

CHAPTER 4

THE EFFECTIVENESS OF DISTANCE EDUCATION

4.1 Introduction

- 4.1.1 The measurement of effectiveness within education is a difficult issue, and much more difficult than politicians would like to believe. It is not simply about achieving objectives, because a system that steadfastly achieves objectives that do not reflect social or individual needs should hardly be called effective. A full consideration of effectiveness must also take into account the quality and relevance of the objectives set, and the accidental benefits or 'spinoffs' that may accrue to different approaches or programmes. These issues will of necessity bring a range of political considerations to bear, and thus a system that is deemed effective in one set of circumstances may not be so in others.

Measures of output can also never form a complete description of education. Opponents of distance education often extol the virtues of school or university communal life. While we do not believe these and other unquantifiable effects of conventional education are always necessary, we acknowledge that the student learning politics by correspondence alone at home has a very different experience from the campus-based student. In contrast, the student of management who is learning better management skills at a distance while at work, has a different experience from the student removed from the job and sent to college for a year. Examination pass rates and student completion rates do not take account of the fact that many adult students embark on study with a particular aim which may not include sitting for an examination; a proportion of adult non-completers can always be considered successful students.

- 4.1.2 Elements of the effectiveness of a course, programme or institution will be demonstrated by the relevance of the learning provided to the needs of the group or individual to whom it is targeted, by the numbers taught and the extent to which the learning is made more accessible to more people, by the extent of successful learning (as measured where relevant by exam passes), and by the cost-effectiveness which will always be comparative between methods, institutions or systems but which may have to consider a range of other issues besides costs. We may also look for signs that a particular educational venture has affected the lives of individuals, or the quality of life of a community, although evidence of such effects is almost impossible to find and isolate. In this chapter, we consider such measures of effectiveness. We have already given indications of numbers taught in chapter 3, so we concentrate particularly on success in learning and cost effectiveness. We also consider the resources needed for effective distance education.

- 4.1.3 A great deal of caution must be adopted when examining and comparing evaluation studies. They vary markedly in quality and depth, and there are methodological difficulties and differences in current evaluation practice. Our chapter considers these briefly alongside the findings. Some of the examples we quote can be used for guidance but are not necessarily based on comprehensive, accurate data. We believe that research and evaluation are strong candidates for Commonwealth collaboration; this chapter and the relevant background papers make suggestions about methodologies.

4.2 Evaluation

- 4.2.1 In this section, we consider the criteria by which the effectiveness of distance and open learning systems have been measured, in relation to their objectives - academic, operational, economic or political. We rely on educational evaluators to determine how well a particular educational programme, curriculum or teaching method works, how it might be improved and how it compares with alternatives. This section draws heavily on background paper 10.

With the increase in publicly-funded distance education over the last fifteen years, often by the creation of new institutions, has come a corresponding increase in the amount of educational evaluation in this area. As with most innovations, evaluation is required to justify continued funding but also it is necessary because of the invisibility of distance students.

- 4.2.2 Innovations in distance education frequently involve new teaching methods, new media, new student groups, new curricula and new institutions. In these contexts "evaluation" tends to cover a broad range of activities and employs the full armoury of social science methods of data collection and analysis. There are difficulties, as with other educational evaluation, in agreeing on the best methods of qualitative evaluation, but generally studies tell us that distance and open education can be as good as conventional alternatives and are sometimes more appropriate. See paper 10 for details of such studies.

4.3 Academic Quality

- 4.3.1 Academic quality relates to the relevance of the programme provided to the needs of the students or professional group at whom it is directed, and the acceptability of the outputs from that programme. In the case of a course preparing students for externally validated examinations such as degrees or professional qualifications, the assessment of such quality often lies outside the institution with professional or examination boards. It can also lie with groups such as employers who, in looking for graduates of such programmes, will form their own view on the quality of the programmes the students undertook. The perceptions

of groups such as employers is best ascertained by market research techniques.

- 4.3.2 But academic quality does not only relate to content: the quality of the teaching and learning provision and student support is also important. These issues can often best be addressed by looking to the students and the answers to questions such as the following:

Do students persist or drop out early on?

How well do they fare in progressive assessment exercises?

Do students sit the terminal exam?

Do they pass or fail the exam?

Many institutions seek to use such questions to assess the quality and abilities of their students. However, unless there are very clear reasons for believing that a particular group of students have lower abilities, the questions are much more valuable as tools for the assessment of the quality of the teaching and learning provision. Some of the institutional failings that these questions might highlight are discussed in 4.4 and 4.6 below.

- 4.3.3 Compared with conventional education, the attrition rate for distance students is higher. An International Council for Distance Education research project over five institutions in four countries found an average drop-out rate of almost 50%. Such figures are common everywhere. On the other hand, students who reach the end will do as well, or often better, in terms of completion rates and grades, than conventionally taught students. An analysis of external studies in Australia suggests that the overall completion rate is 10-20% less than that for internal students. The case study below illustrates this, and comments on its significance.

