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ABSTRACT

The Open University of Great Britain is an open-enrollment, home-based institution in which the majority of the instruction is conducted via broadcasts and correspondence. The student is required to interact with printed materials, broadcasts, tutors, counselors, assignments, cassette recordings, experiment kits, etc. The choice of media is intended to extend access to a broad audience and, at the same time, to be pedagogically sound. Since most students study individually, it is important that the different media elements of each lesson integrate well into the course structure. This integration can be facilitated by a course team approach in which the curriculum designers, media specialists, tutors, and instructors all work toward a predetermined set of educational objectives. (EMH)

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Designing multi-media courses for individualised study: the Open University model and its relevance to conventional universities

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Introduction

The Open University does not rely entirely on self-instructional materials, nor, as we recognize, does its teaching system provide a model for courses in conventional universities. Nevertheless, we feel that there are aspects of the Open University's experience of designing and teaching courses which must be taken into account if self-instruction is ever to form a regular and important part of study in a conventional university.

In order to clarify what it is that we think can be learned from the Open University's experience, we feel it is necessary first of all to give a brief outline of our system, a system which we are aware will already be familiar to many of you.

The Teaching Package

A very wide range of teaching media are available to the Open University, and most of those available have been used, to some extent at least. All Open University courses at present offered make use of the following:

1) Printed correspondence materials - properly printed and illustrated booklets mailed direct to students at regular intervals and often accompanied by supplementary material (e.g. case-study materials, folders containing illustrations, notes on broadcasts, etc.)

2) Television programmes - transmitted at regular intervals on BBC 2.

3) Radio programmes - transmitted on BBC radio 3 and 4 VHF.

4) Correspondence tutors - regionally based, who mark student's written work and advise and guide him in his studies.

5) Face-to-face tutors - often the same person as the correspondence tutor, these hold regular local meetings which students may attend.

6) Counsellors - give general educational guidance and advice, and, especially in the student's first year, give additional tutorial help.

7) Assignments - regular assignments (some tutor marked, some computer marked) act as a means of continuous assessment and also provide feedback to the student on his progress. There is also a supervised examination at the end of the course.

In addition, some courses also make use of the following:

8) Tape cassettes and records - two courses have issued each student with a cassette recorder, on which to play back pre-recorded material, or to record broadcasts, or to record comments and questions for tutors; two courses have issued students with discs, for playing on (student-owned) gramophones.

9) Photographic transparencies - to accompany and illustrate the correspondence text.

10) Home Experiment Kits - these are carefully designed to teach the skills of experimentation at home, without the need for conventional laboratory facilities.

11) National student computing service - students can make use of computer terminals in major study centres linked to a central computer at the University headquarters.

12) Summer schools - every student receives at least one week of summer school activities on each foundation course, and on some subsequent courses. During this

week in the summer vacation there is intensive tuition from specialist tutors. These summer school activities take place in the premises of conventional Universities during their vacation.

13) Set books - specially chosen books, already previously published, but often reprinted in a special, cut-price Open University edition.

14) Reader - a specially-published collection of journal articles, chapters from existing books, sections of unpublished theses, or specially-written articles, of direct relevance to the course.

15) Telephone tuition - apart from the normal one-to-one telephone call facility, which is being increasingly used in many regions, some use has been made recently of the Post Office Conference Call facility. This allows several people to be linked up for tutorials or group discussions.

In order to have some idea of the yearly study commitment made by an Open University student, a breakdown of the Science Foundation Course (S100) activities is outlined as follows:

TABLE 1: S100 (One full credit course) STUDY ACTIVITIES

Correspondence Text	34 units	272 hours
Assignment -	16 computer-marked	16 hours
Radio	8 tutor-marked	16 hours
	32 broadcasts	11 hours
Television	32 broadcasts	13 hours
Summer school	6 days intensive tuition	72 hours (approx.)
	TOTAL:	400 hours (approx.)

In addition to these 400 hours or so, the student can, if he wishes, attend regularly (approximately fortnightly) for tuition and counselling sessions at his study centre.

It can be seen from the above breakdown that the correspondence text is the principal component in this system (although in Table 1 it includes the time spent on home experiments and any other additional material - tapes, discs, etc. - sent in the package.) There are three principle reasons for this approach:-

1) To cover a course of 400 hours work by broadcasting alone would be prohibitively expensive. In any case the number of hours available for broadcasting is severely limited, as are the viewing times of students, who are in full-time employment.

