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ABSTRACT

This booklet is the first of four sequels to the guide "Educational Objectives" that discuss the selection and use of instructional methods. Following a brief introduction, the systems approach to course or curriculum design is reviewed, and the selection of appropriate instructional methods is described as the second key step in the course or curriculum development process. In addition, the wide range of instructional methods available to teachers and lecturers are discussed, and three broad categories of methods are identified--mass instruction techniques, individualized learning techniques, and group learning techniques. Finally, the range of techniques available within each category is examined, and the educational strengths and weaknesses of each technique are discussed. The text is supplemented with two figures and four tables, and two sources for further reading are listed. (KM)

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The booklet was written by Dr Henry Ellington of RGIT's Educational Technology Unit, and includes adapted material originally published in "A Handbook Of Educational Technology", by Fred Percival and Henry Ellington (Kogan Page, London; 1984).

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A Guide to the Selection of Instructional Methods

Introduction

This booklet and its three companions (booklets 3,4 and 5) deal with the selection and use of instructional methods, and are sequels to the booklet on "Educational Objectives" (number 1 in the series).

The present booklet begins by reviewing the systems approach to course or curriculum design that was introduced in the booklet on "Educational Objectives", showing how the selection of appropriate instructional methods should be the second key step in such a process. Next, it reviews the wide range of instructional methods that are available to teachers and lecturers, showing how they can be divided into three broad categories – *mass instruction techniques, individualised learning techniques* and *group learning techniques*. Finally, the range of techniques available within each category is examined and the educational strengths and weaknesses of each type discussed.

The three basic classes of instructional methods are examined in even greater detail in booklets 3,4 and 5 which are respectively entitled "A guide to the use of mass instruction techniques"."A guide to the use of individualised learning techniques" and "A guide to the use of group learning techniques".

A systems approach to course or curriculum design

In the booklet on "Educational Objectives", the process of course or curriculum design was represented schematically by figure 1.

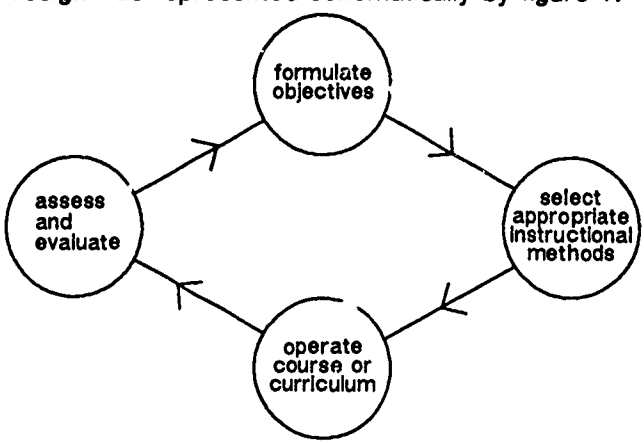

Figure 1: schematic representation of the systems approach to course or curriculum design.

In such a process, the first key step should be the formulation of a clear set of *objectives* for the course or curriculum – preferably couched in behavioural terms so that both teachers and students are clear as to what the latter are expected to achieve. Once this has been done, thought should be given as to what particular mix of instructional and learning methods would be most suitable for helping the students to achieve these various objectives. Clearly, the particular methods that are eventually chosen will depend on a large number of factors, including the detailed nature of the objectives in question, institutional constraints, student characteristics, and the background and preferences of the teaching staff involved. They should, however, be chosen in a systematic way, something that can best be done by looking at each objective (or related set of objectives) in turn, and asking the following two questions:

(i) What possible methods could be used to help the students to achieve this particular objective or set of objectives?

(ii) Which of these methods would probably be most appropriate in the context of the particular course or curriculum being considered?

The main object of this booklet and its three companions, is to help you to answer these questions by increasing your familiarity with the range of methods that are available to teachers and lecturers today.

The three main classes of instructional methods

Despite the large number and great variety of instructional techniques available, it is possible to divide them into three broad groups, namely, *mass instruction techniques*, *individualised learning techniques* and *group learning techniques*. As can be seen from Table 1, these not only differ in terms of teaching/learning mode, but also place the teacher in radically different roles.

