course, important savings if teachers are employed as they train, and if the costs of residence at a training college for more than a short period can be avoided: the costs of the Tanzanian scheme were calculated as being only about one quarter of the cost of training teachers in the conventional way.
Interactive radio is markedly different from traditional educational broadcasting because the design of these programmes is specifically geared to student participation during the broadcast — or student interaction with the programme. The programme keys a dialogue between students and the radio.

For example, in the Kenya Radio Language Arts Project, the programme draws the children in as active participants to a cleverly designed, pedagogically sound dialogue that faithfully covers the Kenya language curriculum. Punctuated by music and little dramas, the 30 minute daily broadcast has regular pauses for the children to respond — and to receive immediate reinforcement for the answers. Responses may be sung or spoken, may be in writing or through other physical action, as the children follow the incessant yet engaging pace of the radio. Typically children respond over one hundred times in each half-hour programme. They are involved, enthusiastic and see immediate results from their work.

The innovation here is in instructional design. Radio has been used for a long time in education, but has never brought about the exciting and measurable improvements that interactive radio has. Traditional educational radio has lectured to students, much in the manner of traditional classroom teachers. For the children, the message is the same: if you want to learn, listen. But interactive radio, by encouraging participation, cuts through that passive-student model. The instructional design turns the traditional pedagogy, both classroom and radio pedagogy, upside down. It is important to stress the difference between interactive radio and conventional educational radio. While conventional radio has had an initial novelty value on its introduction, that novelty has not been able to sustain student interest (particularly at the very first years of primary where children are so short on attention) or to raise scores dramatically, if at all. Interactive radio is not in that tradition, either in its design or in its results.

Also to be stressed: teachers have been interactive radio's biggest boosters. While interactive radio has assumed the major instructional responsibility for the materials it has taught (so far, mathematics and English), the radio is not meant to replace teachers, but to enhance their work. Provided with teachers' guides, the teachers work in concert with the programmes, calling on individual children as cued by the radio, overseeing written responses, and in general monitoring individuals much more closely than would be possible if they were teaching without interactive radio.

A recent summary of the evidence gathered to date leads to several firm conclusions about the use and effectiveness of interactive radio.

- Students can and do learn primary-school subjects when taught by interactive radio.

- Trained teachers and untrained classroom monitors can use radio lessons effectively with little training or special assistance.

- Interactive-radio lessons are seen as teachers and proctors and are used voluntarily, provided that the quality of radio reception is acceptable.

- The cost per student per year to deliver radio lessons after they are developed, is modest since few supplementary learning materials are required.

- In a grade-one classroom comparison with textbook use, interactive radio has been shown more effective in raising student achievement.

(Searle 1985)
Box 3: Interactive school radio in Kenya

The classroom is typical of those in developing countries. Dirt floor, mud-brick walls, no lights. The shuttered windows keep out both weather and light. The benches are rudimentary, as are the few teaching materials and the chalkboard. Into this small dark room are crowded 42 pupils.

Not so typical is the radio the teacher is adjusting, and less typical still the next half hour. The children, who had been quiet and well ordered up to this point, begin to speak up, to stand up, to move arms and legs, to sing, to answer in chorus - all in response to the radio program to which the teacher has tuned. "English in Action" the program is called. But what an observer sees is English being learned through action, and what seems like pandemonium is actually a well-designed, tightly controlled language lesson involving students in their learning, and it is all being done through radio. This is the Kenya Radio Language Arts Project (RLAP), in action.

Most exciting to any observer is the enthusiasm and involvement of the children. They exhibit an animation and an activity level that give promise of increased language learning, and that bears witness to a lesson they have already taken to heart - that learning can be fun. Still in most schools, radio or not, what children learn more than anything else is that their role in the educational process is only to listen - a lesson most seem to learn all too well. That was not the case in this Kenyan school.

A second exciting part of the RLAP is its creative use of radio. It belies the old belief that radio cannot carry the burden of classroom instruction. It was built on the experience of using radio to teach mathematics in primary schools in Nicaragua. Radio Math's achievement was to dispel the doubts among educators and broadcasters that "you can't teach mathematics by radio". Once Radio Math's interactive method produced consistently superior results among children in the radio classes versus children in conventional classes, the next research task was to adapt interactive radio to other subjects. The challenge is to involve children in a conversation with the radio, a challenge that demands precision timing and rigorous observation of how children respond to radio prompts. However, through trials and observations, repeated pretesting and classroom monitoring, creativity and expertise in instructional design, RLAP designers have reached the precision required for effective interactive radio. It is this precision that results in the enthusiastic involvement of entire classrooms of children.

Independent assessments of the RLAP have provided evidence similar to that found in Radio Math - namely, that superior learning is consistently and significantly associated with interactive-radio teaching.

But, it is in the dim light of that rural Kenyan classroom that the case for what interactive radio can do is made best - nothing compares to the enthusiasm, the zest for learning, that brightens an otherwise all-too-typical rural schoolroom.
The interactive model has also been applied outside the formal-school system. In the Dominican Republic, a community-based application called "RADECO" has gone on for several years, with encouraging educational results. Bringing basic education to areas where no education is available, this approach uses community resources, such as volunteer monitors and community-built classrooms – often modest shelters with a roof and four posts. RADECO broadcasts for an hour, late in the afternoon, to allow young children to work as they must, and teaches the rudiments of language and numerical skills. Some worksheets are distributed, but no textbooks are involved. Evaluation of student achievement shows, so far, that students are doing at least as well as, and usually better than, students in comparable communities that have schools.

This community-based model might fit well in isolated African communities and in refugee settlements.

Secondary education

As we have seen, demand for secondary education has outstripped the resources available to finance it in many African countries. Distance teaching has played a minor role in widening opportunities for secondary schooling, and in extending the range of subjects taught at school. It has the potential to play a more significant role.

