

5 How to justify your decisions

We have concentrated so far on the problem of media choice from the perspective of the course manager. We have looked at questions of quality and effectiveness, costs and efficiency, looking at the implications for planning a single course. When looking at costs, however, we concentrated on the costs incurred by the institutions and consequently ignored reception costs, which are generally costs to the learner. We now need to consider these costs and their implications for learners.

Access and reception costs

If we look at costs from an economist's point of view rather than the view of an educational manager inside an institution, we realise that costs are incurred at the point of reception. Traditionally these costs have been small (e.g. the cost of posting an assignment) or marginal (e.g. the cost of using the radio for listening to an educational programme). If you estimate the depreciated cost of a television set for the length of time when it is used for educational purposes, the reception costs to the learner are indeed marginal. Radio and television sets are part of the standard equipment of a household in a developed country: 98% of British households have television and 81% have a phone.

There is a clear threshold in the transition to computer-based learning. Up to that point, it could be argued that no extra costs are incurred to the learner in using communication technology, for education as radio and television are considered as standard household goods. Their availability is taken for granted and is thought to be independent of any decision to enrol on an educational course. Video-recording systems may mark one borderline, although even in this case 79% of all British households have video facilities. The figure rises to 92% for the age group between 16 and 59 (Sargant et al. 1997).

The main threshold comes with computer-based teaching and learning. Only 25% of all households and 32% of the 16 to 59 age group had PCs in 1998. Even in the United States, with one of the highest PC penetration rates in the world, only about 40% of households used PCs. Moreover, far from dramatically rising, increase is slow and may be reaching a plateau. Given that a sufficiently powerful PC, which includes modem and CD-ROM drive and the relevant standard software, costs between £700 and £1 500, such media requirements, which are a potential addition to the usual course costs, present a strong barrier for many potential students.

From a system point of view reception costs are variable costs. Consequently, their effect on average costs cannot be compensated by scale economies. If these costs are not transferred to the learner then they transform the average costs dramatically. We saw that the fixed costs of software development and adaptation for computer-based courses are already high. Generally only high enrolment courses are likely to justify computer-based learning where the development costs can be spread over large numbers of students. If reception costs were taken up by the institution, variable costs could soar by a factor of four or five for courses that require computer access. Such costs could not be accommodated in many normal budgets.

Computer-based learning may erect other barriers as well as the financial one, because of problems of competence and motivation. Those without computer skills may be reluctant to enrol, with consequent effects on the size and characteristics of the student body. It is reported for instance that the increased use of computer technology in the British Open University technology foundation course has reduced considerably the enrolment level of women (ibid.).

Table 5.1 gives a synoptic view of media with reference to their capabilities, their costs, and their implications for access.

The institutional level

The main difference between the course manager and the institutional manager with respect to media choice is that the course manager largely has to operate within the framework of those media already available. At the institutional level it may be possible to take strategic management decisions enabling the adoption of new educational technologies. Questions then arise about quality, effectiveness, access and equity.

Issues of quality and effectiveness

The institutional manager has to make sure that the teaching is effective and of an appropriate quality. The standards to be reached are never absolute but are defined by reference to similar institutions.

In considering media capabilities we have distinguished between presentation and interactivity, whether internal or external (table 2.2). Most of the more traditional technologies are unidirectional and are good for presentational purposes. Interactivity in the classical distance-education model is achieved either through correspondence (with the great disadvantage of delay) or through the introduction of face-to-face elements. The great divide, for the time being, is defined by the extent to which computer-based learning is introduced. External interactivity can be supported by email or computer-based communication, internal interactivity by CD-ROM or the Internet. However, technology may change again; interactivity may become available more easily as part of a merger of television and computing. Then Institutional managers would need to look into the options of interactive television, which allows some feedback. The required set-top boxes would be cheaper than a computer and less complicated to use.