Table 1: the three basic classes of instructional methods

Class of techniques	Examples	Role of teacher
Mass instruction	Conventional lectures and expository lessons; television and radio broadcasts; cable television; films and videos.	Traditional expository role; controller of instruction process.
Individualised learning	Programmed learning; mediated self-instruction; computer-based learning.	Producer/manager of learning resources; tutor and guide.
Group learning	Tutorials; seminars; group projects; games and simulations.	Organiser and facilitator.

Indeed, one of Britain's leading educational technologists (Professor Lewis Elton, of the University of Surrey) has argued that the entire post-war evolution of educational technology can be described in terms of the development of these three areas (see figure 2)

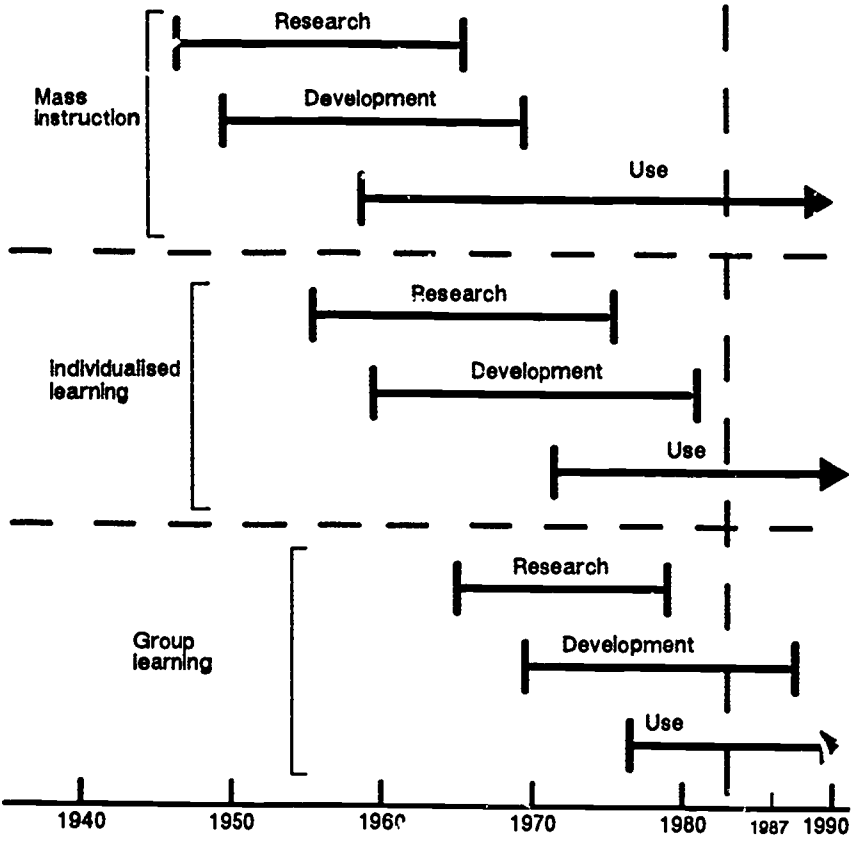

Figure 2: the development of the main concerns of educational technology since the end of the Second World War (after Elton)

In essence, Elton believes that educational technology has undergone a progressive change of emphasis since the end of the Second World War, when it first emerged as a discipline in its own right. Initially, there was a concentration on the techniques of *mass instruction*, then a move towards *individualised learning* and finally, during recent years, a move towards *group learning*. In each case, he identifies three broad, overlapping stages in the development, starting with a *research* phase, in which the basic concepts and techniques are developed, then progressing to a *development* phase, in which these basic concepts and techniques are verted into practical teaching and learning techniques together with their ciated support materials, and finally leading to a third phase in which

the techniques start to achieve widespread *use*. The combined research and development phases have in each case tended to last for roughly 25 years, after which the on-going 'use' phase continues indefinitely, and it can be seen that all three classes are now well into the latter phase. Let us now look in more detail at the way in which each class of techniques has developed, and see where things stand today.