Most Anglophone African countries have established government or university distance-teaching establishments, motivated in most cases by the demand from private individuals wanting to further their education while at work, but also moved by a desire to reduce the foreign exchange spent on correspondence courses from Europe. In a number of Francophone countries, too, distance-teaching colleges have been set up, modelled on the French Centre national de télé-enseignement. Many of the students of such colleges have, in the past, been people with primary education, and perhaps incomplete secondary education, working in the modern sector and needing to get formal secondary qualifications for promotion.

The establishment of such colleges provided an alternative route to secondary qualifications for those who had not, or could not, get into school. In some countries, including Malawi and Zambia for example, the colleges soon found that they were attracting not just people who were at work and needed secondary qualifications, but recent primary school leavers who had not succeeded in entering secondary school. Such students tended to do badly if studying by correspondence: they often lacked the maturity and the study skills to work on their own. In order to provide increased support for them the governments of Malawi and Zambia adopted similar policies of setting up study centres in which students work through correspondence courses, but do so at a fixed time and place, and under the guidance of a supervisor. The supervisor was not a secondary teacher (though he might be a primary school teacher) and lacked the knowledge to teach the students. But he was able to help them with the organisation of their studies and advise them on learning difficulties which they encountered as they worked through their courses. Thus a distance-teaching programme which had been launched to meet the needs of those out of school was adapted to create an in-school alternative.

The existence of study centres like this can be seen as a way of promoting educational equity, in that it opens chances for secondary education which
would not otherwise exist. But the evidence suggests, unsurprisingly, that this is a more difficult route to secondary qualifications than the conventional one. Those who do well in their primary-school leaving examination go to regular schools. Those who do less well go to a method of study which is itself more difficult. If one wanted to promote equity and at the same time to expand secondary education, taking advantage of the economies of scale which distance teaching can bring, then one might rather envisage a system in which all secondary level students did some of their work by correspondence and some in school, face-to-face. Such a proposal is likely to be politically unpopular.

The severest educational difficulties are faced by those who study by themselves, using correspondence courses, but without the support of a study centre. Help for them may be dependent upon a move towards some kind of community school which took a responsibility for part-time learners outside their walls as well as full-time ones within their walls.

Limited face-to-face support for learners is only one of the problems faced by students working at a distance. Three more are also important. First, radio support for these students is often limited. There are few broadcasting hours available for education, and the needs of external students at secondary level are seldom a high priority. Second, a number of the African distance-teaching colleges have encountered serious shortages of resources so that they have not been able to keep their courses up-to-date (or in some cases even in print). Small increases in the resources available to them could make significant changes to their effectiveness. Third - and this problem follows from the shortage of resources - distance-teaching courses have concentrated on the subjects which can most easily be taught on paper: there is only limited experience in Africa of teaching technical or scientific subjects at a distance. Experience elsewhere, notably in Australia, New Zealand and the Soviet Union, has demonstrated that such subjects can be taught successfully at a distance.

At secondary level there are particular groups for whom distance teaching may have important potential. One such group comprises refugees. Projects concerned with refugee education, for exiles from Namibia, South Africa and Ethiopia, have been established in Zambia, Tanzania and the Sudan. The projects are too recent for evaluation data to be available but they illustrate in extreme form the use of distance teaching in an attempt to overcome a severe shortage of trained teachers. A further group which could be helped consists of remote schools that lack the full range of subject specialists. There is experience in both Britain and North America of using distance-teaching resources to widen the curriculum of small and remote schools which could, similarly, be applied in Africa.

The major experience of distance teaching at secondary level in Africa has been to extend education, as we have seen. One project, however, had as its aim to develop and change the curriculum, using distance-teaching methods. The Mauritius College of the Air (MCA), which was established for the Mauritius government by the International Extension College, was charged with the job of bringing resources into the private secondary schools, which provided the major part the secondary sector. MCA designed multi-media courses in subjects which included human and social biology and agricultural science in order to widen the curriculum of the schools. The courses comprised correspondence lessons together with radio or television
Box 4: An alternative route to secondary qualifications in Malawi

The Malawi Correspondence College was set up by the government in 1965 to offer correspondence courses mainly at secondary level. Although it began by teaching private, individual students, it then gradually developed a system of correspondence centres at which children who cannot get into secondary school study for their junior certificate.

By 1978 there were 58 correspondence centers and over 2,800 enrollments. "The centers were originally designed as part-time centers for youth who were at work. They now provide classroom accommodation for up to six hours a day, so that students attending the centers are studying full time. The centers usually consist of two classrooms (for the first and second years of junior secondary education) with ten to fifty students per classroom and no equipment other than furniture, a blackboard, and a radio. They are located throughout the country, predominantly in rural areas. Centers are normally housed in simple school buildings, often constructed by the community next to a primary school, and are frequently accompanied by simple housing facilities for students and teachers. In some cases, the centers use primary school buildings available in the afternoon. Night secondary schools meet in the evenings in the premises of regular secondary schools and are usually staffed by secondary school teachers who are paid directly by the college for overtime work.

Attendance in the centers and night schools is available to any student who has completed the primary school leaving certificate examination and who can pay an annual fee of 22 kwacha (1978$26.40) to study six subjects. The fee entitles a student to the lessons, all necessary textbooks, marking of tests by qualified teachers, a daily radio broadcast of forty-five minutes, and free attendance at a center or night secondary school." (Wolff and Futagami 1982, pp. 92-93)

Although students attend centres regularly, as they would at school, they study in a different way. All receive correspondence lessons prepared by the Malawi Correspondence College and work through their lessons under the guidance of a supervisor; the supervisor's role is to supervise the classes, to help students' with learning difficulties where they can, and to encourage students to listen and follow up the radio programmes which back up the correspondence lessons. Many of the supervisors have themselves had only primary education.

