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ABSTRACT

The unique educational characteristics of television are discussed in this paper, which provides examples of three teaching functions to illustrate television's ability to bring students materials that would not be available through other media: (1) to demonstrate experiments or experimental situations; (2) to provide students with case study material; and (3) to demonstrate processes. Such materials are shown to influence the learning process by providing concrete examples or models of abstract principles, and by encouraging the skills of analysis and the application of knowledge. It is recommended that television material be designed in such a way that it encourages interactivity by exploiting the control characteristics of cassettes, i.e., use of segments, clear stopping points, use of activities, indexing, close integration with other media, and concentration on audiovisual aspects. The relationship between television, learning, and student assessment, and the use of television for relaying classroom lectures are also considered. Ways to overcome the expense of producing educational television programs are suggested, such as using existing materials or making your own programs. Several excerpts from educational television programs accompanied the paper when it was presented. (8 references) (MES)

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LEARNING FROM TELEVISION

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Why use television in higher education?

Question 1: Which is better: a washing machine or a hair-dryer?

Answer: This is a silly question: have you ever tried drying your hair in a washing machine; or washing your clothes with a hair-dryer? *Both* are useful tools, for different functions.

Question 2: Which is better: a lecture or an educational television programme?

Answer: see answer to Question 1.

Perhaps of all the media available for learning, television is the least understood and most neglected. It is generally considered to be an expensive use of resources, and when it is used in teaching, it is often used very badly. However, television can be an extremely valuable resource, when used selectively and with care. What is important is to identify those areas of teaching and learning where television can be particularly useful. What can it do that can't be done by other methods, such as print or face-to-face lectures?

Briefly, there are two main unique educational characteristics of television. The first is television's ability to bring to students material not otherwise available; the second is television's ability to help the learning process in unique ways.

Presentational characteristics

Television is a very rich medium in terms of information density, because of the amount and type of symbol systems it can simultaneously carry. It is the only medium which combines words, still and moving pictures, events occurring in real time, slow or accelerated motion, animation and even text. This gives it a power to present information that other media lack (and I include face-to-face teaching as a medium).

Television's ability to bring resources to learners which would not be possible through any other medium, or even through direct experience is particularly important. I have chosen just three teaching functions which I believe would be difficult to do any other way, or which are far better done as television. There are many more I could have chosen (see Appendix 1 for a full list).

1. To demonstrate experiments or experimental situations.

The first example is from the Open University foundation course, S101, TV22. The presenter is Dr. Peggy Varley.

EXTRACT 1

There are several reasons why television is particularly useful for experimental work:

(a) television, through enlargement, editing and split screens, can enable students to see experimental work even more clearly than in a well-equipped laboratory; in the example, the heart-beat could be directly related to the experimental record through the 'window' in the screen;

(b) editing allows well-conducted experiments to take place, ensuring that students see a 'model' experiment (it is easy for such a demonstration to go wrong)

(c) once the experiment is recorded, there is no need to repeat it, thus saving the time of those setting up the experiment; it also saves student time, avoiding waiting around during preparation time

(d) there are some experiments that cannot be demonstrated in even well-equipped universities, because they require specialist equipment found in only one or two places: television allows such

demonstrations to be available to students in any institution

(e) television can reduce the dependency on live animals: only one rabbit needs to be sacrificed.

Television of course should not be used to replace students' own experimental work, but it can make the *demonstration* of experiments and procedures much more efficient.

2. To provide students with case-study material

Television can be used to record naturally occurring or 'dramatised' events or processes, and edited to bring out the principal features of the 'story' or case. This allows events which often occur over a considerable time-span to be condensed into a short period of study time, while at the same time providing all students with a common case or example to work on.

The example I have chosen is from another Open University course, D208, 'Decision-Making in Britain'. The programme is called 'Operational Decisions', and follows the decision-making process of whther or not to put a policeman on a foot patrol in a village in the North of England. The story was actually developing when filming was taking place, and was meant to illustrate the ways decisions are taken in the police service, and the relationship between police and community.

EXTRACT 2

Television case-study material can play a vital role in teaching in Social Sciences, Technology and Education. Such material might be used to:

(a) illustrate some of the general principles or ideas introduced elsewhere in the course

(b) provide students with the opportunity to *apply* what they have learned in the course, by analysing, explaining or identifying the

phenomena contained in the case-study

(c) allow students to draw on their own experience and knowledge to suggest and discuss solutions to problems posed in the case-studies.

However, research (e.g. Bates and Gallagher, 1977) indicates that such programming needs great care in its use, a point I will return to later.