Mass instruction techniques

Mass instruction is, of course, as old as education itself, with the 'lecture' and 'expository lesson' being the dominant instructional techniques in virtually all sectors of education and training throughout history. It was, however, only in the period following the Second World War that a systematic effort was made to improve the efficiency and cost-effectiveness of the method by using the new types of hardware that were starting to become available. By such means, it was hoped that more people could be educated or trained without necessarily increasing the number of teachers or trainers, and that the overall effectiveness of the teaching process could be improved. Some important outcomes were the development of basic mass instruction tools like the overhead projector and 35mm slide projector, and the increasingly widespread use of 'hardware-based' techniques such as film, radio and television broadcasting and closed-circuit television. Indeed, one manifestation of the 'mass instruction' phase of educational technology was the burgeoning of closed-circuit educational television systems - like the one that linked virtually all schools in Glasgow.

In retrospect, it can be seen that the 'mass instruction' movement failed to live up to its early promise, largely because it soon became apparent that techniques such as mass teaching by closed-circuit television were strictly limited in the type of educational objectives that they could be used to achieve. They were, for example, totally unsuitable for achieving higher cognitive objectives, and were also completely passive, enabling no student involvement to take place. Partly because of these intrinsic limitations (and partly because of the ever-increasing cost of keeping them in operation) many of the large-scale cable ETV networks that were set up during the 'boom' years of the mass-instruction phase have now been closed down or drastically reduced in scale. Nevertheless, other mass instruction techniques such as educational broadcasting have continued to grow in importance, and the various techniques and hardware systems that come under the general heading of 'mass instruction' continue to constitute a very important section of the educational armoury available to the modern teacher or lecturer. Table 2 lists some of the most important of these techniques, and indicates some of their main educational strengths and nesses.

Table 2: characteristics of some of the main mass instruction techniques

Technique	Strengths	Weaknesses
Lectures and similar expository techniques.	• Can be very cost effective in terms of student/staff ratio. • Strong in achieving lower cognitive and *some* affective objectives. • Generally popular with both students and staff.	• Strongly dependent on skill of individual lecturer or teacher. • Weak in achieving most higher cognitive and affective objectives; not suitable for achieving psychomotor objectives or developing communication skills, interpersonal skills, etc • Student involvement generally low or non-existent. • Pace controlled by teacher; does not allow for different learning rates. • Most lectures are too long for the concentration span of students.
Film and video presentations.	• Can be a highly-effective substitute for a lecture or part thereof *if the content and level are suitable.* • Can be used to provide realistic illustrative, supportive, background and case-study material. • Tend to be highly stimulating.	• Can be a waste of time unless content and level are appropriate. • Teacher effectively relinquishes control of teaching process to maker of film or video during presentation. • Cannot be used unless suitable hardware is available. • Can be expensive.
Educational broadcasts.	• Same basic strengths as film and vide presentations, with further advantage that broadcasts are free.	• Same basic disadvantages as film and video presentations (with exception of cost). • Also, timing of broadcasts is generally fixed, making them difficult (or impossible) to fit into a timetable unless they can be recorded – something that can only be done *legally* with certain broadcasts.
Mass practical and studio work.	• Can be effective in developing psychomotor and associated skills. • Can help demonstrate relevance of theoretical content of a course. • Students generally enjoy their participative nature.	• Can be a waste of time unless the activities chosen are relevant to the main content of the course. • Generally expensive in terms of time, manpower, equipment and materials. • Often weak in terms of higher cognitive objectives unless very carefully planned.

A more detailed discussion of these various techniques, including hints on how to use them with a class, is given in the "A guide to the use of mass instruction techniques" (booklet number 3 in the series). This booklet also examines the audiovisual media that can be used to support such techniques.