Case Study: Completion rates of External Students in Australia

On average, about two-thirds of full-time undergraduate students complete their courses, compared with about 40 per cent of part-time internal and external students. It could be argued that the relatively low graduation rates of part-time and external students lead to significant inefficiencies. This argument is, however, not sustainable. Australia's system of part-time and external study is one of the most important means whereby enhanced opportunities for improved participation and access to higher education (in particular the opportunity to upgrade and update qualifications) are provided. This is particularly important for mature age students. Thus, while it might be theoretically possible to improve the efficiency of the

higher education system in terms of expenditure per graduate by limiting opportunities for part-time and external study, any gains would be off set by a substantial reduction in the opportunities to enter higher education, particularly for significant groups of disadvantaged students

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Success Rates (a) of Bachelor Degree university students by field of study and mode of attendance, 1982

Field of Study	Full-time	Part-time	External	Total
	per cent	per cent	per cent	per cent
Agriculture	86	-	-	86
Architecture	89	71	54	87
Arts	79	76	71	78
Commerce, Economics	80	69	60	78
Dentistry	94	-	-	94
Education	88	80	74	85
Engineering	86	80	-	85
Law	87	79	77	86
Medicine	94	-	-	94
Science	81	77	74	80
Veterinary Science	96	-	-	96
Other	87	79	59	85
	—	—	—	—
TOTAL	84	75	71	82
	—	—	—	—

(a) The ratio of the number of subjects/units passed in a given year to the total number of subjects/units in which students were enrolled for that year.

(Source: Australian Vice-Chancellors' Committee)

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In 1982, university full-time students undertaking bachelor degrees were successful in 84 per cent of the subjects/units in which they were enrolled; the rates for part-time and external students were 75 per cent and 71 per cent respectively. Although the rates vary to some extent between different fields of study, they represent, by any measure, an encouraging picture. Although success rates for part-time and external students are lower than those for students studying full-time, they still show that university students facing the extra difficulties of part-time and external study are able to sit for and pass 70 per cent or more of the subjects for which they had enrolled in a given year. The part-time and external modes will still be

relatively efficient methods of delivery if resources used per capita are less by the relevant proportion.

(Source: Commonwealth Tertiary Education Commission, **Review of Efficiency and Effectiveness in Higher Education: Report of the Committee of Enquiry**, 1986, Australian Government Publicity Service)

4.4 Operational Quality

4.4.1 An open or distance education system can fail operationally in a numbers of ways, including:

- * the wrong courses are offered (market research and curriculum design have failed);
- * the system is badly designed (media choice is inappropriate; the distribution system does not function);
- * the system is poorly maintained (underfunding is the most common reason for this).
- * inadequate student support is provided (too few tutors or difficulty in contacting them, response to assignments or enquiries is slow or poor, additional texts or backup materials not available)

4.4.2 Poor marketing, poor scheduling of materials production, unavailability of essentials such as paper, inadequate tutorial arrangements can contribute to failure, and are all, unfortunately, common. Those new to distance education often underestimate the organisational capacity necessary.

These problems are easy to identify and investigate through simple surveys and monitoring exercises, but often costly and difficult to overcome.

4.5 Economic and Political Effects

4.5.1 Superficial economic and political effects appear to be relatively easy to assess, but the value of the information gleaned is often questionable and appropriate future courses of action are much harder to assess. Employers can be interviewed to determine if the quality and numbers of trained applicants are appropriate, economic measures can be applied to assess local, regional or national living standards, market research studies can be conducted to assess public opinion.

4.5.2 However, relating findings on educational effectiveness to economic or political objectives (or even accidental benefits) often reduces or negates the validity of the educational findings.

For example, a study could reveal that a regional initiative in public health education has adopted a particular approach that is less effective and more expensive than alternatives. However, such findings may be less significant than the fact that it has involved the creation of a local educational institution (a cause of increased local pride) and generated 300 new jobs in the region.

- 4.5.3 It is also important to recognise that economic and political influences can operate at both the macro and the micro level of educational provision. Many of the organisational failures listed in 4.4 can often be caused by economic or political decisions overriding the educational needs of students. As a result, it is often very difficult to identify true cause and effect relationships between educational quality concerns and the success or failure rates of students.

- 4.5.4 Studies attempting to investigate educational effectiveness within the context of political and economic priorities are few and far between, and results must always be treated with caution. The UK Open University has undertaken a study to explore its impact on its graduates in terms of their occupation, personal development and further educational or professional activities. Findings from this work are expected to be released during 1987.

4.6 Issues related specifically to distance education

- 4.6.1 An effective distance education institution must produce high quality teaching materials, distribute them efficiently to the students, provide support and teaching as required, and manage the learning and assessment. What makes the difference between good, bad and indifferent distance education? There are a number of major factors that can impact on the success of a programme, and the effect of these will often be reflected in the retention rate of students.

- 4.6.2 There may be a mismatch between the programme provided and the students' expectations or needs

This problem has been strongly recognised in the United Kingdom where significant attention is now being paid to the need for educational guidance services for adults. The Unit for the Development of Adult and Continuing Education in its report "The Challenge of Change" and the Council for Educational Technology (UK) in "Adult Learning by Choice" both highlight this problem and call for urgent action to develop such guidance services as well as systems to help adults more accurately assess their learning needs.

- 4.6.3 For professional/vocational courses, there may be poor links with the working environment.

A course in public accounting offered by the Andhra Pradesh Open University in India illustrates how much the link with work matters. Arrangements for collaboration between the University and public accounting offices were unsatisfactory, over 50% of the students dropped out, and the exam pass rate was 18%.