Thus the centers provide a low-cost alternative to secondary schooling for those who cannot find a place in a regular secondary school. At the end of the first year in the centers, all students are tested and a small proportion of the most successful (60 or 4% of the first year enrolment in 1977) are placed in regular secondary schools.

Costs per student at the study centers are only about 70 per cent of the costs for day schools and less than a third that of boarding schools. But the success rate of these students is much lower so that their costs per graduate are higher than those for day schools, though lower than those for boarding schools. 1978 calculations were $1,117 for the centers, $700 for day schools, and $1,531 for boarding schools (ibid. p.98).
broadcasts. They were, however, conducted in the private secondary schools and supervised by the schools' regular teachers. The courses were also made available to external students: while the distinction we have drawn between work in school and out is important, it should not obscure the fact that the same materials can be used for two different groups of students.

Nonformal education

The distinction between formal and nonformal education can never be a hard-and-fast one. Although what has been said so far has been mainly about the formal category - and rightly, because that is where most of the experience has been - it is, to complete the picture, necessary to add a word about the nonformal as well. In this context, the distinction is not one of method, for distance teaching is still the subject. Nor is the distinction between the certificated and the uncertificated. The nonformal does not so often lead to diplomas, but it can. Children of any age and adults of any age at certain radiophonic schools in Latin America (which are far from being ordinary schools) can acquire 'primary school leaving certificates', and there is no reason why this should not apply also to secondary or indeed to any level of education.

The distinction is to do with the curriculum. It is the curriculum which is not formal, the word being used, in the sense used by Alexander Pope, as a synonym for conventional.* The curriculum is not that of the ordinary school so much as the 'school of life'. Gorki had the feel of it when he referred to his experience at work, and out of work, as being his 'universities'. It follows that, in Africa at any rate, any education can rank as nonformal when the curriculum is directed first and foremost to the acquisition of practical skills, and to any other skills, mathematical or linguistic, which are preconditions to a practical mastery.

It would not be appropriate in this paper to run the gamut of examples - in health education, political education, religious education or even in agricultural extension and education, though nonformal education in Africa without a central place for agriculture would be strange indeed. But it would be stranger still to refer to secondary education without bringing in the nonformal.

The reason is that in none of the countries south of the Sahara are there, to a greater or lesser extent, enough places in secondary schools to satisfy demand: and there are not likely to be for a long time ahead. The result is a political problem - many of those whose primary education seems to have led to nothing of tangible value are liable to discontent: and an economic problem - school-leavers may be loth to take up work on the land whose virtues have not figured large in the primary school. There may be no continuing education for those whose exam success has been insufficient to secure them a place in an ordinary secondary school. Where there is continuing education it may be limited to the demanding, but academically narrow courses available at such as the Malawi Correspondence College or its counterparts elsewhere.

* 'Still in constraint your suff'ring Sex remains,
Or bound in formal, or in real chains.'
There plight has raised again an old vision in African education going back to the Phelps Stokes report of 1922 and well before that - the vision of an education which is vocational without losing its general educational purpose. Nor would the vocational element be narrow in its objective, as much of vocational education is narrow. For the objective would be to educate girls as well as boys in the range of skills needed for farming and for the child-rearing and the trading that goes with farming.

An illustration comes from the Botswana Brigades. Young men and women enter one of the Brigades, for building, vehicle repair, leatherwork, or farming at about 16 or less and spend four days a week at a craft or a trade and a fifth on more ordinary academic subjects. It is four-fifths nonformal. Patrick van Rensburg describes a Brigade like this:

If the visitor is to see everything happening in the Brigades, he must rise at 5 o'clock in the morning. He will go down to the Farmers' Brigade, where he will find trainees already up and about. Some of them have been out to the pastures to bring the dairy cows in for milking. The big Friesland and smaller Jersey cattle will be near the cowshed. The trainees may be checking on their condition to see if any are ill or on heat... The trainees will have cleaned out the cowshed after milking the night before and they will have placed supplementary feeds in the troughs at the front of the milking berths. They will milk by hand, taking care to wash their hands before. Other trainees will collect the milk, weigh it, record it and test it in the little dairy laboratory. (van Rensburg 1974, p.116)

The Brigades were unusual in their curriculum, not in their teaching methods. They did not make use of distance teaching. This has not yet been done on any scale on behalf of an alternative curriculum at the secondary level. But there have been many pointers to what might be done. The Radio Forums which emanated originally from Canada have been adapted in Ghana and Niger, Ivory Coast and Senegal, always for the purpose of accelerated rural development. In all places groups of adults are supported in their efforts to improve or change their agricultural and other practice by broadcasts and written materials and visits. People teach each other but with outside backing, as they have also done in the radio study campaigns of Tanzania, Botswana and Zambia.

A closer approximation to an 'open secondary school' has been achieved in Latin American radiophonic schools whose pupils, like those who attend farm forums, meet in their own villages and homesteads. The schools consist of groups of children and adults who are teaching themselves with the aid of broadcasts, printed materials and visits from travelling monitors. But insofar as they set out to provide an equivalent course leading to an equivalent diploma they are at the primary rather than at the secondary level.

Basic literacy and numeracy, an understanding of the basic concepts of science, and an appreciation of the moral and political values of society are their goals, just as they are of primary schools. But the radio schools set out to teach through discussion of agriculture and how to improve one's income from it, how to improve the health of oneself and one's family, religion, basic politics, civics and economics. (Young et al. 1980, p.101)
Such efforts are clearly relevant for countries like those in South America and Africa which are still a long way from achieving universal primary education. They could also be for those which are even further from achieving universal secondary education.

But the crucial experiment has yet to be made. Distance teaching has not been used on behalf of a secondary school of the air, with as systematic an intent, and as cumulative a curriculum, as any ordinary secondary school. 'Radio colleges' are one name for them. They have been described.

