

## Bibliography

Before citing the references on which our argument is based, some general comments serve as a guide to the literature.

One body of literature examines the definition of open and distance learning, a term, which two traditions brings together. Reference to openness reflects the political agenda of much distance education, with its intention to broaden participation in further and higher education in order to include social groups, which have been hitherto underrepresented (Young in Paine, 1988). Besides looking at widely accepted definitions of distance education, like those of Keegan (ed. 1993) or, more succinctly, Perraton (1991), it is interesting to look at programmatic formulae such as Peters' definition of distance education as the 'most industrialised form of education' (Peters in Keegan, 1994). We can infer an interest in scale economies from this definition.

Of direct relevance for our research was the literature on the cost-effectiveness of dedicated open and distance learning institutions. The British Open University was evaluated in its early stages by Wagner (1972 and 1977) and Laidlaw and Layard (1974). These early evaluations found it more cost-effective than conventional institutions. Two distinct performance indicators have been developed to assess the cost-effectiveness of open and distance learning institutions, recurrent cost per student and cost per graduate. Ansari 1992 did similar research within India. The relevant literature has found that while the cost per student for open and distance learning tends to compare favourably with that of conventional education, the cost per graduate is less convincing (Perraton 1982, AAOU 1993 and Dhanarajan *et al.* eds. 1994).

There exists a further body of case studies on the economics of educational media commissioned by the World Bank and undertaken by UNESCO (UNESCO 1980, 1982). The case studies use a common methodology which facilitates the comparison of results. The methodology is presented in Jamison (1972, 1977) and Jamison, Klees and Wells (1978). A succinct exposition of the methodology is found in Orivel (1987). Many of these case studies were done in developing countries, and assess distance teaching in a more general political framework. The articles of Carnoy and Levin (1975) and Klees (in Carnoy 1995) also take this approach. More recently Potashnik and Adkins (1996) have published some case studies on information technology projects in developing countries for the World Bank. The same authors reviewed (also in 1996) the research papers of the World Bank on education and technology in a second World Bank paper.

The more narrow literature on costing of distance education is limited. Perraton (1982b) and Rumble (1997) are among the most important summaries of the field. A practical guide to costing was edited in 1990 by Crabb. There are references to cost-effectiveness in Hunt and Clark (1997), Beaton (1995) and Curran (1996).

The development of information and communication technologies is important for issues of cost-effectiveness in open and distance learning for various reasons. The new technologies have a different cost structure from conventional distance education and may make open-learning strategies attractive for on-campus teaching also. Rumble (1992 and 1994) has discussed the implications of this for dual-mode institutions.

To get an idea of the scope of the new technologies a certain understanding of their nature and some of their technical characteristics is relevant. An introduction, which puts the Internet and the new communication media into a historical perspective, is Winston (1998). Angelides *et al.* (1997) give an overview on multimedia information systems and Cunningham *et al.* (1996) provide a good introduction into CD-ROM based publishing. A good introductory summary of the educational applications of many of these technologies can be found in Collis (1996).

A substantial amount of information is available on the Internet itself. We made use of various websites, which provide technical information and even product advice (the Ukerna website on videoconferencing systems is one example). Case study reports and evaluations can also be found on the Internet. Relevant to our case was the Annenberg/CBB project report (1997). Less detailed but quite illustrative was the documentation on 'Benefits and Costs of Learning Technology' by Doughty *et al.* (1997). Also conference documentation, like IDRIS'98 in Bristol, is increasingly in full detail made available on the net. (We include the relevant websites in a separate section of the bibliography.)

Some economic implications of the new technologies are examined in Egan 1996 (on multimedia) or, with specific reference to the Internet, in MacKnight and Bailey (1997). But they refer more to the general problems of regulatory frameworks and pricing options than to the costs of educational media.

Publications, which look at the cost implications of educational technologies in some detail, are rare. Rumble (in Mason and Kaye, (1989) published a cost assessment of the Cosy experience at the Open University. Phelps *et al.* (1991) looked at costs of computer mediated communication. An important inroad in the problem of costs of educational technologies was made by Bates study on technology in open learning (1995).

There is a long tradition of research into the comparative effectiveness of different educational media. As distance education has to rely on media to bridge the distance to the learner, it is necessary to examine whether you can teach as effectively through media as in the conventional classroom. A substantial body of research has been carried out over many years which consistently shows that there are no significant differences between the educational effectiveness of different media (Chu and Schramm, 1968, Russell, 1997). Perraton (1987) summarised this line of argument as media equivalence theory. It was radicalised by Clark in the claim that media do under no circumstance affect learning (1983). This was criticised in a widely quoted article of Kozma

(1991), which claimed that media may well influence learning. The debate is succinctly summarised by Carter (1996).

Kozma's article reflects a tradition, of arguing that, notwithstanding their similar effectiveness, there were practical advantages to be found in matching a particular medium to a particular educational task. Laurillard (1993) gives a synoptic summary, which links media capabilities to different aspects of teaching.

A number of writers look at how media function in different contexts including traditional classroom teaching and explore the capabilities of media there. Snyder (1998) investigates the implication of changing from print to screen, Somekh and Davies (eds. 1997) and Maier et al. eds. (1998) both present a series of case studies of the use of information technology in teaching and learning. Specific reference to the use of the Internet is made by Forsyth (1998). Hiltz (1995) gives an enthusiastic endorsement to computer mediated conferencing. In general it can be observed that most case studies have quietly abandoned any comparative intentions and concentrate on exploring the teaching and learning potential of the different media.

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