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ABSTRACT

The first part of this paper summarizes the experiences of the Open University in using print, television, and radio to provide postsecondary education to adults. Descriptions of these three components are followed by details on the functions served by each; i.e., how print, television, and radio differ in their ability to educate, and how the Open University utilizes the instructional strengths of each. Need for integration between the media is discussed, but it is pointed out that this requires careful planning, particularly in the type of courses taught in the Open University. In the second section, alternative ways of combining print, television, and radio for educational purposes are outlined and examples from open universities in various countries are provided. The paper concludes with five questions directed at Italian attempts to combine print, radio, and television for educational purposes. (JB)

PRINT, TELEVISION AND RADIO IN EDUCATION: PRINCIPLES AND EXAMPLES

David Hawkridge
The Open University

Introduction

I write as a senior member of staff of the Open University, an institution that has successfully employed print, television and radio to provide post-secondary education to large numbers of adults for the past ten years. Print, television and radio are at the heart of the University's instructional system, integrated with a limited amount of face-to-face teaching and other media such as computers.

It would be a mistake to assume that at the Open University we have solved all the problems of designing and operating this multi-media system. Indeed, we carry on continuous debates concerning how to improve it, and spend funds on research and evaluation in order to find out what can be done better. After ten years, however, we do have some experience. In the first part of this paper I will attempt to summarise that experience. Please bear in mind that it relates to a specific audience of students: adults learning off-campus, in their own homes.

It would also be a mistake to assume that the Open University has the best or the only multi-media educational system. There are many ways of combining print, television and radio for educational purposes. In the second part of this paper I will outline a few alternatives and draw examples from several other countries.

I recognise that the topic encompassed by the title of this paper is a vast one and inevitably I shall have to be selective in what I write. Nevertheless, in the third part of this paper I raise questions that I hope are significant in the context of the ERI conference.

Paper prepared for an international conference on television, radio and print, arranged under the auspices of Edizioni Radio/Televisione Italia (ERI) at Turin, November 23 - 30, 1979.

The Open University's experience

To place what follows in context, I should explain that the Open University is a university under a Royal Charter, funded almost entirely by government, as are all other British universities. Its students are admitted regardless of their academic qualifications, provided that they are 21 years old or over. Since 1971, when over 24,000 students began their studies in the University, some 33,000 graduates have been produced. Most of these have been persons who had experienced some post-secondary education before entering the Open University, but about two-thirds of the student body as a whole is made up of people whose parents were in working-class occupations. In 1979, about 65,000 undergraduates registered as students, and another 25,000 people took courses outside the degree programme.

From the earliest days of planning the Open University there was an intention to use broadcasting. Indeed, for some years the name given to the embryonic institution was the 'University of the Air'. This label caused much controversy, however, as few would believe that a university education could be obtained through broadcasting, even via the BBC! When Parliament finally approved the establishment of the Open University in 1969 it was clear that print would be the dominant medium in the new teaching system, which would be designed so that almost all students' studying could be done in their own homes. Compare this design with that of Telescuola, which required that students come to a central place in a village to view broadcasts and to complete written work under the watchful eye of a proctor.

Print dominates the teaching of the Open University. Students spend far more time on printed materials than on broadcasts. The average student uses ten or more hours a week to study printed materials, and supplements this with at most 50 minutes of watching television and 30 minutes of listening to the

radio. More usually, he or she uses 25 minutes three or four times a month for television, and 15 minutes twice a month for radio or cassettes. Naturally, these averages conceal wide variation, but the dominance of print cannot be denied: it is all-pervasive, and no student can depend on broadcasts alone to achieve a pass in the course he or she is studying.

What is the print component of the system like? It takes several forms, some familiar, some not so familiar. Basic to every Open University course is a series of 'course units'. These are well-printed, well-illustrated booklets of A4 dimensions, each booklet covering one or two weeks of study. They are written by members of a course team made up of subject-matter experts, BBC broadcast producers, educational technologists and editors. Each contains expository text strengthened by a variety of teaching devices as appropriate to the subject-matter. For example, most units begin with a statement of objectives for the student, and throughout the text there are scattered what we call 'self-assessment questions', the answers to which are given elsewhere in the text. The content is carefully structured, with due attention being paid to new terms and concepts. In many units, there are references to the teaching contained in the broadcasts or in other parts of the University's instructional system. In addition, students are referred to other printed elements. For instance, every course has a set of books, some published by the University, that students must expect to consult. Sometimes one of these books is a 'reader', that is to say, a series of specially-edited papers and extracts relating to the subject-matter of the course.