- 4.6.4 Time-structured tuition may be poorly paced, and either too fast or too slow. There are powerful arguments for designing courses in such a way that the student may control their own learning pace.

Several research projects suggest that students are encouraged to continue if their work is marked quickly. Expectations vary from country to country; European students expect their work to be marked in a few days, while in much of Africa, students have to wait for weeks.

- 4.6.5 The materials provided are poor in content, design or structure, or they are unsuitable for the entry skills or knowledge of the students

Much research has taken place to determine desirable characteristics of distance-teaching materials. The student's response will depend greatly on expectations. Three points are worth noting:

- * developmental testing should be an essential element of materials design.
- * good face to face teachers will not necessarily be able to design and produce effective learning materials
- * good materials will generally not result from the direct transfer of face-to-face lectures to a media base. Careful structuring of the learning is required to take account of the circumstances in which learners will be working.

- 4.6.6 The students may be unready, or insufficiently motivated for an open or distance learning approach. Open or distance courses can be quite demanding of students because of the absence of regular tutorial or peer group contact, and the consequent need for a high degree of personal drive or external pressures.

Students new to distance education need help to adapt to the mode of study. Two common forms of help are assistance with developing study skills and the provision of student support services, particularly face-to-face facilities. While these are particularly important for new students, they also contribute to sustaining motivation in continuing students, besides often providing an important teaching component.

4.7 Future Strategies for Evaluation

- 4.7.1 Our background paper (Paper 10) gives a summary of evaluation techniques, what they can show and what they have shown. While there have been many useful findings, they almost always depend very heavily on the nature of the system under study and of the society in which it occurs. We are very far indeed from being able to construct "iron laws" of open or distance teaching systems. Drop out rates provide an excellent example of this fact. By knowing something about the course characteristics and the student population we can estimate the likely drop-out rate for a new UK Open University course. However, it would be invalid and inaccurate to use such a predictive model as it stands for, say, a distance learning package on farm practice in a developing country. Rather than the detailed results of particular evaluations, or even their predictive models, it is the general approaches and considerations that should be of interest to evaluators elsewhere. There is scope for much more careful comparative research. The Commonwealth is well-placed to encourage international initiatives.

4.8 The Choice and Use of Media

- 4.8.1 In distance education at least one medium of instruction is used to transmit content to learners. There is no logical step-by-step procedure for deciding on the best media configuration and there is no single optimum choice. Each teaching system has to be custom built to suit the subject matter to be learnt and the circumstances in which it has to operate. But there are some factors to take into account, summarised below and presented more fully in Paper 12. The costs of the different media are discussed below and in more detail in Appendix VII.
- 4.8.2 We will recall from chapter 3 that there is widespread conservatism in the use of media in distance education today. Only half the institutions in our survey used audio, and that was more frequently used than any other medium besides print. About a third used video, and less than 10% used television. There are constraints on media use: some students do not have access to certain media, and some subjects are not suitable for presentation in certain ways; but such constraints do not entirely account for the limited use of all media except print.
- 4.8.3 Access and delivery (as well as cost) are among the most important considerations in choice of media. The following are key questions:

Does the target group have access to the medium?

- at home (with equipment that they own or borrow);
- at study centres (with shared equipment).

Are the times allocated for broadcasts suitable?

Can the equipment be maintained?

For collaborative/international projects, is copyright clearance negotiable/affordable?

- 4.8.4 Broadcasts are very good at attracting students. Radio is cheap and accessible, but television programmes are costly to make and transmit, and in some countries, many if not most people do not have access to television.
- 4.8.5 In the course of our study, many practitioners mentioned an interest in using more media and new modes of delivery. Any such initiatives should be preceded by a careful survey of facilities available or potentially available to students, and an investigation of the costs of providing them, if necessary. The wider range of media employed, the more important and difficult become arrangements with other institutions, such as broadcasting or telephone organisations for improving access to students.
- 4.8.6 Educational factors can affect media choice. Why should we use media other than print and face-to-face? While each medium can be used to teach most things effectively, there are areas where one medium is particularly effective. Television, for example, can show material otherwise inaccessible, such as laboratory experiments and case study material, but is a relatively ineffective vehicle for conveying much content.
- 4.8.7 Materials must be of reasonable quality, and this raises issues of production. Printed materials in distance education are subject to the control of an editor or team. Broadcast or recorded materials, video or audio, need to be prepared to a reasonably professional standard. Three kinds of expertise are required of producers:
- * knowledge of what the medium can do relative to the subject matter being taught;
 - * knowledge of the subject matter and ways to teach it effectively;
 - * expertise in instructional design, how to integrate the media, and how to help learners get the most from each medium.
- 4.8.8 It is difficult to determine what constitutes sufficient quality in materials. In general, people will accept materials that give them an opportunity to learn, regardless of production quality, provided that the learners are highly motivated and the system is well-designed. We have come across examples of handwritten photocopied materials which were successful with highly motivated office accountants. On the other hand, if a medium is used where students are used to higher quality, and where they are not highly

motivated, the teaching may not be successful. Black and white schools television, for example, often fails to hold the attention of children used to colour television.