Further, the institutional manager may also need to consider developments in the professional fields for which the institution is preparing its students. Many professions are making increasing use of computing and communication technologies so that students have access to the necessary technologies and need to learn about their application. It would not make sense to teach people about computer applications within their profession purely by print. An induction into the relevant professional practices becomes essential. For example, accountancy and architecture increasingly use CAD (computer-aided design) software to conduct their day to day business. In more academic fields like mathematics it is virtually impossible to teach statistics without reference to the relevant software packages (like SPSS) or ignore MathCAD software for modelling. As potential students become more and more computer literate their expectations change; they will come to expect more than the traditional chalk and talk, thus pressing for change both in conventional education and in open and distance learning. There may be arguments that flow from the nature of the subject matter being taught in favour of choosing a particular medium or combination of media.

Issues of costs and efficiency

We have seen that increased use of computer-based technology tends to drive up costs in two ways. It raises the fixed costs of course development and, by facilitating communication between tutor and student, is likely to increase variable costs for tutoring. Gains in quality, or in the richness of the educational experience, have to be set against these costs for both resource and communication media. We need, therefore, to ask whether there are opportunities to seek economies while making increased use of the advanced technologies. Three opportunities present themselves.

The first is to increase the size of the audience, so that development costs can be spread over a larger number of students. Historically this has been achieved by enrolling an increased number of students at the institution that has developed a course. But new patterns of inter-institutional co-operation may also make it possible to achieve economies of scale in course development. The Open Learning Foundation in Britain and FIT-Est in France serve as examples. In each case, a group of universities pool their resources to develop teaching material that any members of the group can use. At a European level initiatives like TERENA are beginning to demonstrate the potential of collaboration of this kind.

Table 5.1: Technologies for open and distance learning

Medium	Media characteristics	Educational strength or weakness	Cost implications	Implications for access
Face-to-face study	Simultaneous, two way, communication is possible	Adaptable; may allow immediate individual response to learner; can be highly motivating	Costs generally rise in relation to student numbers	Requires attendance at fixed time and place
Print	One-way communication Two-way communication possible where correspondence assignments are designed and returned through mail, fax or email	Provides convenient permanent record Limited in its effectiveness to motivate students May be of restricted value for some practical subjects	Significant fixed costs in developing printed materials. Reproduction costs used who economies for large print runs but with digital, just-in-time, printing may no longer do so	Generally no problems of access
Broad-casting (radio and television)	One way communication	Can motivate, excite, dramatise, illustrate Ephemeral unless students record off-air	Production costs generally higher than for print Television generally up to ten times as expensive as radio Transmission costs generally met by broadcasting authority	No problem of access, with universal access to radio and tv, but timing of broadcasts may be inconvenient

Medium	Media characteristics	Educational strength or weakness	Cost implications	Implications for access
Cassettes	Generally one-way communication. Audiocassettes occasionally used for delayed response to tutors	Similar educational qualities to broadcasts but not ephemeral	Production costs in principle as for broadcasting; costs in practice lower as lower quality is often acceptable Distribution cost falls on teaching institution	Problems of access only if students do not have audio or videocassette player (79% of households had video 1995)
Video-conferencing	Can be two-way synchronous communication, generally between two sites, or with many sites if one-way video and two-way audio	Allows up-to-date, live, two-way communication, giving a sense of immediacy. Ephemeral	Significant investment needed in videoconferencing equipment and ISDN line charges. Cost a function of number of sites involved	Access open only to those who can reach location with equipment
Computer-related learning	Allows two-way asynchronous communication	Allows simulations and activities that depend on computer capacity Can be used as communication medium	Heavy initial cost to develop computer-based learning material Significant personal investment needed for computer Cost of communication through Internet relatively low	Major, but reducing, problems of access. 25% of households had PC (1995) but smaller proportion had Internet access

Source: Based on Perraton and Hülsmann 1998

Second, where courses use computer-mediated communication, it becomes possible to build up searchable banks of frequently asked questions. If the existence of such banks in practice resolves learner difficulties, then they may increase the efficiency of tutors in responding to students. This is, of course, a long way short of arguing that a bank of questions and answers should replace individual or group tuition.