In summary, print conveys the main messages of the course. Students must read. If they want to achieve good grades in the assignments they send to the University, they cannot avoid using print. We have been accused of providing a rather 'bookish' education. Yes, we do, if by that term is

meant a reliance on books as a principal source of knowledge and understanding.

Let me describe next the television component of Open University courses. As I have noted already, students use this far less than print. Course teams employ television in differing amounts, depending on how successful they have been in bidding for this component within the University. The programmes are produced by and transmitted through the BBC under contract, at comparatively high cost. They are a limited resource, to a far greater extent than print.

Under the contract betweeen the University and the BBC, the OU is guaranteed about 30 hours a week of television broadcasting. In fact, at present the figure is rather higher, about 35 hours a week. These broadcasts are transmitted on BBC-1 and BBC-2 during early morning and early evening hours Monday to Friday, and during Saturday and Sunday mornings. The wide range of programmes, reflecting the range of courses offered by the University, is shown in the two extracts below from a national newspaper, The Guardian, which advertises our broadcasts, along with all other broadcasts, at no charge. Thus a print medium supports the broadcast media.

TUESDAY

BBC-1: 6.40 am System modelling 7.5 Renaissance and reformation. 7.30 Materials processing.

BBC-2: 7.5 am Telecommunications systems. 7.30 The control of education in Britain. 4.50 pm Research methods in education and the social sciences. 5.40 Geophysics. 6.5 Man's religious quest. 6.30 Science foundation course.

WEDNESDAY

BBC-1: 6.40 am Geophysics. 7.5 Art in Italy 1480-1580. 7.30 An introduction to calculus.

BBC-2. 7.5 am Understanding space and time. 7.30 National income and economic policy. 4.50 pm Biochemistry. 5.15 Fundamentals of statistical inference. 5.40 History of mathematics. 6.5 Images and information.

The University could certainly use more air time, particularly at hours that are more convenient for its students. Our research studies show that students find it difficult to get home from work in time to view the early evening broadcasts, and that they regard the early morning viewing on Saturdays and Sundays as inconvenient too. Our chances of getting more peak air time are not good, however, and one may well ask whether any national broadcasting system should provide peak time for what is essentially minority programming. Many of our courses have enrolments in hundreds rather than thousands. No course has more than 6,000, which is a very small audience in BBC terms. There is some evidence that in addition to our formally registered students, other viewers watch our broadcasts, but the numbers are still likely to be low in comparison with general broadcasting audiences for television in Britain.

Perhaps I should have mentioned earlier that the broadcasts are mostly in colour. This was not so when we started teaching in 1971, because we inherited black-and-white studios at Alexandra Palace, and the conversion to colour came four years later, although a number of broadcasts were made before that date of programmes filmed in colour, rather than taped. We made the change partly for educational reasons, partly to keep pace with modern technology.

This year, the BBC will make nearly 300 television programmes for the University, thus adding to a total of about 2,500 already in existence. Once made, Open University courses (and the programmes) stand unchanged for anything from four to ten years, apart from minor updating and corrections.

Radio serves the University's instructional system in similar style, but there are important changes in the wind, to which I will refer in a moment. As in the case of television, radio allocations are subject to bidding

from course teams at an early stage in course planning. When a team has received its allocation, detailed specification of what is to go into each broadcast proceeds, involving both BBC producers and OU staff. Production takes place at the BBC's sound studios, and transmission is via Very High Frequency (VHF) in the BBC's Radio 3 network. Again, national newspapers in some instances carry details of the broadcasts, as in the case of The Guardian example below.

TUESDAY	WEDNESDAY
Radio 3 (VHF): 5.45 pm Understanding space and time. 6.5 Soviet government and politics. 6.25 Music. 6.30 Statistical sources. 6.50 Patterns of inequality.	Radio 3 (VHF): 5.45 pm The age of revolutions. 6.5 Ecology. 6.25 Music. 6.30 Genes and development. 6.50 Technology foundation course.
Radio 3 (VHF - North Scotland and Mid-Wales): 12.20 am Personality and learning. 12.40 Open Forum.	Radio 3 (VHF - North Scotland and Mid-Wales): 12.20 am Biochemistry and molecular biology.

I should add that The Radio Times, which is the BBC's own magazine, circulating to a very large proportion of British households, also carries details, for both our television programmes and our radio programmes, although this was not so in the first few years of our teaching.

The problem of suitable air time is even more difficult for radio than it is for television. Less time (about 25 hours) per week is available, and some of the hours provided are even more unsuitable than those for television, being very late at night or very early in the morning. Pressure from the BBC, to use the channels increasingly for general broadcasting to larger audiences than the OU broadcasts can command, is likely to reduce further the peak times available to the OU. Our response has been to depend more on taped cassettes.