- 4.8.9 It is sometimes argued that the use of a course team improves quality. It is true that a group working together to produce a multi-media course is more likely to produce integrated materials than a set of individuals. On the other hand, teams may be unwieldy. One UK OU course team, for the Science Foundation Course S101, had 64 members, 32 full-time and 32 part-time. Co-ordination of such a group has its costs in time, effort and money. A partnership of writer and editor, with a specialist subject adviser, can result in excellent quality materials, without the costs of a large team.

4.9 Costs of media

- 4.9.1 For any medium, there are costs associated with the planning and developing of materials, with producing them, with distributing them to students, and with supporting their use in the field. These costs vary enormously with the type of media and their conditions of use. (A fuller account of these costs is provided in Appendix VII of this report as well as in background paper 9.) A number of general conclusions can be noted here.
- 4.9.2 It is no surprise that the range of costs associated with the different media is enormous with the production costs of short workbooks at one end of the scale costing perhaps US\$0.40 when produced on sufficient scale to broadcast television costing perhaps US\$150,000 per hour or even more.⁺
- 4.9.3 What is surprising is the difference in costs for the same media between different countries. One example drawn from Appendix VII will serve to demonstrate this:

Table 4.1: Comparative costs of radio and television (1980)
(in 1986 US\$ equivalent)

	Radio Production and transmission	Television production and transmission
Britain	6,900	83,200
Bangladesh	57	1,510

(Source: Perraton H; *The Cost of Distance Education*, International Extension College, 1982, p.10)

⁺ Where conversion factors are available, cost figures have generally been converted to US dollars (US\$). Where such factors are unavailable, figures have been left as supplied.

- 4.9.4 Such marked distinctions between countries stem from a large number of local differences. In the context of Table 4.1, the differences result from differing technical production standard requirements for broadcasting (the UK BBC and IBA technical requirements are far more stringent than those in Bangladesh and therefore the cost of origination equipment is much higher), different union manpower requirements for productions, relative salaries and costs of living, significantly different costs associated with the maintenance of the broadcasting infrastructure, and many others.
- 4.9.5 Despite the enormous differences in costs between two countries such as these, it could be that, in the right circumstances and for the right purpose, the use television would be adjudged cost-effective in Bangladesh and not in Britain, or vice versa. There is little transferability of findings related to the cost of media from one country to another.
- 4.9.6 The costs of media will always be a significant consideration in the planning of open and distance education programmes. In order that cost-beneficial decisions can be made, regular and detailed national costings need to be made. (Technological developments - e.g. electronic publishing - can often result in major cost changes over a period of a few years or even less.) Such studies, which will make an important contribution to assessments of cost-effectiveness (see 4.10) must be conducted for each country as local variations can have profound effects. There is undoubtedly a need for a range of further and ongoing work in the area of media costs.
- 4.10 Cost effectiveness of distance education
- 4.10.1 We now turn to considering the costs of complete distance-teaching systems. We have been concerned to collect new data to extend our knowledge of conditions under which distance education is cost effective in comparison with conventional education.
- 4.10.2 Our study has encountered the same difficulty as others: shortage of data, both about conventional and distance education; and lack of consistency between those studies that have been attempted in various Commonwealth countries. We believe that further studies are necessary, and our background paper on costing (Paper 9) gives guidance on approaches to this task. Despite the patchiness of existing data, we have attempted, using evidence summarised in our background paper and the studies to which it refers, and using data collected during the study, to answer the kinds of questions we expect policy makers to ask concerning the cost-effectiveness of distance and open education.
- 4.10.3 The problems that inhibit us from drawing firm conclusions are:
- * little agreement on methodology of costing, eg differences in treatment of capital costs;

- * problems in reflecting the 'true' costs of a system, and drawing valid conclusions from these. For example, some studies concentrate on institutional costs (those costs carried on the budget of the institution), while ignoring 'system costs' which fall on other people or institutions;
- * the costs of goods and services (including the costs of publishing in different media) differ from country to country, making international comparisons difficult;
- * some institutions receive help in the form of international aid which enable strategies and technologies to be adopted which could never be supported using indigenous sources. The presence of such gifts or loans may distort international and inter-institutional comparisons;
- * views on the acceptability of levels of charges for education relative to standards of living vary from country to country and according to socio-economic status
- * there are wide variations in how any given medium is used and distributed. Consequently, it is very difficult to draw conclusions about the relative costs of different systems;
- * there are very few studies on the relative costs of different media choices. In general, such studies only offer broad generalisations from institution-specific or country-specific studies, and are therefore of limited help in costing intranational and particularly international projects.

4.10.4 Despite these problems, there is plenty of evidence that distance education can be cost-effective in comparison with conventional education. Our concern is more specific: what media combinations and what systems are likely to be cost effective in different circumstances.

4.11 System costs

4.11.1 In order to achieve maximum economic benefit, the following conditions must be satisfied:

- * the variable cost per student is less than that found in face-to-face systems operating at a similar education level;
- * the number of students is large enough to keep down the average cost per student;
- * drop-out rate is kept at a reasonably low level;
- * the number of courses or volume of materials does not grow so large that it becomes difficult to keep the average cost

per student down.

- 4.11.2 These conditions have implications for the choice of media, market research (to ensure there will be enough students), and resources put into student services and the infrastructure.

In comparing systems, we do not compare the absolute cost of the system, but the average cost per student.