2) The correspondence text provides the student with a permanent record of the course, which he cannot easily get from television and radio. Such a record is clearly important to the student and the correspondence text is a very economical way of providing it.

3) About 25% of our students can't get to study centres on a regular basis, and in any case, as the number of courses on offer increases, the number of students in any one area, particularly in the more thinly populated parts of

the country, becomes so small as to make even occasional face-to-face tuition sessions prohibitively expensive in money and time both for the University, and for the students, who have to pay their own travelling costs.

Choice of Media

Many promising research careers have sunk into oblivion in the search to match learning objectives to particular media. One of the lessons from the Open University situation is that the initial choice of media is as much, if not more, determined by problems of access to students, as it is by pedagogic factors. It can be seen that the reason why print, correspondence tuition, and, to a lesser extent, broadcasting, became and remain the key components of our teaching system is that it is only through these means that we can be sure of reaching all of our students.(1) The reason we are a home-based institution, relying primarily on self-instruction, is that working at home is the most efficient and convenient mode of study for our students, who are working during the day. The teaching system therefore was designed to fit in, as far as possible, with the needs of the student. Now does this have implications for conventional universities? We think it does. It would seem to us to be essential to go right back to the basic needs of students at a conventional campus, particularly those needs which are not currently being met. Self-instruction might be an answer, to some of those needs, by improving students' access to knowledge, or it might help meet other needs by freeing resources (particularly academic manpower) to meet these other needs. That is not for us to judge, but we doubt whether self-instruction could flourish without it being closely related to meeting the actual needs of students, and this would to some extent determine the choice of media to be used to provide self-instruction. We believe that self-instruction can only be justified if, at the same time, it allows some of the unique features of an ideal higher education system - e.g. personal tuition, small-group learning, etc. - to be more strongly implemented. Consequently, human resources - teacher, peer-group - should also be considered as "media" for design purposes.

Media Integration

Another clear lesson from the Open University situation is that when you have a wide range of media to choose from, and students are studying individually, with relatively little assistance, the material must to some extent be integrated. To do this in the Open University situation, we have adopted a course team approach. Course teams are made up of central academic staff, including educational technologists, trained BBC/TV producers who also have a knowledge of the subject area of the course, and Staff Tutors, who are based in the regions and provide the link between regions and central course teams.

In the course team model, the initial production step is to specify the objectives of the course in some detail (unit by unit) and then design the course to meet those objectives.(14) This process means that the various media can be used in those areas where they are likely to be most effective and the rationale for their use, and therefore the integrating points of the course, can be clearly seen.(15)

Decisions can be made on the use of media both at a macro- and a micro-level. For example, our second level course in Biochemistry decided to use television to teach and demonstrate practical techniques, while the correspondence text taught

biochemical theory. A decision was therefore taken to 'decouple' the television programmes from the correspondence text at an early stage and run them as an independent sequence. However, the sequence was carefully planned and cross references made from the text to the television programmes throughout the course.

With over eighty different courses now designed or in the process of design, it is difficult to generalise, but the usual production process operates not at a course level, but at a unit or block level and here the objectives of the unit are considered together with the media available. For example, an S100 course might have related to it in the following components:-

1. Correspondence text.
2. TV programme.
3. Radio programme.
4. Home experiment.
5. Computer-marked assignment.

When the objectives of the relevant unit are considered then they will naturally form an integrated whole but these objectives may be achieved through different media.

One strategy in choosing appropriate media which it is not always possible to use in our course team situation, but which we have found very helpful in allocating resources to course teams, is to rank the various media in terms of cost and effort required, and apply to the most expensive component (in our case television) the criterion: could this be done in any other way more cheaply and as conveniently for all students using any other medium available to us in our system? This has allowed us to produce a list of over 30 functions appropriate for television and radio within our system.(2) It also appears from our studies that although there is a link between content areas and the use of different media, it is not so much the content - in terms of subject matter, abstract principles, facts, events, theory, etc. - which determines the choice of media, but the actual style or function of the teaching, and the time available on each medium.(3) For instance, we have found that television is more useful for demonstrating applications of theory or principles to real world situations, for getting students to analyse situations, for presenting "models" or "analogues" of abstract principles, for demonstrating experimental design, method and equipment.