We started by setting up a tape-duplication service: students could write to us requesting a tape of a given broadcast, and we supplied the tape free of charge. This service expanded rapidly. In 1979 it will probably issue about 40,000 tapes. Indeed, the BBC is now turning to making tapes specifically for use in cassettes to be played in the home, rather than for broadcast on open circuit transmission. Course teams are finding that these tapes permit the use of different pedagogical techniques.

So far, I have provided a limited account of the three chief media components of our instructional system at the OU. I have indicated in passing that they work together, with one medium supporting the others. Next, I should like to go into detail concerning the functions served by each of the media: print, television and radio. For print, we do not have a research base from which we have evolved these functions: rather, they are the same functions that print has served in universities of more conventional kinds, plus new functions served only in the OU. For television and radio, we have derived lists of functions empirically through our studies of the University's developing use of these media.

Gavriel Salomon of the Hebrew University in Jerusalem has suggested that human communication employs three principal codes: digital, analogic and iconic. Digital codes require symbols such as letters and figures. I am writing this paper in digital code. Each 'digit' has no meaning by itself, but strung together and placed in context, digital codes convey meaning. If I were reading this paper to you, aloud, I would be employing analogic codes: I would be converting the written word to the spoken word. The latter is an analogue of the former. As there is one diagram in this paper, I can claim to be using iconic codes too. Thus print, without illustrations, contains only digital codes; radio contains analogic codes, and television contains analogic and iconic codes, plus digital codes when titling appears. Is this

classification important? Perhaps not, but at least it helps us to reflect upon what certain media can do for us. For example, take the analogic codes of radio . The quality of the spoken word or of performed music is important in teaching in quite different ways from the quality of illustrations, whether the latter are scientific diagrams or beautiful reproductions of fine artists' work. The iconic codes of pictures are used to teach what may be impossible to convey in printed words or numbers or sounds. A trivial but famous example: describe a corkscrew in words only. Similarly, digital codes may be the only way to teach abstract concepts such as chemical equilibrium, although we may attempt to convert these concepts into analogic or iconic codes. In recent years, computer graphics have offered a means of translating into iconic codes a wide range of mathematical functions formerly expressed only in digital codes.

In education, print teaches through digital and iconic codes. It provides a relatively accessible store of knowledge: books, newspapers and magazines are comparatively convenient storage devices, being light, portable, durable, reversible, accessible at random (more or less), and so on. As the English magazine Punch portrayed it some years ago, the B.O.O.K. is a marvellous teaching machine, requiring no electricity and having few moving parts.

Within the printed store of knowledge, students can find original source material (such as poetry, fiction), commentaries, exposition and logical explanation, opposing views and interpretations, references to other sources, summaries and indexes. These are all standard functions of print in university teaching. Print conveys information of many kinds, including abstract concepts ranging from Einstein's relativity to the doctrine of Original Sin.

The Open University deliberately uses print for other functions. It sets out purposefully to provide its students, at the start of each course and of many

of the units, with a mapping of the cognitive fields they are to explore. The simplest way in which this is done is by a table of contents. Many units carry in addition sets of learning objectives that spell out what the student can expect to be able to do after reading the units and studying associated materials. Some units, particularly in science, provide lists of terms and concepts introduced in the text for the first time. These lists, as well as the sets of objectives, are sometimes used by students to check that they have mastered the knowledge contained in the units. We have also experimented with cognitive maps, on which the main concepts in a unit can be plotted roughly, and their interrelationships shown, thus utilising both digitial and iconic codes. There are certainly problems in constructing such maps, and students may find them ambiguous and quite difficult to interpret, but an example appears below:

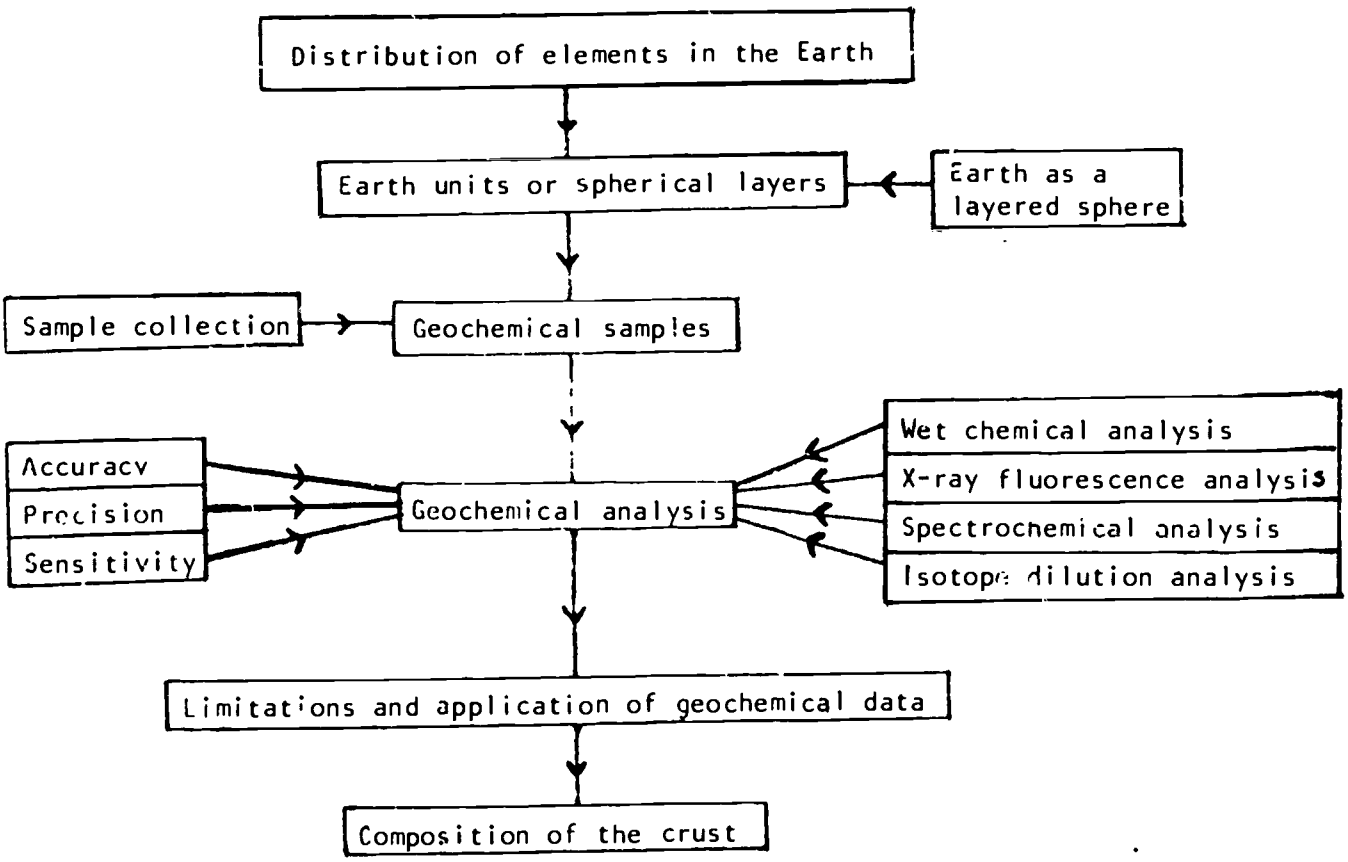

Fig. 1 Part of a cognitive map from an Open University course unit dealing with geochemistry.

There has been some discussion of whether the University is guiding its students too directly by these means. Should not a university education be 'free'? Should not students learn to find their own way? Our reply is that we do not offer our lists and maps as the only way in which knowledge can be organised, and that if we are to be lucid teachers we should make clear to our students the field of exploration. That field may be defined in various ways: we can attempt to draw its boundaries - but that is difficult to do; we can erect a number of beacons in the field, in the hope that students will move from one to the next, and thereby explore most of the field, or we can leave it largely to chance by putting up a signpost some distance from the field, pointing towards it, and by hoping that students stumble in the right general direction. Snyder's studies some years ago at the Massachusetts Institute of Technology on what he called the hidden curriculum provide support for our view that making the curriculum more visible, particularly in print, is helpful to all students, without constraining their learning. Each student explores the field in an idiosyncratic way.

Students using the print materials are challenged and stimulated by the questions that appear in the units. Usually these questions do not ask students to recall what they have just read, in parrot fashion. Instead, students are expected to ponder and apply: to weight the facts, compare, analyse and criticise. Many of the questions have no single 'right' answer. The answer given elsewhere in the unit, often at the back, are frequently speculative rather than definitive. This bias reflects our view that in a university education uncertainty and ambiguity are fundamental to knowledge in many fields, from mathematics and physics on the one hand to history and sociology on the other.

There is little doubt, however, that print functions in the Open University as a guide and a pace-maker. Students follow a series of units that take

them in linear progression through various topics that together make up the course. They do so week by week, more or less keeping pace with the packages of printed material that arrive through the mailbox. The average student falls behind at some stage in each course he takes, according to our statistics, but print has some pacing effect, along with other media (particularly the regular broadcasts), and the requirement to submit assignments at intervals of about one month, sometimes less.