Individualised learning techniques

Although individualised learning, in the form of correspondence courses and similar systems, also has a long tradition of use in education, it was only comparatively recently that it became part of main-stream educational technology. The catalyst for this development was *behavioural psychology*, which was pioneered by B F Skinner and his followers during the 1950's. Skinner's work on the *stimulus/response* mechanism, which represented (in many people's view) the first truly 'scientific' theory of learning, first triggered off the bandwaggon *programmed learning* movement that dominated educational thinking during the 1960's. More recently, it led to the development of a wide range of individualised learning techniques (such as tape-slide and the various computer-assisted systems that are now achieving more and more widespread use) as well as to fully-integrated individualised instruction systems such as the Keller Plan and Open Learning systems.

As in the case of the earlier 'mass-instruction' movement, it can, in retrospect, be seen that the individualised learning movement failed to live up to its early promise. During the 1960's, programmed learning enthusiasts were predicting the early demise of the traditional classroom teacher or lecturer, claiming that they would be replaced by the new *teaching machines* that they were developing as delivery systems for their programmes. These teaching machines turned out to be the biggest non-event in the history of education, however, partly because of the fact that high-quality software was never produced in the quantities that would have been needed for them to make any real impact, and partly due to the increasing realisation that there was much more to education than the teaching of facts and principles. Nevertheless, the individualised learning movement has had a tremendous influence on educational thinking, and the various techniques that it has made available again form a vital section of the modern educational armoury. Some of the more important of these are listed in Table 3, together with some of their main strengths and weaknesses. A more detailed discussion of these various techniques is given in the set of notes entitled "A guide to the use of individualised learning techniques" (booklet number 4 in the series), and further information about computer-based learning can also be found in the "How computers can be used in tertiary education" (booklet number 9 in the series).

Table 3: characteristics of some of the main individualised learning techniques

Technique	Strengths	Weaknesses
Directed study of material in textbooks.	• Can be a highly effective way of teaching basic facts, principles, applications, etc., provided that suitable texts are available and the work is is carefully structured. • Allows learner to work at his/her own natural pace. • Needs no specialised facilities other than a suitable library.	• Requires careful planning and structuring on part of teacher. • Dependant on suitable texts being available in sufficient numbers to cater for the size of class carrying out the work. • Not suitable for achieving many higher cognitive and non-cognitive objectives.
Study of specially-prepared notes or programmed texts.	• Same basic advantages as directed study of books, and can be even more effective if the material is well prepared. • Can allow learners to interact with the material.	• Preparing suitable material can be very time consuming. • Again, not suitable for achieving many higher cognitive and non-cognitive objectives.
Self-instruction via audiovisual media (audiotapes, videotapes, tape/slide programmes etc).	• Enables a wide range of educational objectives to be achieved (especially lower cognitive). • Allows learner to work at his/her own pace. • In addition, use of mediated presentation enables sound, movement, realism, etc. to be introduced, thus increasing student stimulation. • Can save teachers from having to carry out repetitive, time-consuming work (e.g. teaching certain basic laboratory skills).	• Ideal ready-made courseware seldom available, and preparation of custom-designed material can be both time-consuming and expensive, as well as requiring specialist skills. • Again, not suitable for achieving many higher cognitive and non-cognitive objectives. • Cannot be used unless suitable hardware is available; this can be expensive to provide.
Computer-based learning.	• Enables a wide range of eductional objectives to be achieved (especially lower cognitive). • Allows learner to work at his/her own pace. • Can allow considerable interaction between learner and instructional programme, and can adapt to needs of learner; can be highly stimulating. • Can provide (through computer simulations) a wide range of otherwise inaccessible learning experiences. • Allows on-going assessment and monitoring to take place automatically.	• Same basic weaknesses as mediated self-instruction. • In addition, requires computer literacy and (in many cases) a high degree of programming skill on the part of the teacher.
Individual practical studio or project work	• Same basic strengths as mass practical and studio work. • Allows students to work at their own pace.	• Same basic weaknesses as mass practical and studio work.