Radio is useful for presenting alternative viewpoints, or for bringing out the main points of an argument or a theory, or, in conjunction with printed material, for talking students through difficult concepts or difficult diagrams or for discussing the structure of diagrams or pictures, or for getting well-known people in the field to condense or summarise in a manageable form a wide range of knowledge and experience. We have found it inefficient to use television merely to present a lecture (even with sophisticated graphics or photographs) - (although we often do it)! This can usually be done much better - in terms of learning effectiveness - through print.

The Course Team Approach

The course team approach, the clear specification of objectives, and the identification by the course team of the appropriate media required for achieving these objectives are essential to the Open University system. The adequate design and planning of courses however is necessary not only to ensure integration of the media but also because the actual production processes (television rehearsal and recording, graphics, selections

for reader, editing, printing, etc.) require the courses to be designed and produced many months before their presentation dates. Frequently different parts of the course (e.g. television programme and text) have to be produced out of phase with one another. This need not present a problem as long as firm and clear advance decisions have been made about the pattern of the course and the use of the various media. It should be easy though to imagine how poor design and planning can lead to lack of integration and a failure to meet deadlines.(4) (5)

The importance of the course team in the Open University is also reflected in the financial structure. While staff are appointed to Faculties, the budget for course development, production and maintenance is not allocated to the Faculties or disciplines, but directly to the course teams. Furthermore, course team chairmen have considerable flexibility in the way the money is spent, thereby giving them considerable freedom in the choice of media to be used.

We think the question of whether the production of materials for self-instruction in conventional Universities requires a course team approach is an issue which requires serious consideration. There are obvious advantages, in that with students studying independently, it is important that the individual bits of a course form a coherent whole. Also, a team system makes it easier to maximise the potential of the audio-visual contribution, by involving production staff in the planning from the beginning, and by ensuring that the availability of audio-visual material is taken into consideration all through the design of a course. Furthermore, if students are studying independently, the material must be "bug-free", i.e. clear, concise, error-free, relevant, and related to other parts or components of the course, and working as a team can help this type of "quality control" at the production stage.

On the other hand, a team approach is fraught with difficulties. For a start, it is very time-consuming. The average yearly production norm of a Science academic at the OU is 1.6 units (i.e. 1½ week's work for a student.) Such work "norms" can only be justified with very large student numbers. Of course, the OU situation is different - the OU academic can't assume student access to a wide range of books, laboratory equipment, personal contact. In fact, his 1½ units is equivalent to 1½ textbooks of 22,000 words, plus the design of home-experiments and the development of the necessary equipment, assignments, television and radio programmes, etc., plus of course time for research. But it would be wrong to underestimate the amount of work required to develop effective self-instructional materials, even if - or perhaps especially if - produced independently by individual University teachers. Secondly, for a team approach - and indeed, self-instruction - to be effective, major organisational changes would be necessary, both to the structure of the University, and to the way that teaching is organised. For instance, some budgets, such as printing, library and possibly A/V budgets, would have to be increased, and organisational units to handle art work, and the printing, duplication and distribution of A/V material, would also be necessary.(6) Indeed, such an approach would really only be justified if it was cross-faculty and cross-University. No doubt some mid-way point between the OU's thorough-going team approach and more individual methods of conventional University teaching can - and probably have - been worked out, but there is the possibility in such a position of falling between two stools - more work for academic staff, but a fall in the quality of teaching, due to reduced personal contact with students. Another solution might be joint co-operation with the Open University, as in the Genetics course being designed with the Universities of Hull, Birmingham,

Sussex and York, with financial support from the Nuffield Foundation.[7] Certainly, the work-load involved in designing self-instructional materials makes it essential that different institutions don't duplicate each others work. Some co-ordination of effort between Universities would appear to be essential - but would this not be a dangerous move towards a centrally controlled curriculum? Certain approaches to subject areas in the Open University already carry an undue influence in some courses, and there is often a lack of regard for quite legitimate alternative approaches. This can be tolerated while the conventional universities plough their own furrow, but the danger to independent modes of thinking through the development of common self-instructional materials is - while not immediate - nevertheless real.[8]