4.12 Costs of pre-university distance education

- 4.12.1 At **primary level**, distance teaching is seldom likely to be cost-effective in comparison with conventional schools. At **secondary level**, however, there are examples where it has been demonstrated to be cheaper.
- 4.12.2 In **non-formal** education, it is much less easy to draw comparisons between the costs of distance and conventional educational methods, not least because non-formal education does not lend itself to traditional methods of teaching. What can be said is that where distance methods are used in large scale projects, the unit costs are low.
- 4.12.3 At lower levels of education, because per student costs in the formal system are lower, it is more difficult to make open learning cost effective, and it is only sensible to initiate open learning if student numbers are large.

We have not attempted to gather new data for these basic levels, as our terms of reference demand an emphasis on higher levels. We wish to point out, however, that the need for basic and non-formal education among adults is very great. It can be effective in terms of learning outcomes and costs, and distance education at these levels deserves to be accorded far greater priority.

4.13 Costs of University distance education

- 4.13.1 At the **tertiary level**, distance education is likely to be more cost effective than conventional practice. In universities, two models can be identified, the dedicated distance-teaching university and the conventional university with an external programme.

4.14 The dedicated distance-teaching university (Open University)

- 4.14.1 This is usually dramatically cheaper than conventional education, even when an open university uses the more expensive media. A recent comparative study⁺ of costs in Britain (see Table 4.2 overleaf) shows how per student costs in an open university compare with those of conventional institutions.

Table 4.2: Costs per student per annum (or equivalent) in US\$ (1986) [Figures converted from £ sterling]

	Loughborough University	Middlesex Polytechnic	Open University	National University Average (USC)	National Poly-technic Average
Arts Sub-jects	3360	3766	2072	3612	4550
Science Sub-jects	6062	5390	3276	6566	5516
Average	4564	3836	2520	4914	4662
Comple-tion rate	97%	86%	72%		

- 4.14.2 The proportion of students that succeed is more critical. From Table 4.2, it can be seen that if the completion rate were to drop below 55%, the cost per successful student could be higher for the Open University. But some further figures suggest that for the larger open universities in other countries, drop-out must be extremely high before this is the case. The Allama Iqbal Open University, Pakistan, estimates the costs per student of its BA courses as 38.35% less than the costs of study in a conventional institution, with its intermediate (lower level) courses 44.72% less.* An study from Thailand compares costs per graduate of the Sukhothai Thammathirat Open University with 10 other conventional

⁺ Study conducted by Ralph Smith, Open University (1986) and figures given verbally. To be published as Smith, R C, 1986: A Comparative Study of Some Performance Indicators for a UGC funded University; a Polytechnic and the Open University.

* AIOU: The First Ten Years, Islamabad, Pakistan, 1986

universities; the STOU costs in 1982 range from 4.84% to 54.91% of the costs in other universities, with the cost in most cases being between 15 and 25%, (Wichit Srisa An, 1986, **Financing and Cost Effectiveness of Distance Education**, paper prepared for Asian Development Bank, November 1986, p32).

- 4.14.3 In general terms, the higher the enrolments, the more cost effective an open university is likely to be; but growth must be limited in order not to overstretch the support system. If numbers are so great that access to and quality of teaching and other support services deteriorate, drop-out rates will increase and costs per successful student increase.

4.15 **A conventional university with an external programme.**

- 4.15.1 The costs here vary tremendously. A major reason for this is that the external programme is often closely tied to the internal syllabus. This has two important results:

- * the courses offered are often replicas of lectures, to the extent that course material may be little more than printed notes, and that no additional media are used;
- * external programmes may be obliged to offer courses with a minute and uneconomic demand, especially at higher levels.

- 4.15.2 The size of the programme (in terms of the number of students involved) can also affect the approach adopted for the programme and the consequent costs. For this reason, they are treated separately below and a case study is provided for each type. A further case study is presented of an institution that utilises a mix of distance and conventional approaches.

4.16 **Institutions with small external programmes**

With smaller programmes, costs tend to be close for both systems, and many uneconomic programmes are probably in operation. In Australia, which has many small programmes, one analysis suggests a minimum of 2,000 enrolments is needed for a programme to be cost effective. The case study below explains this.

Costs of the Australian Model

Researchers who have attempted to analyse the costs of single mode institutions have found enormous difficulties, and these difficulties are compounded in the Australian dual mode system. Furthermore, because Australian distance teaching institutions vary greatly in their organisational structure, technologies, methodologies, level of courses, and enrollments, the problem is compounded even further. Perhaps one of the worst problems of the dispersed system of

distance teaching in Australia has been an apparent inability of institutions to furnish accurate sectional costs in their distance teaching operation.

However, the institution of which the author is a staff member (Darling Downs Institute), has made a genuine attempt to isolate costs. Australian higher education institutions are all government funded, and funding is on a capital and recurrent basis. In general terms, the institution at which the author is employed, receives recurrent funds of about US\$3,500 per equivalent full time student enrolled in a Bachelor of Business degree. How any one institution disperses the recurrent funding it receives is at its discretion. It is fully entitled to spend more than the recurrent amount on one faculty and less on another. More importantly, it is at liberty to spend more of its recurrent funds on face-to-face teaching per equivalent full time student than it is on external teaching.

In the author's institution, the cost of producing materials and teaching a unit of study in the Bachelor of Business degree is approximately US\$3,500 per student enrolled in a subject or unit of study with total enrollment of up to 50 students. However, when 200 students are enrolled, economies of scale begin to accrue and the cost per student falls to US\$2,800.