Print serves another function at the Open University too: it displays the University's teaching, in a way that makes it vulnerable to criticism. There may be criticism of broadcasts too, but since these are usually transitory events, observed by few informed critics, the comments carry less weight than those of informed readers, particularly readers who are academics in other universities. The University is unique in that it teaches in public, and nowhere is its teaching more public than in print, which can be scrutinised repeatedly and at length. Awareness of the vulnerability of their teaching makes Open University teams take great care in writing the units and other print materials for courses.

Conversely, while print makes the University's teaching vulnerable it also helps to establish academic credibility. No other British university can claim that its teaching is being used, by staff and students of other universities, as broadly and successfully as the Open University can. The OU's teaching reputation is based particularly on the print component.

Let me turn now to the functions of <u>television</u> and <u>radio</u> in the OU instructional system.* First I list functions that are common to both media: they increase students' sense of belonging to the University, help

* I have derived this set of functions from research papers by my colleagues in the Institute, particularly those of Tony Bates.

them to identify themselves with the course team (as well as helping them to recognise at sight or sound some of the team's members), and thus make the teaching more personal, in spite of distances. Television and radio reduce the time needed by students to master content, and they add to the pacing effect of print. They attract and recruit new students to the University or to specific courses, and interest general viewers. And, like print, they help to establish the University's academic credibility, particularly when distinguished academics from other British and overseas universities take part in the broadcasts.

Second, there is a list of functions that can be served by <u>television</u> but not by radio. Television can demonstrate experiments well, particularly when the equipment or phenomena to be observed are large, expensive, inaccessible or otherwise difficult to observe, such as the inside of a nuclear accelerator. Similarly, television can be invaluable when observation of behaviour cannot be readily reduced to a single dimension, as in the case of human behaviour, or when the behaviour being studied may be influenced by uncontrollable but observable variables. Television is ideal for illustrating principles involving dynamic change or movement. With the help of physical models, it can illustrate abstract principles: the digital equations of chemical equilibrium can be demonstrated by a physical model consisting of a game played by two players on a board similar to a chess board, thus converting the digital code to an iconic one. Television can illustrate principles involving two-, three- or n-dimensional space, in spite of its two-dimensional screen. More obviously, perhaps, changes over time can be demonstrated by animation, slow-motion filming and time-lapse or speeded-up photography or video-tape. In combination, such techniques can enable students to master advanced scientific concepts, such as quantum theory, without using sophisticated mathematical techniques.

To continue the list, television can substitute for field visits by students to factories, museums, archeological or architectural sites, ecological environments, geological features, and so on. These visits-by-television may enable students to gain an accurate and comprehensive picture, possibly as part of a wider context. Television can rapidly display the relationships between different components of a machine or process, as well as surveying factors contributing to a given landscape. It can identify for students differences in scale and process between laboratory and mass-production techniques, and teach them to differentiate between classes of phenomena, by observation.

Television brings to students original material for study. For example, a programme showing diseased plants can be broadcast to assist students in recognising symptoms. Recordings of master teachers in classrooms can help teacher trainees to improve their teaching. They can be asked to analyse the master class, using principles enunciated in the print materials. Similarly, abstract principles in, say, sociology, may be applied to the solution of a real-world problem, and the consequences televised.

In Open University courses, television is also used to demonstrate decision-making processes, both by actual filming or taping of decisions being made and by televising dramatisations, simulations and role-playing. Students can be asked to analyse what they see.

Television's potential to change attitudes cannot be ignored. Its function may be to present ideas in novel ways or from an unfamiliar viewpoint, to counter established attitudes. Dramatisation may help students to identify with the emotions and viewpoints of participants.

Another function of television is to preserve and record. For the Open University, television is used to record events, species, places, people, buildings and objects that are vital for understanding the print materials. Some of these recordings preserve what is now dead or destroyed. Television also serves to explain to students how they may carry out practical tasks for themselves, such as using home experiment kits, conducting a door-to-door survey and so on. It can also condense or synthesise a wide range of facts that would require many pages of print to describe; moreover, this synthesis may be set against a background that is essential for full understanding.

My list is almost complete. Television is also valuable for demonstrating methods or techniques of dramatic production and for presenting different interpretations of plays and novels. It can be used to teach sketching, drawing and painting techniques, and to demonstrate how instruments can be played or tools used. Through combining graphics and sound, it can even provide analyses of the structure of music.

Many of these functions have been known to film-makers and television-producers for years. I am not pretending that the Open University invented them. What we have done is to use television in all these ways, within a multi-media system for educating adults in their own homes.