Open University approaches to individualising learning

With these words of warning, it might be helpful to look at some of the techniques adopted at the OU to individualise our learning system. In the early days, we did consider using a programmed learning approach. A full-scale programmed learning approach was in fact deliberately rejected. It wouldn't have been appropriate at a higher education level, and in any case it wouldn't have been practical either, for a number of reasons, including the problem of training, the pressure of deadlines, and the difficulties of pre-testing on a large scale. But we have tried to inject into course design many of the principles derived from programmed learning. Perhaps one of the most controversial areas is the attempt to get course teams to specify objectives. In fact, except in the Science area, to do this in strictly behavioural terms - along the lines of Bloom's taxonomy for instance - has often proved to be impossible. Indeed, we believe that if this was carried to behaviouristic extremes it would be undesirable, in that it would lead to a too-tightly structured learning package.[9] Even so, we have found that putting preseure on academics to say what they expect the student to be able to do at the end of a course, or at the end of a particular unit of study, is necessary in a situation where the aim is self-instructional material, using a course team production method. For a start, other academics in the team must have a clear idea of what ground will be covered before and after their own contributions. Secondly, in a self-instructional situation, students will become very frustrated if it is not clear to them what they are expected to do. It also helps the academic in the end to concentrate on and produce more efficiently the materials required, and perhaps most important of all, it allows a team to understand and agree more easily about the content and approach of a course as a whole.

How do we get academics to think more precisely about course objectives? Well, a lot are quite capable of doing this on their own. Many do have a clear idea of what the eventual "output" will be. But many do not. One strategy is to work out at the beginning what kind of questions will be asked of the student at the end of the course: in other words, to begin by looking at student assessment. Many academics though cannot be sure of the "objectives" until they have written something. ("I like to start on a journey, and see where it takes me.") On many course teams, after a good deal of initial argument about the course as a whole, members of the team are asked to draw up one-page summaries of what should go into each unit. These are circulated, and discussed and modified. This stage is important, because once an academic has written an extensive first draft of about 15,000 words, the nature of the beast is such that after such hard work, he is naturally resistant to making major changes in the structure of the draft. These short one-page drafts therefore are more

open to modification, so that overlap, omissions and irrelevant areas are avoided. In fact, at least three drafts of each unit are written and circulated to other members of the course team for comment, and considerable modification does take place (one important - and very useful - constraint is print budgets!) Therefore the whole process of production is one of sharpening objectives, and indeed many "objectives" do not get finalised until after the package has been produced! However, unless you have a model of a finite world of learning, this is not necessarily a bad thing.

Another technique from programmed learning that we have modified is to try and break up the learning into manageable chunks. Therefore into the correspondence texts are built self-assessment questions and activities, to make the student himself do some of the thinking, and to evaluate his own progress through the unit (the answers being given elsewhere in the text.)

These activities are not confined to the text alone. We have been trying to encourage course teams to write broadcast notes in such a way that students are asked to carry out activities following a programme, or to try and answer certain questions from their watching or listening.

In addition to the self-assessment questions and activities, our continuous assessment system is also used to break up the learning into regular chunks, to avoid students getting too far behind in the course, and then not being able to catch up. Students generally have at least one major piece of work to do each month, marked by a correspondence tutor, which counts towards their final assessment. Computer-marked assignments are also used, but the feedback for students is less satisfactory by this method.

All these techniques can of course be easily applied to self-instruction in conventional universities. However, there is one extremely important aspect of our teaching system where there might be considerable problems in applying it to conventional universities. We have deliberately decided to make high-quality, well-presented and lavishly illustrated printed material (the correspondence texts), and full-colour broadcasts made to national broadcasting production standards. To do this of course is very expensive (although even drastic savings in these areas would have only a marginal effect on the overall cost of the OU.) We think this approach is essential however because of its motivational impact on students. The correspondence texts encourage students to learn. They make you want to pick them up, and flick through, and then linger over some diagram or picture, and then to sit down and study them thoroughly.(10) Most students do try to watch most television programmes on their courses. The visual quality of the material, and the convenience and pleasure of watching the programmes, enable students to break the inertia of beginning study on their own. Proving that this approach is essential is difficult, we admit. We can only point to the staying power of our students in the system, compared with other distance-teaching systems, the very high viewing figures, feedback from our students themselves, and the demand for our printed materials from many other institutions, both here and abroad.

The role of the tutor in the Open University system

So far we have mainly considered the initial 'making' of a course. Once a course is made, however, it is to some extent mediated to a student even if only through the comments which the tutor writes on the students assignment. More likely, however, the student will, at least on some occasions, ask his tutor or counsellor for help with

his studies.