Their timetable and curriculum would have to be oriented to work, because that is where most of their students would be. The times set aside for study would have to be compatible with working hours, and the subjects taken up would have to be relevant to that work and such leisure as there was from it, if the interest of the students were to be maintained. As we have already argued, it follows from this, and from the fact that in developing countries the majority of people live in rural areas, that the curriculum would need to be about rural work, health, housing and leisure, though always set in the context of the broader national and international society of which each village is perforce a part. (ibid. p.127)

Tertiary education

Africa has had limited experience to date with distance education at tertiary level. And yet it may be the easiest level to teach at a distance, because of the comparatively high motivation and maturity of students. The elaborate resources of the British Open University model are not a requisite: indeed, the large numbers of instructional designers, researchers, and media producers used in that approach are out of the question for most of Africa in the near future. In Africa and in other regions, simpler approaches have proved effective.

The high cost of tertiary education in Africa suggests that if distance teaching could show comparative savings it might be of key importance. Typically the unit cost of higher education in Africa is 100 times that of primary education; in contrast, the ratio in industrialised nations is usually between five and ten to one. As demand for higher education increases the absolute impact of these high unit costs will become an increasingly acute budgetary and political problem for African nations. At the same time, universities face the need to move into new subject areas, where they are short of academic expertise.

We can distinguish four approaches that have potential for Africa in response to those needs: a variant of the open university model, the offering of external degrees by existing universities, links to meet the needs of scattered student audiences, and the use of distance teaching to bring in resources from outside.

In the open university model complete degree programmes are offered by institutions separate from those offering residential training. There are no precursors in Africa. It is this model, however, that has had a robust growth in the last decade elsewhere - in Britain of course, in several European countries, Pakistan, Venezuela, Thailand, China, and most recently in Indonesia. The media mix varies markedly among them, as does the degree of instructional design going into the pedagogical effort. Some countries have
stressed television as a primary medium, as has China, while others such as Thailand have relied largely upon correspondence courses.

For Africa, an independent national open university would be practicable only in the limited number of larger countries where the scale of student enrolment would justify the significant investment required. At the same time, regional cooperation in East, West, or Southern Africa could meet that requirement. Given political constraints, such cooperation may be most likely in Francophone West Africa, where a number of regional institutions have demonstrated some viability. As most economies of scale are associated with the production of course materials, there would be advantages if national open universities could draw on a regional institution for many of their courses but manage and accredit the learning process on a national basis.

The cost advantages of an open university option can be substantial, because of the ability to increase the student/faculty ratio at low marginal cost and because of the great savings that arise when student maintenance is not provided by the state. Additional economic advantage can also arise from the fact that students frequently work while attending such institutions. These advantages can also accrue to the external degree model described below.

The establishment of a highly effective open university system takes time and considerable investment. On the other hand, both China and Indonesia have recently shown that a basic system can be put in place very rapidly, and on a large scale. (Important to the rapid development of the Chinese Television University was the decision to concentrate, at least at first, on a narrow range of subjects - in this case in engineering). While it would be dangerous to extrapolate from the experience of very large countries in Asia to Africa, it is striking that nine months after receiving government approval to organise its Open University, Indonesia last year enrolled its first class, of 65,000. It is now simultaneously expanding enrolment and improving pedagogical quality through better instructional design procedures. While so rapid an initiation is hardly to be advocated, it demonstrates the degree to which the organisational parameters for such systems have become known, routinised, and mastered.

An alternative approach, the external degree model, which has some African precedents, provides the opportunity for students to take degree work off campus. At both the University of Lagos and the University of Zambia, for example, it is possible for students to do two years of their degree by correspondence. Courses are available at Lagos in education and business studies and in Zambia in the humanities and social sciences. Comparable programmes exist at a limited number of other institutions of higher education in Nigeria, and in Francophone Africa, and of course in other countries.

While these projects are modest, and lack the glamour of large open universities, they demonstrate that distance teaching can be used under African conditions to widen university opportunity. Experience elsewhere in Anglophone Africa has also shown that distance education courses can be used for other forms of post-secondary education. In Kenya, for example, a distance-teaching course offered by the Correspondence Course Unit of the University of Nairobi has been used to train 2700 adult literacy tutors, who learned new skills for their job while working throughout Kenya.
Outside Africa links to meet the needs of scattered audiences have been important, especially in archipelago communities. Both the University of the South Pacific and the University of the West Indies have used satellite communications in order to reach audiences in islands with no university campus. A variant of this model has recently been developed in Indonesia, where junior faculty in Indonesian universities in the Eastern archipelago are being upgraded through distant tutorials by experts at a major research centre located thousands of miles away, on Java. For this purpose, reliable two-way audio communication is certainly desirable, so that discussions can occur.

While costs for such live two-way links remain relatively high, they need to be seen in the context of declining prices for telecommunication links and of the high costs of moving people to and from remote areas as compared with the costs of moving information.

In some parts of the world distance teaching is being used to bring in resources from outside the campus, or even the country or the region. This can permit universities to combine their areas of specialisation to serve students throughout a region, rather than attempting to duplicate faculties in each institution. While regional universities have done so in the past, the requirement to take courses on each campus has been a very severe constraint. Distance teaching, on the other hand, permits students enrolled at any campus, typically the one nearest their home, to take course offerings from any campus. A project in the Eastern Islands area of Indonesia is linking students on ten campuses in this fashion, through audio communications and print.

This kind of sharing is possible with the most modest technology. Experiments are beginning - for example between the University of Papua New Guinea, University Sains Malaysia and the University of the South Pacific and universities in Australia, Britain and Canada - in the co-operative development and use of distance-teaching materials. Once the necessary institutions have been established, universities in Africa will thus be able to widen the range of what they can teach at a distance by using materials prepared elsewhere, or materials which they prepare co-operatively.