Group learning techniques

While it can be argued that the 'individualised learning' phase of educational technology probably had a greater impact on modern education and training than the 'mass instruction' phase that preceded it, there are, in practice, a number of limitations to the approach. One of the most obvious stems from the fact that it is, by definition, *individual*, and, as such, cannot enable students to interact with one another and develop group skills such as discussion skills, interpersonal skills and the various other skills needed to collaborate effectively with other people in carrying out a common task or project. This has led to an increasing realisation that the various activities that come under the general heading of *group learning* have a very important role to play in modern education and training.

The theoretical basis for much of the current interest in group learning is the *humanistic psychology* that was developed by people such as Carl Rogers during the 1960's – a totally different type of psychology from the highly mechanistic behavioural psychology which formed the basis of the programmed learning movement. Humanistic psychology is concerned with how people interact with and learn from one another in small-group situations, and involves the use of the techniques of *group dynamics*. When used in a learning situation, such techniques generally require no specialised hardware and (in most cases) very little in the way of software other than simple printed sheets and booklets; the emphasis is very much on the *approach* or *technique* rather than a reliance on specific types of hardware or software.

At the time of writing, group learning is still in the final stages of its 'development' phase, although its 'use' phase is now well underway – as evidenced by the widespread use now being made of participative exercises such as games and simulations. Some of the more important types of group learning exercises are listed in Table 4, which again identifies their main educational strengths and weaknesses.

A more detailed discussion of all these various techniques is given in the booklet number 5, "A guide to the use of group learning techniques", and further information about exercises of the game/simulation/case study type can also be found in "How games and simulations can be used in tertiary education" (booklet number 9 in the series).

Table 4: characteristics of some of the main group learning techniques

Technique	Strengths	Weaknesses
Buzz sessions and similar short small-group exercises.	• Constitute an excellent method of introducing variety into a lecture, thus helping to maintain student attention. • Can be used to achieve a wide range of objectives, both cognitive and non-cognitive. • They get students *actively* involved in a lesson. • They allow feedback to take place.	• They are most useful in a *supportive* role as part of a larger lesson as they are not, by themselves, intended for use as a front-line method of teaching basic facts and principles.
Class discussions, seminars, tutorials, etc.	• Same basic advantages as buzz sessions, etc. • In addition, their greater length allows an even wider range of objectives to be achieved, often of a very high level. • Enable relevant topics to be examined in great depth.	• There is a danger that not all the members of a class will take an active part in the exercise unless steps are taken to make sure that they do. • They can cause timetabling problems if a class has to be split up.
Participative exercises of the game/simulation/case study type.	• They can be used to achieve a wide range of objectives, both cognitive and non-cognitive, often of a very high level. • High student involvement. • Highly stimulating and motivating if properly designed. • Ideal for cross-disciplinary work.	• Most useful in a supportive or illustrative role rather than as a front-line method of teaching basic facts and principles. • Can be difficult to fit into curriculum, especially in case of long exercises. • Must be *relevant to course* to be of real educational value.
Mediated feedback sessions such as microteaching, recorded interviews, or recorded group exercises.	• Use of mediated feedback (eg audio or video recording) enables valuable group discussions of student performance to take place. • Can be used to develop a wide range of skills. • High student involvement.	• Some students find method off-putting at first. • Requires suitable hardware and other facilities, often expensive • Can cause timetabling problems if a class has to be split up.
Group projects.	• Suitable for developing a wide range of objectives, both cognitive and non-cognitive, often at a very high level. • Ideal for developing interpersonal and group skills. • Ideal for cross-disciplinary work.	• There is a danger that not all the members of the group will pull their weight unless steps are taken to make sure that they do. • Assessment of contributions made by individual students can be difficult.

Further reading

1. *A Handbook of Educational Technology*, by F Percival and H I Ellington: Kogan Page, London; 1984. (An introductory text on educational technology specially written for practising teachers and lecturers; it provides detailed guidance on how to select suitable instructional methods for different purposes).
2. *Designing Instructional Systems*, by A J Romiszowski; Kogan Page, London; 1981. (The definitive text on the subject, but probably a bit high-powered for the average teacher or lecturer – or the average educational technologist, if it comes to that!)