Third, in the development of computer-based learning, it may be possible to make major reductions in staff costs by using generic software. In some cases this will be ordinary, multipurpose, software available commercially. Good teaching can be built around standard wordprocessing and spreadsheet packages. But, beyond this, it may be possible to develop less standard software so that components can be re-used. If software development is concentrated on generic re-usable software, compatible with various shells or user interfaces, the time required to develop computer-based courses, might be reduced with consequent reductions of development costs. (Example: if you have developed generic software for an arts course, which handles the life and work of Matisse and includes software to recompose pictorial elements, you can do the same for the course in cubism. The software for remedial vocabulary training is likely to be quite similar across many languages.)

Institutional managers are likely to be concerned with equity and access as well as with costs and effectiveness. There are likely to be trade-offs here between maximising educational quality and widening access. If, for example, there are educational arguments for having a technology-rich course and social ones for keeping the cost down, the manager will need to make a social, educational and economic judgement about the educational mixture to be sought. For the manager, the initial planning decisions are likely to be about the investment cost of a particular course and the extent to which this can be recovered, over the life of the course, either from general funds or from student enrolments. But questions about variable costs can also have a significant bearing on the financial viability of a course and on access, at least where students pay fees to meet part or all of their costs. If student fees are set below the variable cost of a course, then the institution itself incurs additional expenditure with each extra student, so that its recurrent costs rise with increasing numbers. It has, therefore, a disincentive to recruit the extra number of students that may be called for to justify the original investment cost. If, however, all the variable costs are passed on to students, the institution is encouraged to increase recruitment, but may need to increase the price to students to a level that reduces access for significant numbers of them.

Recommendations for cost-effective media choice

We can summarise the conclusions of our work in twelve recommendations.

If no specific arguments are presented, go for textual media. If there is a choice to be made between print and screen, go for print. Print allows more flexible use.

In considering the broad choice between resource media and communication media, bear in mind that resource media are likely to have economic advantages. They allow for economies of scale as well as permitting internal interactivity.

Select carefully the features of internal interactive design. Some features provide valuable student learning opportunities over considerable periods at reasonable costs, whereas in-house development, for example, of complex simulations, can prove extremely costly.

Select, and plan with care, your use of communication media which do not generally allow scale economies.

Communication media need to be monitored in terms of their unit costs. These costs are variable or semi-variable and are likely to contribute the larger part of the aggregate unit costs (often rather more than two-thirds of the aggregated unit costs).

As a general rule, asynchronous communication has cost advantages over synchronous and group communication over individual. The choice of asynchronous and group communication may be defended in terms of efficiency where computer-mediated communication is used to support students. In any case, the cost of tutorial time is likely to be an important variable. Clear guidelines will probably be needed in order to limit the input of tutorial time (and consequently costs) and to adjust learner expectations.

Face-to-face tutorials may have motivational as well as academic benefits. Reports on their emotional effects are ambivalent. Some students gain in confidence by being able to position themselves well in the group, others lose in confidence. (It is interesting to observe that some institutions keep learning centres even when they have abandoned all face-to-face contact of students with staff. It is reckoned that such centres provide a focus of identification with the institution.)

Tutor marked assignments (TMA) provide learner support and may be used for assessment. Their use for assessment may be particularly important for courses leading to formal qualifications.

If videoconferencing is considered, analyse the savings in terms of opportunity costs. There is little chance of videoconferencing being advantageous in cost terms if no considerable savings in travel time and costs can be envisaged.

If your institution is into software development, concentrate on generic software in modular form. Archive the re-usable components. This will reduce development time (time to market) and, in consequence, costs.

In computer-based learning it is worth looking into the option of banking answers to emerging standard questions in course-specific 'frequently asked questions' archives for customised re-use.

All decisions have to take into account not only costs but also the market. We have observed two strategies: expansion and specialisation. Big providers must keep high profiles to keep up enrolment. Other institutions may go for more specialised audiences. An intelligent use of existing facilities, and the development of low cost wrap-around material, may make it possible to produce high-quality courses at relatively modest cost for specialised audiences.