We can sum up that, while no African country has set up an open university, there are important beginnings in the use of distance teaching in higher education. It may be of growing interest to ministries of education faced by increasing demand for higher education and its relatively high unit costs. The most important developments may come through the use of distance education based at existing colleges and universities, following precedents in Kenya, Nigeria and Zambia, rather than through the establishment of completely new institutions. But, given the political will, there may be scope for smaller countries to benefit from some kind of regional open university through economies of scale in the production of teaching material, even though its teaching would also need to be organised nationally. In the most populous sub-saharan countries, a national open university might be able to work on a scale that would allow substantial reductions in unit costs as compared with conventional alternatives.

The conditions for success

The experience of distance education reviewed in this chapter has shown that it can be relevant to problems of educational opportunity, of access,
Box 5: External degree courses at the University of Zambia

With the exception of the University of South Africa (itself a correspondence-based university) the University of Zambia has probably the longest experience of distance teaching at tertiary level in the continent. A requirement to teach at a distance was written into the charter of the university on its foundation, and has been written into the contracts of its academic staff. It has been running correspondence courses since 1967 and in 1984/85 had some 600 students enrolled on 22 correspondence courses. Students work mainly by correspondence but have a weekly 15-minute radio programme - enough perhaps for stimulation but hardly for any serious teaching - and must attend an annual residential course of two weeks. In the 1983/84 academic year 77% of those enrolled completed their course and 64% of them passed their examinations, with a further 28% passing in some but not all their papers (Department of Correspondence Studies, 1985).

Courses are written by the regular academic staff of the university, with limited professional input from the three professional staff of the unit. The unit also employs two course advisers to counsel students which they do by post and through regional tours. There is a student postal loan scheme for books but only a limited number of books are available in the extramural section of the library. After completing two years by correspondence, students gain their degrees after a further two years on the campus.

There are significant differences between this program and the working of an open university. The courses are written by the same staff as those who teach face-to-face, with students following the same syllabus and taking the same examination. The university has also devoted only limited resources to the production of courses; these are duplicated and sometimes mere expansion of lecture notes than courses prepared to suit the particular needs of students working at tertiary level without the expenditure, or the commitment, required to establish a separate university.

Estimates of recurrent expenditure for 1984 give a cost per student of K416 (US$220). Despite its small scale, and the constraints imposed by the limited resources available to the correspondence department, the service has, in practice, widened entry to the university, done so at modest cost, and enabled students with work and family commitments to get a degree after a shorter period of full-time study than would otherwise be possible.
and of quality. But it is not a strategy to be used on its own. It is, rather, to be viewed as a legitimate form of education alongside conventional alternatives.

Success is dependent on the necessary political support and on a number of requirements more specific to distance education. The design of distance-teaching projects should be both cost-effective and manageable within existing administrative limitations. To be successful instructional design should be based on sound pedagogical principles. Systematic feedback and formative evaluation should be built into the system to allow for review and revision. Professionals working in distance education need to be trained in instructional design. Teachers need monetary or professional incentive to upgrade skills through distance education. Students and teachers require certification upon completion of equivalency courses. A reliable system for the production and distribution of materials, and for the maintenance of necessary hardware need to be assured.

Most educational innovations make similar demands. We would stress three points which are of particular moment for distance education. First, distance education needs to be organised on a scale which permits adequate investment of academic time in the production of good teaching materials. Unless good materials are produced, and kept up to date, learners will suffer. And where numbers are very small, it is impossible to justify the necessary input here. (On the other hand, course enrolments do not need to read the tens of thousands of the British Open University for distance teaching to become economically attractive.) The need for investment in course development is not a once-for-all commitment: there needs also to be continued investment in manpower and materials to maintain and update them.

Second, in projects as varied as interactive radio for primary schools and the development of correspondence courses at tertiary level, pedagogical inputs are necessary. There is a growing body of expertise, within Africa and outside, in the design and making of sound educational materials. Such specialist knowledge needs to be brought to bear: for most purposes, distance teaching demands more than the mere recording and production of the face-to-face lectures.

Third, distance teaching demands logistic support. Again, there is extensive experience within Africa of setting up arrangements to distribute materials, to maintain records, to get feedback from students, to oversee their tutoring. Without well worked out logistical support of this kind, distance teaching may offer the shadow of more conventional education but will not offer its substance.
4: COSTS OF DISTANCE EDUCATION

We can summarise the available information on the cost of distance education in terms both of resource use and of its relation to alternatives. We begin by reviewing the cost experience with interactive radio for quality improvement then turn to equivalency programmes. Much of the experience is from outside Africa where costs, notably in Asia, may be expected to be lower than in Africa: inferences for Africa from the data reported here should bear that in mind.

Costs of Interactive Radio

As interactive radio is used within a normal classroom, its costs are additional to the ongoing costs of primary education. Table 3 provides estimates of the annual per student incremental recurrent costs of providing interactive radio for one year. In Thailand, $0.35 out of the total of $0.44 is for the student workbook; in Kenya, student worksheets (at $0.06) cost much less, but, because it is assumed that the only use of the radio sets is for the radio lesson in one subject, radio reception costs run to about $0.30 of the $0.40 total. Thus, depending on whether workbooks are supplied as part of a radio project and on how many uses there are for the radio receivers, interactive radio recurrent costs are likely to be in the range of $0.30 to $0.75 per student per subject per year. Provision of a 200 page textbook to a student would have costs in approximately the same range, assuming a production and distribution cost of $1.50 per book and a 7-year useful lifetime. These figures compare to the approximately $50 per student per year recurrent cost of primary education in Kenya, to take one example.

The cost effectiveness of instructional radio can be assessed only in comparison with other alternatives for enhancing achievement. One carefully controlled study from Nicaragua assessed the impact on achievement relative to the status quo in first grade mathematics of instructional radio (without textbooks) and of providing mathematics textbooks to every child. Both the instructional radio and the textbook groups performed significantly better than the control group, which had relatively limited textbook availability; gains in the radio group, however, were significantly greater than those in the textbook group (Jamison et al, 1981).