Variances evident in overseas institutions in costs according to discipline area are also evident in Australian external studies. At the author's institution costs incurred in mounting a scientific unit are 40% higher than those for business studies. But whatever the discipline area it is obvious that subjects taught by external means are definitely capable of economies of scale, albeit with some more so than others. The figures suggest that, in general, where enrollments are below 50 in a subject, distance teaching is likely to be very cost inefficient, and this is a generous interpretation. As a corollary, where there are 150 or greater enrollments, a satisfactory level of cost efficiency is being achieved. It should be reiterated that the greatest economies of scale accrue in the preparation and production of materials. Preparation includes the work of the author, the instructional designer, the editor. Production includes wordprocessing, graphics, printing, audio and video production. There are far fewer economies in the mailing, warehousing, teaching, student support, examination and equipment provision areas.

If this is related to the Australian context, it means that provided the materials were prepared and produced by a central organisation, satisfactory economies of scale could be achieved. If a multiplicity of institutions were then prepared to use these materials, or certainly the core of them, for their own teaching purposes, a cost effective

situation would result. Of course, staff in the institutions are quick to point out that they want the right to use their own materials. They would not be happy using something prepared in a central institution. These inhibitions may be overcome if the central organisation prepares and produces only the core materials in subject areas and teaching staff are left to add their own interpretations. This approach is especially relevant in vocationally oriented areas such as engineering and accounting. It may be more difficult in philosophical and social science areas. Funding authorities who have an obligation to see that, on a national scale, cost effectiveness in education is achieved, can argue that it is necessary for teaching staff to forego some of their independence of spirit in deference to an unacceptable cost structure.

The above approach looks at the costs of producing subject materials. But an institution which intends to operate in a distance teaching mode must be prepared to establish a basic external studies infrastructure. This comprises academic and technical staff, computer hardware and software, wordprocessors, and a printery. An institution which does not have this infrastructure will find it difficult to prepare instructional materials of an adequate standard and will be faced with the alternatives of either not putting sufficient expertise and effort into materials preparation, or using a modified face-to-face approach. In the author's institution attempts were made to separate out the infrastructure costs so as to give an indication of the cost of setting up an adequate external teaching system. It showed that such costs are difficult to justify until an institution has minimum external student enrollments of about 3,000. It showed that, where enrollments fall from 2,000 to 1,000, the costs per student increase enormously. It is also clear that these figures vary significantly according to the number of courses offered since each extra course incurs absolute cost increases.

In summary then, we can say that when a distance education system is being established that:

- a) There are high initial costs which result in considerable inefficiencies until total enrollments reach a certain level.
- b) Each additional course of study results in additional costs and an increase in total enrollment needed to achieve a given level of efficiency.
- c) It is likely that total enrollment of at least 2,000 is necessary to support the efficient operation of an external studies programme, even with a limited range of courses on offer, and of at least 3,000 of a wider range

of courses.

These figures are lower than those which have been quoted for overseas institutions. One of the reasons is that in the mixed mode institutions in Australia, the external studies section share some infrastructure costs with the face-to-face areas.

Furthermore, the calculations above have been based on an approach to distance education which is decidedly modest. The model includes no allowance for broadcasting or other expensive technologies, or any high cost subject areas such as science. Further it is based on a much smaller range of courses than is offered by many of the big overseas institutions.

(Source: Taylor, J, **Application of Distance Education in formal and non-formal education.** Paper prepared for Asian Development Bank, November 1986)

4.17 Institutions with large external programmes

- 4.17.1 In the case of the correspondence course Institutes of India, student costs are very low compared with conventional universities. In 1983-84, the average cost of education per student in formal colleges in Delhi was over five times as much as in the correspondence institute. The costs per student in the correspondence mode vary directly with the number of students enrolled, as Table 4.7 shows and the case study below describes.

Table 4.3: Costs of correspondence study in India

Correspondence Inst.	No. of students (1981-2)	Cost per student	
		Rs.(1981)	US\$(1986)
University of Madras	446,600	246	21
Andhra University	11,851	315	27
University of Allahabad	638	486	41
University of Jammu	258	528	45

University of Delhi Correspondence Course Institute Case Study

[Note: As this is a quoted document and as the importance of the figures is for their relativity rather than their value, costs are left in Rupee.]

The enrollment constantly increased from 6,482 to 18,520 during 1980-81 to 1984-85. Consequently cost per student showed decline from Rs.806/- in 1980-81 to Rs.552/- in 1984-85. These figures are at current prices. Even then over the five-year period, cost per student has declined by 31 per cent. It is further observed that fee income per student as a proportion of total cost has shown an increase from 28 per cent in 1980-81 to 42 per cent in 1984-85. As a consequence, there has been a gradual reduction in the subsidy component by State from Rs.577- per student in 1980-81 to Rs.320/- in 1985-86.

The institute has worked out cost of education per student in selected colleges of Delhi and the school of correspondence and continuing education in 1983-84. The average cost of education per student in formal colleges was Rs.3,187 as against Rs.613/- in the case of school of correspondence and continuing education. In another study conducted by the Institute, efficiency of the correspondence mode was compared with formal education in which the results of the final examination year 1977 were compared. It was found that the pass percentage of students of regular colleges was 56.72 and students of correspondence education was 41.57. It may be recognised that pass percentages of students of correspondence education are generally low. But there are other factors which may also be considered in these studies. Regular college students are qualitatively better off in terms of their performance at the previous examinations and they have better socio-economic backgrounds.