What about radio? My former colleague, John Meed, in an analysis of Open University practice, has listed functions of radio. Radio in the OU can provide aural experiences, such as music and poetry or drama. It can be used for recording and presenting for study the sounds of real-world situations, such as children talking at school, people in a noisy job, or a family crisis; these broadcasts may be aimed primarily at sharpening students' analytical skills or at evoking emotional responses, or both. In much the same way, dramatised situations can be recorded and studied.

Radio can present important people, such as decision-makers, revolutionaries, politicians, civil servants, and experts on all sorts of subjects. It can do so quickly and cheaply. It can, through editing, condense an argument, whether of the intellectual kind or a political one. It can present controversies and debates. On a more personal level, it can offer tutoring, with the teacher adopting a person-to-person style towards his students. Because it is cheap and quick to use, radio can serve as a noticeboard or feedback mechanism. Errors in teaching can be corrected, at least in some cases. Errors in learning can be dealt with by broadcasts that discuss what mistakes students commonly made on an assignment. Information about changes, particularly last-minute ones, can be transmitted speedily to the student body - provided students are likely to be listening.

Perhaps all of these functions are obvious, but let me provide a few examples. Take the topic of mathematical limits (not one I know much about): radio is used by the course team to talk through problems based on this topic. Or take the course on the nineteenth century novel as an example: radio is used to discuss some of the major themes running right through the course, thus synthesising and summarising. Or take a broadcast in a course on sociology, dealing with crime: this programme analyses how political, sociological and legal studies of crime overlap.

Again, the Open University did not invent any of this. Doubtless Italian producers have been making such programmes for several decades. What then is different? It is the use of radio within a multi-media system.

With the help of the BBC, we have found ways to combine the analogic codes of radio with the digital and iconic codes of print. We use what the BBC calls radio-vision in a number of our courses. Students are supplied with

print materials that are for use when the radio programmes are on the air. Radio is used to reinforce or clarify concepts taught in print. For example, in a technology unit dealing with the moving coil meter, students have before them diagrams which are explained further on the radio. In a course on spectroscopy, the radio programme calls upon students to carry out calculations, and provides ten-second silences in which they can do so before continuing. In a science course, the spread of Dutch elm disease across the countryside is discussed on radio while students look at diagrams and maps that illustrate the life cycle of the parasite and the vectors of the disease. A similar programme on owls is accompanied by maps and diagrams, but is also linked to a television programme broadcast at a different time. In a technology course concerned with systems, a case-study of hospital use of a renal (kidney) treatment system combines radio and television, using two programmes in each medium, plus print. A course on instrumentation in science and technology provides students with a home experiment kit. Using the kit, students are expected to learn how to polish and etch metal specimens for examination under a microscope. Radio-vision is used to demonstrate the techniques, with the radio commentary pointing out the problems of doing the polishing and etching the right way. In a course on the history of architecture and design, students are directed by the broadcasts to look at various parts of plans and pictures of buildings - including some fine examples from Italy!

It is easy to see that many of the radio broadcasts would be more valuable to students on tape. Tape can be started and stopped. Tape can be listened to in many different places, at times convenient to the student, repeatedly if necessary. Our studies show that most OU student listen to the radio while doing something else; this is no doubt partly habit, but it may also reflect the low status they give to radio. They value radio- or audio-vision more

highly, since it is linked to print. They value print even more highly than television.

This brings me to the question of balance and integration of the media. I stated earlier that print dominates in the OU. In fact, print usually leads, in the sense that print materials are designed and prepared first, with television and radio following after. Print carries most of the essential messages. Television and radio often enrich what has been taught via print, but they can seldom be considered absolutely essential. This may account for their lower status in students' eyes. But it is not the whole story. In the case of the Open University, print must dominate because it is the medium that carries the information that students need to obtain passing grades on their assignments and in their examinations. The University can guarantee that all its students will receive the print materials; it cannot be sure that all its students are able to receive the television or radio broadcasts. Quite apart from the difficult times of broadcast, there is the problem of coverage: not all parts of the country can receive BBC-2 signals and VHF radio. While any students are likely to be at a disadvantage, the University will not make the broadcasts compulsory.

Some years ago, we conducted a study of OU students in remote locations in Scotland. We were somewhat surprised to discover a rather successful group of about ten students who lived beyond transmitter range on the Outer Hebrides, islands off the north-west coast of Scotland. Was their success due to the fact that their attention was focussed on the print materials? Or was it due to the lack of social distractions on such remote islands? Or was it because broadcasts do not matter in the OU instructional system? We were relieved to find that their success was probably due, more than anything else, to their high standard of previous education and their

technical experience. They turned out to be members of the scientific staff of a rocket testing station! Not sheep farmers.