An alternative to comparing interactive radio with other interventions to improve quality is to assess its impact on the time it takes a student to progress through the curriculum. At its crudest, this approach uses grade repetition as an indicator of failure to progress; the impact of interactive radio on the repetition rate can, then, be used to assess the cost per graduate with and without radio. Clearly, costs per graduate can decline

1. The radio receivers are included in recurrent costs in these calculations - presumably because in the long run, there will be a steady flow of required replacements. Costs of program production, which can be substantial if programming is undertaken de novo, are based on the staffing level required in a steady state and not on that used in the experimental Kenya pilot. While these costs are low, when expressed per student, they were necessarily higher than for conventional schools broadcasts in Kenya.
Table 3: Interactive Radio Cost Estimates

<table>
<thead>
<tr>
<th>Estimated Recurrent Costs for First-Grade Radio Math in Thailand</th>
<th>Estimated Recurrent Costs to Disseminate Radio English Lessons to all First-Grade Classrooms in Kenya</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumptions:</td>
<td>Assumptions:</td>
</tr>
<tr>
<td>- Only future recurrent costs are considered.</td>
<td>- Only future recurrent costs are considered.</td>
</tr>
<tr>
<td>- Programs are used in 30,693 schools with 45,413 first-grade classes totaling 1,081,733 students.</td>
<td>- Programs are used in 11,966 schools with 1st-grade classes totaling 840,000 students.</td>
</tr>
<tr>
<td>- Every first-grade section in a school currently has a radio.</td>
<td>- Every first-grade section in a school will have a radio (12,000 now in schools; 10,250 to be added for full implementation).</td>
</tr>
<tr>
<td>- Nonreusable workbooks are given to all students.</td>
<td>- Reusable workbooks are provided to every student.</td>
</tr>
<tr>
<td>- Radios last about 5 years; batteries last for about 100 hours.</td>
<td>- Radios last about 5 years; three sets of batteries per year are required.</td>
</tr>
<tr>
<td>- All teachers are given manuals which last an average of 2 years.</td>
<td>- Three 30-minute programs are broadcast daily throughout the school year.</td>
</tr>
<tr>
<td>- 34% of all schools have electricity.</td>
<td>- An existing radio channel is available and has been boosted, at no cost to the project, to reach the entire population.</td>
</tr>
<tr>
<td>- Radios will be used 6 hours per day among several classes. Only 1/2 hour will be first-grade math, so only 1/12 of cost attributable to Radio Math.</td>
<td></td>
</tr>
<tr>
<td>- Teacher orientation is part of regular ministry costs.</td>
<td></td>
</tr>
</tbody>
</table>

Cost per student per year (US$) Per Student

<table>
<thead>
<tr>
<th></th>
<th>Student Costs:</th>
<th>Per Student</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student Costs:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>workbooks</td>
<td>.35</td>
<td></td>
</tr>
<tr>
<td>Teacher's manual</td>
<td>.44</td>
<td></td>
</tr>
<tr>
<td>Radio (annualized)</td>
<td>.85*</td>
<td></td>
</tr>
<tr>
<td>Power (batteries)</td>
<td>.32</td>
<td></td>
</tr>
<tr>
<td>Program revision</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>Transmission Costs</td>
<td>$1.63</td>
<td>.07</td>
</tr>
<tr>
<td>Program Costs:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative personnel</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>$0.44</td>
<td></td>
</tr>
</tbody>
</table>

*Costs used for 1A other programs.

<table>
<thead>
<tr>
<th></th>
<th>Per Student</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Classroom Costs for 40 Students:</strong></td>
<td></td>
</tr>
<tr>
<td>Teacher's manual</td>
<td>.15</td>
</tr>
<tr>
<td>Radio (annualized)</td>
<td>7.00*</td>
</tr>
<tr>
<td>Radio maintenance</td>
<td>2.50*</td>
</tr>
<tr>
<td>Power (batteries)</td>
<td>2.81</td>
</tr>
<tr>
<td>Teacher training</td>
<td>.03</td>
</tr>
<tr>
<td>Transmission Costs</td>
<td>$12.49</td>
</tr>
<tr>
<td><strong>Program Costs:</strong></td>
<td></td>
</tr>
<tr>
<td>Administrative personnel</td>
<td>.02</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>$0.40</td>
</tr>
</tbody>
</table>

*Cost of 10,250 new radios for full implementation, used exclusively for English lessons.

Source: Searle (1985)
even when interactive radio is strictly an add-on cost if there is a more than compensatory decline in the repetition rate; such a decline was indeed found in the first year that mathematics by radio was introduced in Nicaragua. Later, however, teachers apparently stiffened their requirements for mathematics attainment and no further impact on repetition was found. To assess the impact of interactive radio on learning time we should, then, clearly use other indicators of student progress than teachers' standards, where these are likely to change. While such calculations have not, to our knowledge, been undertaken, doing so would be straightforward enough. One would expect that analysis of Nicaragua and Kenya interactive radio data would show it to be highly cost-effective by this criterion, but the analysis remains to be done.

Costs of Equivalency Programs

We have rather fuller data on the costs of equivalency programmes for various purposes—teacher training, secondary education and tertiary education. Costs are available for the distance-teaching schemes for teacher education in Kenya and Tanzania. In interpreting them we should remember that their rationale was to expand teacher training rapidly rather than to seek economies. Costs are available for the project in Kenya and were reported to be not particularly favourable as compared with the costs of face-to-face alternatives. Costs per student rose from 1978 US$144 per subject-equivalent to $288 between 1970 and 1977: during this time the fixed costs of the project showed little change. While the number of students in the programme declined (Hawkridge et al 1982). In Tanzania, as we saw, costs of a larger scheme than that in Kenya, were about 25% of the cost of full-time training. These findings are consistent with those of an earlier scheme run by UNRWA/Unesco in the middle east refugee camps. While detailed figures were not reported, a Unesco study found that costs were about half of those for teacher education through conventional attendance at a college (Lyle 1967).