(Source: Mullick, S P, **Distance Education in India**, paper prepared for Asian Development Bank, November, 1986)

- 4.17.2 Unfortunately, these figures do not make it clear what proportion of enrolled students sit the exams. The smaller the proportion and the lower the pass rate, the nearer the costs become to those for internal students. In addition, this and other correspondence institutes have been criticised by the UK University Grants Committee and others for their poor quality (see Paper 6). Some large dual-mode institutions may achieve low per student costs through the use of poor quality printed notes and inadequate tuition. The extent to which large scale dual-mode programmes can maintain both quality and cost-effectiveness at this level bears further examination.

4.18 Mixed distance and face-to-face programmes

- 4.18.1 The costs of adding more courses are a particularly important factor in several degree systems. In a degree based on credits, large numbers of students take each basic level course, while diminishing numbers take higher level options which may thus

become very costly. In the Universiti Sains Malaysia, a large number of options are offered. However, the University avoids the high cost of offering all final year options at a distance by teaching the final year face-to-face; physical capacity thus restricts the numbers admitted to the whole programme. As it stands, the off-campus programme is probably not cost-effective, if drop-outs and failures are taken into account, as the case study below suggests.

Costs of the USM Off-Campus Programme

A very rough and simplistic costing indicates that in 1985, the cost of maintaining an off-campus student carrying an 18-credit unit workload per academic year amounted to about MYR.3,094 (US\$1,222). Presuming that this student successfully carries the same workload for the next five years, he would cost the University about MYR.15,472 (US\$6,115) for the 90 credits (1985 value). In the final year as a full-time residential student he would cost the taxpayer between MYR.8,000 - MYR.10,000 (1985 value - US\$3,162 - 3,952) for one year. This would mean the output cost of the off-campus student will be between MYR.23,472 and MYR.25,472 (US\$9,277 - 10,067). A similar student in the on-campus mode would have cost between MYR.32,000 and 40,000 (US\$12,648 - 15,810), or about 27.37 per cent more than his off-campus counterpart. This conclusion is based on the fact that the above mentioned off campus student and the rest of his cohort will continuously be successful at every stage of their study and either graduate in the minimum time or continue to be in the system till they graduate. Once again our experience in the USM indicate that less than 70 per cent of every cohort graduate in the minimum stipulated time and perhaps as much as 15 per cent fail to complete the programme.

(Source: Paper 2)

4.19 Costs of Professional and Technical Training

- 4.19.1 For Professional training, little data is available, but there is no reason to suppose the picture is much different from university level, with one qualification: much technical training is likely to require a substantial face-to-face component, which is costly. All the same data on professional courses from Australia shown in Table 4.4 overleaf shows a cost for distance courses of about 50% that of internal courses.

Table 4.4: Direct teaching unit cost for Royal Melbourne Institute of Technology, internal and external programmes 1975-1980 (US\$, 1986 converted from Aus\$, 1984)

(US\$ per EFTS)

Year	Internal	External
1975	1,433.58	695.45
1976	1,853.21	845.43
1977	2,011.74	922.36
1978	2,312.97	1,208.47
1979	2,351.71	1,364.35
1980	2,467.31	1,048.80
Mean	2,071.75	1,048.69

(Source: Sharma, R D, "The Economics of Distance Education in an Integrated Tertiary Education System", **Challenges Facing Distance Education**. James C Taylor, Judith A Timmins and Vernon J White, editors. [Australia: Darling Downs Institute Press, 1984], p. 76)

- 4.19.2 We can also look at technical and vocational training according to the costs to the client or employer, where in-service training is taking place. It has been calculated that in the UK, the costs to the client for on-site training are between US\$4 and US\$8 per student hour, providing student numbers exceed 500 a course. This compares with an off-site cost of US\$15-20 per student hour.⁺ Such figures make distance learning look most attractive.

4.20 Costs of Acquiring Courses

- 4.20.1 Costs can be dramatically reduced by borrowing materials. The Open College at Hong Kong relies entirely on materials bought from other institutions and it covers its costs through student fees.

⁺ Ralph Smith, **The Growth and Scope of Distance Education**. Paper prepared for the Asian Development Bank, November 1986, p. 30.