The story demonstrates that balance among the media may not be necessary for success in a multi-media educational system. Students may profitably neglect one or more media, if their goal is to pass examinations. On the other hand, they may take advantage of all the opportunities being offered for learning through the full range of media. In doing so they will enrich their studies immensely.

Integration between the media is far from easy. Appendix A contains a set of examples from Open University courses. These show that integration can be achieved, but I want to make it clear that I could more easily have presented examples where no integration had occurred. Many television and radio programmes have been made that bear only tenuous relationships to the other media (print, television and radio) being used by students at that point in the courses. Integration requires incredibly careful planning, particularly in the context of courses of the type the Open University teaches. Radio-vision and audio-vision also require careful planning. The investment of capital in production of software - in print, television and radio formats - is very high, and errors are easily made that render one or more of the formats less valuable. Moreover, the more tightly integrated the three media are with each other (and possibly with others), the greater are the consequences if something goes wrong, or has to be changed. For example, if a book not published by the OU goes out of print, this may damage immensely the multi-media package of which the book is a part.

If integration is so difficult and dangerous, why bother? There may be some circumstances in which it is not worth bothering even in the Open

University. I believe it is true to say that the majority of us who teach through the Open University's system wish to continue to strive for integration. We see the media reinforcing and complementing each other. What television cannot do, radio (or tapes) may be able to do. Where words fail, still pictures may succeed. Where still pictures fail, moving pictures may succeed. Print, television and radio offer multiple perspectives to learners. For us, they enable us to provide a university education to people in their own homes. Tens of thousands of these people have told us that it works, our integrated multi-media system. It works for them.

Alternatives

I said at the start that the Open University's system may not be the best, and that it is certainly not the only one in education. Open universities now exist in other countries. Some employ print, television and radio; others cannot afford television and many ignore radio. In addition, there are what I call distance education systems at other educational levels, for both adults and children. A few depend heavily on television, but most look to print and radio for their media of teaching.

Let me focus on the other open universities first. Table I summarises the use made of print, television and radio (or tapes) by these institutions, some of them developed with assistance from the OU.

Table I Use of print, television and radio by 'open universities' in various countries

	Print	Television	Radio
Europe			
France:			
Centres de Télé-enseignment Universitaire	Yes	No	Yes
Télé-CNAM (Conservatoire National des Arts et Metiers)	Yes	Yes	No
Netherlands:			
Open University (planned)	Yes	Yes	Tapes?
TELEAC	Yes	Yes	Tapes
Poland:			
Television Polytecnnic (now defunct)	Yes	Yes	No
Agricultural Televison University	Yes	Yes	No
Spain:			
Universidad Nacional de Educación a Distancia	Yes	No	No
Soviet Union:			
Polytechnical Correspondence Institutes	Yes	Yes	Tapes
West Germany:			
Bavarische Telekolleg	Yes	Yes	No
Deutsches Institut für Fernstudien	Yes	No	Tapes
Fernuniversität	Yes	No	Tapes
The Americas			
Canda:			
Athabasca University	Yes	Yes	Tapes
North Island College	Yes	Yes	Tapes
Télé-université	Yes	Yes	?
Mexico:			
Universidad Abierta	Yes	Yes	Tapes

United States:			
Chicago TV College	Yes	Yes	No
Dallas Community Colleges	Yes	Yes	No
Empire State College/WNET	Yes	Yes	No
Miami-Dade Community College	Yes	Yes	No
University of Maryland Consortium	Yes	Yes	Tapes
University of Mid-America	Yes	Yes	Yes
(West) Coast Community College	Yes	Yes	No
Venezuela:			
Universidad Nacional Abierta	Yes	Yes	No
Elsewhere			
Australia:			
Deakin University	Yes	No	Tapes
University of New England	Yes	No	Tapes
Japan:			
University of the Air (planned)	Yes	Yes	Yes
Iran:			
Free University of Iran	Yes	?	?
Israel:			
Everyman's University	Yes	Yes	Tapes
Pakistan:			
Allama Iqbal People's Open University	Yes	No	No
South Korea:			
Junior College of the Air and Correspondence	Yes	No	Yes