At secondary level we have some cost data from Africa and other developing countries which is summarised in table 4. Difficulties of interpretation arise because we are short of information about success rates for private external students. But we can say with some confidence that the African experience shows that distance teaching at the secondary level can show favourable economic results as compared with conventional secondary schooling. In Kenya, as we have just seen the numbers being taught in the programme (geared to secondary level qualifications though designed primarily for teachers) were not large enough to justify the fixed costs of the programme. In Malawi the costs per successful student were lower than those for boarding schools, though higher than those for day schools. In Zambia, the dropout rate for students working at a distance would have to rise to between 86 per cent and 95 per cent before the cost per student rose to the level of full-time secondary education. In Mauritius the programme was one of improvement so that the costs were additional to those of the private secondary schools in which the courses were offered: these additional costs were, however, not out of line with those of private tuition, widely resorted to by parents as a way of increasing their children's educational chances.

The savings generated are important, but indicative more than anything else: we would suggest that they demonstrate the potential for using distance teaching to widen opportunities and reduce costs in secondary education, rather than claim that all of the potential savings have yet been realised.
While we have no African data on the cost of tertiary education, data is available from a range of projects outside the continent, as in table 5. We can summarise by suggesting that open universities may show economies as compared with conventional universities. It has been suggested that open universities with 10,000 to 20,000 students are "probably critically balanced, in so much as their unit costs are on a par with or below those of campus-based institutions" (Rumble 1982, p. 138). At the same time more modest projects, which have not demanded the heavy investment in infrastructure needed by a free-standing university, have shown unit costs which compare favourably with those of conventional education at much lower enrolment levels.
<table>
<thead>
<tr>
<th>Country, institution and date of studies</th>
<th>Type of project</th>
<th>Aprox annual enrolment at time of study</th>
<th>Annual capital cost per student in US 1984 $\text{a/}$</th>
<th>Measure of success included in calculations?</th>
<th>Measure used</th>
<th>Rate</th>
<th>Comparison between costs of distance teaching and costs of orthodox education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>Secondary</td>
<td>8,000</td>
<td>107</td>
<td>Yes, at $7.5%$</td>
<td>Examination passes</td>
<td>37%</td>
<td>D/t is probably more expensive</td>
</tr>
<tr>
<td>Brazil</td>
<td>Secondary radio, print and some face-to-face support for out of school equivalency exam</td>
<td>177,000</td>
<td>40</td>
<td>Yes, at $7.5%$</td>
<td>n/a</td>
<td>n/a</td>
<td>D/t is probably cheaper</td>
</tr>
<tr>
<td>Canary Islands</td>
<td>Upper primary/ lower secondary</td>
<td>23,000</td>
<td>102</td>
<td>Yes, discount rate not stated</td>
<td>Number promoted to next class after 6 months study</td>
<td>72.75%</td>
<td>D/t is cheaper</td>
</tr>
<tr>
<td>Kenya</td>
<td>Teacher training</td>
<td>340-2,900</td>
<td>517</td>
<td>Yes, at $7.5%$</td>
<td>Teachers promoted as a result of course</td>
<td>90%</td>
<td>D/t is more expensive</td>
</tr>
</tbody>
</table>

...... cont.
Malawi

<table>
<thead>
<tr>
<th>Malawi Correspondence College</th>
<th>Second-</th>
<th>3,800</th>
<th>254</th>
<th>Yes, at 7.5%</th>
<th>Examination passes: as proportion of enrolments 13% as proportion of exam entrants 21%</th>
<th>Cost per successful student cheaper than for day schools but dearer than boarding schools</th>
</tr>
</thead>
</table>

Mexico

<table>
<thead>
<tr>
<th>Telesecundaria</th>
<th>Second-</th>
<th>29,000</th>
<th>374</th>
<th>Yes, at 7.5%</th>
<th>Standardised tests administered to Telesecundaria and conventional school students</th>
<th>Cost per student lower $374 instead of $502 but no information about cost per completion</th>
</tr>
</thead>
</table>

South Korea

<table>
<thead>
<tr>
<th>Air Correspondence High School 1974-77</th>
<th>Second-</th>
<th>20,000</th>
<th>108</th>
<th>Yes, at 7.5%</th>
<th>Examination passes 46%</th>
<th>D/t is cheaper</th>
</tr>
</thead>
</table>

Zambia

<table>
<thead>
<tr>
<th>National Correspondence College</th>
<th>Second-</th>
<th>12,000</th>
<th>64 to 185</th>
<th>Yes, at 7.5%</th>
<th>Examination pass rate n/a</th>
<th>If success rate above 5-14% of original enrollment, then D/t is cheaper</th>
</tr>
</thead>
</table>

Notes: a. Costs converted to June 1984 $$ using World Bank and US deflators
b. Costs summarised in Perraton (1982) where sources are given
c. Espina Cepeda (1980)
e. Perraton (1983); high and low estimates or cost reflect the varying cost of face-to-face supervision
Table 5: Costs and success rates: distance teaching at tertiary level