- 4.20.2 Full fees for an ordinary degree are Hong Kong \$39,600 (US\$5,040). An Honours degree is HK \$13,200 (US\$1,680) extra. Students must also buy a set of books on many courses. The college breaks even on the total income despite large number of courses (65) and a small number of students (2000). With 10,000 students, the fees could probably be reduced by at least 30%.
- 4.20.3 The 1986/87 average unit cost in recurrent expenses at Hong Kong University is HK \$52,600 p.a. (US\$6,695) or HK \$210,400 (US\$26,777) for a four year honours degree. Capital costs are too varied to include in any year or for either university. 1986/87 capital spending on the two universities will be US\$27.6m. In addition to US\$118m recurrent spending. The Open College total costs are estimated at about one quarter to one fifth recurrent cost at Hong Kong University.
- 4.20.4 If an institution that uses other peoples' materials only expects small student numbers, the choice of materials may be limited by copyright factors. The down payment for use of video programmes may amount to thousands of dollars, and even the costs for reproducing extracts from commercially published textbooks to accompany study guides can be prohibitive.
- 4.20.5 Despite apparent cost benefit from this approach, some caution must be allowed when acquiring materials from other institutions. The amount of benefit gained will be reduced by the extent to which the acquiring institution must adapt acquired materials before they are suitable for local use. Such adaptation may be required to allow for language differences, cultural differences, regulatory differences, pre-requisite skills required, literacy or numeracy levels and many others. The costs associated with substantial adaptation may approach the cost of developing entirely new materials if permanent staff have to be employed.
- 4.20.6 Failure to make the necessary investment in adaptation can have a retrograde impact on cost-effectiveness if the rate of learner drop-out increases because they find the materials unsatisfactory.
- 4.20.7 Some institutions combine their own course production for some courses with purchasing for others. Table 4.5 overleaf shows how this might affect costs. To be cost effective, an institution that purchases a large proportion of its course material should have a small permanent professional staff.

Table 4.5: Possible effects of course development policies on Athabasca costs 1980/81

Currency: Canadian \$

Mix of courses	Costs of developing courses	Costs of acquiring courses	Total university expenditure	Average cost per student enrolment
66 developed 0 acquired	1,386,000	-	6,009,450	1,014
44 developed 22 acquired	924,000	154,000	5,701,450	962
33 developed 33 acquired	693,000	231,000	5,547,450	936
22 developed 44 acquired	462,000	308,000	5,393,450	910
0 developed 66 acquired	-	462,000	5,085,450	858

(Source: Perraton, H, *The Cost of Distance Education*, International Extension College, 1982)

[As these figures were derived from official sources, and as it is the relative values that are important, figures have not been converted.]

4.21 Collaborative Projects

- 4.21.1 Collaborative projects incur some costs not encountered in stand-alone schemes, mainly concerned with communication. Institutions will not only need to be ready to spend money on services such as telephones. There may also be capital costs, for acquiring compatible equipment such as wordprocessors, and hidden costs in time for discussion and explanations between partners. Some collaborators admitted to us that such costs had far exceeded stated budgets.

4.22 Meeting the costs

- 4.22.1 The costs of distance education must be met by the provider, its sponsors and by the students. The costs of large scale capital

items (buildings, broadcasting facilities, etc), will generally need to be carried by a government or international aid agency, and treated as a sunk cost (ie, not recoverable). Students may reasonably be asked to buy the basic equipment they need to study. The extent to which students should pay for all of the costs of (1) tuition and direct other training costs, (2) general student support costs, (3) development and production of course materials, and (4) general institutional overhead costs, is a matter of judgement.

4.23 Conclusions on Costs

4.23.1 Distance education for all purposes and at all levels can be cost-effective. How much so depends on numbers of students, the level or type of education, institutional organisation and configurations of media use. The following points may serve as guidelines:

- * distance and open education is more likely to be cost-effective at tertiary level than at lower levels
- * at tertiary level, a dedicated distance teaching institution such as an open university is likely to cost significantly less per successful student than a conventional institution, provided that overall numbers are sufficiently large, and the drop-out rate does not become critical - in the examples provided here, the drop-out rate would need to be well in excess of 50% before the costs advantage was lost
- * dual-mode institutions are likely to have smaller numbers of students, but our examples suggest that numbers per subject or programme need not be very great for it to be cost-effective. There is a need to control the number of subjects offered and the quality of materials produced
- * although there is little data available, it would appear that, given the high costs associated with professional and technical education (particularly where job release is required), and where numbers are substantial, open and distance education for that sector offers significant cost benefits over conventional provision
- * acquiring courses from other institutions can be a very cheap way of providing distance education providing the amount of adaptation required is limited and does not require the employment of a large permanent materials design and production staff

4.23.2 While such generalised conclusions as these can be drawn regarding the costs of media and the cost-effectiveness of distance education, they can only act as a guide to planners. There is no absolute consensus on how to cost a project and there is no

substitute for costing each planned course or system as carefully and as accurately as possible.

4.23.3 Intranational and international projects raise particular problems in costing and the analysis of costs, not least because:

- a) organisational structures and work roles may differ, making it difficult to draw precise boundaries in allocating costs to categories of expenditure;
- b) the absolute cost of services may differ markedly for reasons beyond the control of project administrators (eg, radio transmission may be free in one country, expensive in another);
- c) in the case of international projects, account has to be taken of exchange rates and differences in inflation;
- d) if comparisons of cost-effectiveness are to be made, then common measures of desired outcome must be agreed for the whole project.

4.23.4 Detailed costing of individual planned projects can and should be done in all cases. However, maximum value will only be obtainable from comparative evaluations where there is an agreed basis for costing in the first place. It is also important to recognise that the objectives set for initiatives in other countries are almost certain to differ to some extent from those in the project under consideration, and many of the significant political or economic objectives may not be explicitly declared. In such a context, neither costs nor measures of outcome are absolute. Each is capable of interpretation and variation. Costing methodologies can be derived from the many studies that already exist on Commonwealth initiatives and valuable judgements can be made about the relative cost-effectiveness of different systems where comparable methodologies are used. Paper 9 offers a model for such an approach.