What stand out most clearly from Table 1 is that few of these open universities use radio, although about half use either radio or tapes, that all use print and that only in the Americas do all those listed use television. It may be surprising to find that so few use radio, when the cost of radio is compared with that of television and when I recall that radio provides complete geographical coverage in most countries. My own view is that the reasons for low use of radio in open universities are complex. It is true that the educational functions of radio are more limited than those of television or print. Radio, since the advent of television, has lower status both in broadcasting organisations and among audiences, than television. In many countries, radio operates on a regional basis too, with the consequence that national link-ups for educational broadcasts are difficult to arrange. Even at the BBC, where radio has served education for fifty years, there are regional problems, as the OU schedule from The Guardian illustrates. Tapes, on the other hand, have become cheaper, ownership of tape-recorders has become widespread in European and American countries at least, and tapes offer greater flexibiltiy educationally than radio. Hence there is a trend in open universities away from radio, particularly for courses on which there are populations of less than 1000, since radio loses its cost advantage over tape at that level

Before anyone abandons radio as an educational tool, however, he should be aware of the highly successful uses made of radio at lower levels of education during the last decade in developing countries. One 1973 review, by my friend Emile McAnany, listed no fewer than 65 radio education projects in almost as many countries. The list today would be even longer, topped by remarkable projects like the Nicaraguan primary school mathematics radio project.

Television, not print, dominates in the Bavarian Telekolleg and the Chicago TV College. It may well dominate in Japan's future University of the Air. In these institutions, printed materials are prepared to supplement the broadcasts. This is the reverse of what happens at the Open University. It is more like what happens in the BBC's Continuing Education programme, or in the Children's Television Workshop series like Sesame Street and The Electric Company. When television leads, there is always a strong risk that funds will be scarce for writing the teaching materials, whether these are books, magazines or newspaper lectures. Within the world of education, television organisations are seen as powerful institutions, and television producers seldom accept control by writers or educators. Probably the Open University had to be created, by the government, as an autonomous, high-status academic institution in order to enter into a successful partnerhsip with the BBC. A lesser college would have failed to tolerate the BBC pressures.

In recent years, however, it has become easy to point ot collaboration between broadcasting and education. Prominent examples exist in Europe and North America. At the adult education level, for instance, the Ontario Educational Communications Authority in Canada owns and operates a network of television stations reaching 80% of the population of the province; the Authority has recently collaborated with colleges in designing and producing courses to be taught via print, television and audio-tapes. In the United States, the University of Maryland Consortium has adapted five courses from the Open University; the television programmes will be beamed up to the Public Broadcasting satellite, for reception by educational television stations right across the continent - but completely separated from the three major commercial channels (ABC, CBS and NBC). In Britain, the BBC and the Independent Broadcasting Authority have been working with the National Extension College to provide multi-media adult education courses at below university level.

Ministries of education and broadcasters have collaborated for many years in European countries to produce and transmit educational broadcasts for schools. In support of the broadcasts, guides for teachers and sometimes texts for children have been written, printed and distributed. There is an important difference, however, in these educational endeavours when they are compared with the 'open universities': in all of the former, control of the teaching and learning process remains firmly in the hands of the classroom teacher. In fact, it could be said that the teacher is the dominant mediator in classrooms. Where print, television and radio have been used, they have been enrichment media under the control of the teacher. Sadly, they have not always been used well or efficiently, often because teachers were not prepared to change roles.

These examples from different countries show that there have been many alternative ways of using the three media under discussion in this conference. I believe that the conference will want to consider how the benefits of using print, television and radio in education can be maximised, while the costs are minimised. Television, as a powerful medium, may bring large benefits, but there is no doubt that it is expensive. Print is very much cheaper, and so is radio (or tapes), but these media have less power. In combination, the three media appear to be able to provide educational opportunities to adults and children, with one medium supporting and reinforcing others.

Some questions

My knowledge of Italian education, and of the roles played by print, television and radio in Italian education, is very small. As I write now in England, I am at the disadvantage of not knowing how much of what I have written so far will be news to my Italian readers. Nor do I know the problems facing ERI and RIA as they attempt to maximise benefits and minimise costs in serving

their public. Perhaps in Turin I shall learn a great deal about these matters. In the meantime, I should like to pose a few questions that may be useful in stimulating discussion at the conference, but of course I recognise that other, more vital ones, may come to the surface there, not only as a result of what I have said but also as a result of other speakers' paper .

Here are the questions:

1) Are there any barriers that prevent ERI and RAI from combining print, television and radio for educational purposes? If so, can they be removed?
2) What must be done in Italy to achieve maximum cost-effectiveness in using this combination of media in education?
3) What is the relationship in Italy between educational and general broadcasting? Can print assist general broadcasting, and, incidentally, provide benefits to educational broadcasting as a by-product?
4) Is the combination of print with broadcasting likely to increase the audience of RAI, through interactive effects of the media?
5) What can Britain and Italy learn from each other in this multi-media field, particularly in relation to education?

In closing, may I remark that one of the first papers I ever wrote and had published was about educational television. Telescuola was the principal example I quoted. It is a pleasure to return to Italy.