<table>
<thead>
<tr>
<th>Country, institution and date of studies</th>
<th>Type of project</th>
<th>Aprox annual enrolment at time of study</th>
<th>Annual cost per student in US 1984 $$ b/</th>
<th>Capital included in calculations?</th>
<th>Measure of success</th>
<th>Measure used</th>
<th>Rate of distance teaching and costs of orthodox education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Britain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open University 1971/79</td>
<td>University</td>
<td>25,000</td>
<td>1,872</td>
<td>Yes</td>
<td>Graduates as proportion of final registration</td>
<td>54%</td>
<td>D/t cheaper per graduate produced than orthodox university</td>
</tr>
<tr>
<td>Open University 1981/82 c/</td>
<td>University</td>
<td>20,000</td>
<td>n/a</td>
<td>Yes</td>
<td>as above</td>
<td>57%</td>
<td>Cost per graduate through OU 62% of cost per arts graduate at orthodox university, i.e. $13,219 (OU) $21,472 (CU)</td>
</tr>
<tr>
<td>Doncaster Institute of Higher Education 1977/78</td>
<td>Professional qualification</td>
<td>75</td>
<td>1,193</td>
<td>No</td>
<td>Final examination passes as proportion of entrants to 3-year course</td>
<td>52%</td>
<td>D/t cheaper. Costs per graduate are: $12,545 conventional $7,566 d/t</td>
</tr>
<tr>
<td>South West London College</td>
<td>Professional qualification</td>
<td>150</td>
<td>833</td>
<td>No</td>
<td>Final examination passes as proportion of entrants to 2-year course</td>
<td>35%</td>
<td>D/t cheaper than evening classes but dearer than day release classes. Costs per graduate are: $4,241 day release, $4,764 d/t, $6,268 evening classes</td>
</tr>
</tbody>
</table>

....cont.
<table>
<thead>
<tr>
<th>Country</th>
<th>University</th>
<th>Cost per Year</th>
<th>Cost per Credit</th>
<th>Graduated</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>Athabasca University 1979/80</td>
<td>4,400 $/yr.</td>
<td>1,238 $/credit</td>
<td>Yes</td>
<td>Costs are within the range of comparable Alberta conventional universities lower than that of small conventional universities</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>Universidad Estatal a Distancia 1980</td>
<td>8,150 $/yr.</td>
<td>1,038 $/credit</td>
<td>Yes</td>
<td>Cost per student lower than at conventional universities. Cost per credit comparable with that of larger conventional university</td>
</tr>
<tr>
<td>Israel</td>
<td>Everyday University 1978</td>
<td>8,000 $/yr.</td>
<td>1,266 $/credit</td>
<td>Yes</td>
<td>Graduates as proportion of enrollment forecast $9,582 compared with $18,800-20,500 at conventional universities</td>
</tr>
<tr>
<td>Japan</td>
<td>University of the Air</td>
<td>7,000 $/yr.</td>
<td>1,922 $/credit</td>
<td>Yes</td>
<td>Cost per graduate will equal cost at private day universities, if 50% graduation rate achieved</td>
</tr>
<tr>
<td>Venezuela</td>
<td>Universidad Nacional Abierta 1980</td>
<td>13,400 $/yr.</td>
<td>1,571 $/credit</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

Notes: a. Except where shown, this table is based on table 5 in Perraton (1982) where full references for data are given.  
b. Costs have been converted to June 1984 US$, generally using the US Consumer Price Index as a deflator.  
d. Using the figures for 1979/80  
e. Course enrolments  
f. Full-time equivalents  
g. Budgetted, not actual expenditure  
h. Muta (1984)
5: CONCLUSIONS AND RECOMMENDATIONS

The hard evidence on the cost effectiveness of distance education in Africa is thinner than we would like. There is only limited experience of its use in higher education within the continent. At secondary level projects have been modest and have suffered by being starved of resources; student numbers have sometimes been too low to reap potential economies of scale. At primary level only a single project within the continent, Radio Language Arts in Kenya, points clearly forward.

In contrast with these limited accounts of success and failure, distance teaching has been used on a large scale for teacher education within Africa, and it has had important successes in other countries of the south in secondary and higher education. The evidence on teacher education is important: ministries have found that distance-teaching methods can produce the results they want, at costs which compare favourably with those of conventional education, and permit them to reach and teach people throughout their countries. If we can extrapolate from the experience of teacher education to post-secondary education generally, then its potential in Africa is great. If, too, we can extrapolate from the limited experience in Nigeria and Zambia in higher education, and from open university projects in Asia and Latin America, then there is scope for further development at this level. At secondary level, while African success is modest, the cost advantages of distance teaching are such that it may play an increasing role in expanding secondary schools. We would, however, caution against the consequences of building a parallel system of education at a distance, separated from the regular schools: such a system will increase access to secondary education, but may do little for equity, offering a more difficult route to secondary education for those who are likely already to be educationally deprived. At this, as at other levels, distance education will promote equity as well as increase access if it is integrated closely with the work of schools or colleges in a system which combines the benefits of conventional and distance education. One possibility here may be for a new kind of institution, using more nonformal approaches than those of most of the equivalence programmes we have examined.

We can sum up our views in the following recommendations.

1. Distance education should be considered seriously, in planning education investments, because of its proven capacity and further potential to improve educational quality and access.

2. Distance education has solid achievements in primary education (interactive radio), where radio has been enhanced by innovative instructional design. Instructional design is an area with great potential that has been all too little explored; this exploration should continue. What has been developed can now be applied.

3. Particularly in Africa, additional channels are needed for radio broadcasting. The Bank should consider financing one or more channels dedicated to the Education Ministry or other appropriate agencies.

4. Distance education should be used for teacher training, especially the upgrading of unqualified teachers and the specific in-service training of qualified teachers.
5. Distance education has the potential to reduce costs at the secondary and tertiary levels. At tertiary level there are particular advantages in its use for part of the whole degree course - possibly but not necessarily for the first one or two years of the course. Distance-teaching units within universities have particular advantages but there is also a potential for some kinds of open university to be established, both on a regional basis and, in the more heavily populated countries, on a national one.

6. To foster equity as well as increasing access, and to combine the advantages of distance and conventional education, conventional schools and colleges should accept responsibility for working with distance-teaching institutions, and for serving students beyond their walls as well as within.
References


Mkuye, M.S. and O.J. Matemu. 1984. "Activities of the National Correspondence Institution, Dar es Salaam, Tanzania" (Case study for short course in distance teaching, University of London Institute of Education).