In the early years of the Open University the tutor's role was seen as largely remedial and interpretative. In other words, he was present at study centre meetings and available on the telephone or by letter for helping students to overcome difficulties in the course. More recently it has been appreciated that tutors, at face-to-face meetings, can (and do) give something more than this to students, and that the remedial function was too highly stressed in earlier years.

Thus it has become increasingly accepted that tutors should be encouraged to offer a structured seminar type of meeting. Reasons for accepting this view are varied but two factors of relevance to the present discussion are:

1) tutors have found that the individual consultation approach does not work in many of our courses. Since both tutor and student can only attend the study centre on a limited number of occasions the time available for individual consultation is very small - in relating to a students travelling time. Furthermore, those not actually speaking to the tutor may not be able to do anything very worthwhile as they wait.

2) Certain students appear to value the experience of a structured seminar and consider the group interaction and the tutor's contribution important study experiences. Many members of staff appear to agree with them.

The uncertainty about the role of tutorials reflects to some extent our own uncertainty about the extent to which Open University courses are (and should be) truly self-instructional. However, the self-instructional course in a conventional university would not encounter quite the same problems with regard to mediation, for presumably a tutor could be available both for individual remedial consultation, as well as for group teaching. Furthermore, the fact that students in a conventional university are obliged to be present on or near a campus renders them less isolated than our students and perhaps less in need of organised group meetings.

The Open University's tutor's role, despite the freedom he has in how he runs his tutorials, nevertheless remains mainly that of interpreter and mediator, for his part of part-time tutor does not involve him in the initial course design. It is true that tutorsmake valuable comments regarding the maintenance of courses and their remaking, but the remaking and maintenance of a course is as centralised an activity as its original design.

Some problems

It could be that tutors will, in future, be more involved in course design, for although we have tried to encourage and support self-instruction in the Open University, we have found a number of problems. Perhaps the most common is the practical one of overloading students. Perhaps the most common is overloading students. We frequently give students more material than they can handle in the time available. There is a fear on the part of academics of leaving out important material, when as we all know, in a conventional university situation, no student covers even three-quarters of the curriculum. In a self-instructional situation though, the learning is more structured and the student is more isolated, and it is less easy therefore for him to opt out, with confidence, from major sections of the course. This results in another problem, that of students keeping on schedule. Their lives are governed by the

assignments. They tend to "bunch" their work around the assignment dates. If programmes are scheduled to be shown at times when students ought to be working on a unit, they will often not have covered the necessary pre-reading.(11) In a conventional university, a video-cassette system allowing access to programmes on demand therefore has considerable advantages over a pre-scheduled distribution by cable.(12)

Another problem relates to the deeper issue of what a student should gain from University study, for by separating the preparation of teaching material from the assessment of the student the course can sometimes ignore the need to help students to develop basic learning skills, such as fast and selective reading, essay writing, the development of objectivity. We have found for instance that many students need help in knowing how to approach the television and radio programmes. Also, our system is so structured that it controls the way the learning is organised.

If the paradoxical effect of self-instruction were to make students ill prepared for learning on their own without the tight control of a system, then the widespread adoption of self-instructional techniques should be viewed with caution. Our own experience does not quite lead us to this conclusion but the view is increasingly heard that the system does limit the students' learning.

There is a growing concern within our Institute of Educational Technology that in our attempt to end up with clear, pre-specified objectives, and highly structured learning, we are doing the creative thinking, and not the students.(13)

A structured learning situation is probably necessary in the early stages of a students' experience of self-instruction, but there should be a gradual progression from a structured situation to a situation where the student himself is able to organise instructional learning material from various sources, into his "own" learning package. This involves giving the student more responsibility for deciding which areas he will study, how he will organise his study, and how he will present it. This approach is most likely to include some kind of project work. It is our experience however that without some form of preceding structured learning, students will not have developed the necessary skills for self-organised project work, or a very heavy load is put on to personal tutorial assistance with project work. We certainly haven't yet found a satisfactory way of organising this kind of self-instruction in a distant teaching system.

It should be clear from our talk therefore that even making allowances for the special circumstances of the Open University, the development of a coherent set of self-instructional materials is a major undertaking, and one in which there appears to be a number of critical problems still to solve in the conventional university situation. We hope that the Open University model does provide some guidelines, but we are sure that you yourselves will be able to work out self-instruction systems much more suitable to your own situation.

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