3. To demonstrate processes

This is an extremely broad category, covering use in many different contexts. Television though is ideal for showing a sequence of activities that need to be carried out in a certain order, within a certain context. The example I have chosen is from an Open University Arts course, but could equally as well come from Science, Technology or the Social Sciences.

EXTRACT 3

The important point here is that television allows the students to access materials which it would be extremely difficult to access in any other way. While my three examples are all drawn from the Open University, I suggest that even in a conventional university it would be equally as difficult or time-consuming to provide students with such learning experiences. But *how* does such material actually influence the learning process?

From the concrete to the abstract

Television can provide concrete examples or models of abstract principles, can model processes, and through the combination of picture (usually providing the example) and commentary, relate example to principle. In other words, for many students there are often times when words are not enough; they need to be able to see to understand, and television is one way - for some students often the only way - in which

this can be done.

A major presentational characteristic of television is its ability to provide an illustration or a concrete example of an abstract principle or generalisation. Examples or illustrations can be given in texts, but the power of the moving picture, combined with the ability to synchronise such pictures with words and sound, creates striking audio-visual images symbolising important concepts or ideas. Paivio (1980) for example argues that we carry around in our heads a library of audio-visual images. These images can be used by the learner like keys to a room. One function of television is to generate appropriate audio-visual images linked to otherwise difficult abstract concepts. Let me give you an example of how television can provide a concrete illustration of a particular abstract concept, $(a+b)^3$.

EXTRACT 4

It is extremely valuable to be able to provide higher education students with powerful audio-visual concrete examples. Much of higher education is about abstraction. Abstract ideas are usually stored and communicated in words. However, cognitive psychologists such as Bruner and Piaget have recognised that full understanding and internalisation of abstract concepts is preceded by some form of direct experience, some manipulation or exploration by the learner of the boundaries of a concept. It is often difficult to provide this physical experience directly for students, but television can act as an effective substitute.

Adolescent and even adult learning can easily fixate, in Piagetian terms, at the concrete, operational stage. Some help is therefore often needed to move learners from the concrete to the abstract, or from the specific to the general. Because television can combine concrete images*with* words, it can act as a bridge between the concrete operational and formal (more abstract) stages of learning.

For instance, in one of our surveys of Open University student performance and reactions to television, Margaret Gallagher (1977) found

that in Mathematics courses, it was the borderline students (i.e. students getting Grade C or D for the course) who tended to rate the programmes as very helpful (50% of C/Ds, compared with only 24% of A/Bs). While this tendency was most marked in Mathematics courses, it was also found in all other faculties except Arts. My own interpretation of this finding is that the higher achieving Mathematics students were able to follow the course primarily from the text, i.e. they were already able to work at a high level of abstraction, and hence needed less help from television, but for those struggling with the course, the television programmes were able to provide extra help in understanding concepts, probably through the use of concrete examples. Research then does suggest that television can be of particular value to those students on a course, perhaps a minority, who are struggling with difficult concepts. Television seems to be of particular value to 'high risk' students, and can help to keep down drop-out resulting from the difficulty of a course.

Content or skills?

Up to this point, I have been discussing how the presentational characteristics of television can help student comprehension of abstract ideas, through providing concrete examples. However, there are other unique ways in which television can help the learning process. Let's look at the next two extracts. The first is from the Open University Technology Foundation Course, T101; the second is from a Continuing Education course, P653, Caring for Children and Young People. I want you to analyse the different ways in which viewers are expected to respond to these two programmes.

EXTRACTS 5 and 6

The first example was clearly aimed at helping students to comprehend some basic principles, and to understand how some equipment worked. It had a clear cognitive goal. The second one was likely to evoke not only strong feelings from the viewer - an affective goal - but in the context in which it was to be used, it was also meant to encourage students to analyse for themselves how the foster mother handled the situation, and

what they themselves might do in similar circumstances. This extract provided an opportunity for students to make their own interpretations, and to develop skills of analysis and application of principles taught elsewhere in the course.

This brings us right up against a very important issue, and that is the type of learning that we as teachers are trying to develop. Much of the research conducted in North America has been concerned with measuring to what extent a particular medium leads to *comprehension*. Are the students able to reproduce accurately and with understanding what they have been taught? However, in higher education we are often wanting to do more than that. To what extent can the learner *apply* what has been taught to new situations? Can the learner *evaluate* evidence or arguments, on the basis of what he or she has been taught? Can the learner *analyse* a new situation on the basis of previously taught concepts? Can the student bring new or unanticipated *insights* to the situation portrayed?

Television, because of its richness of symbol systems, lends itself to interpretation, to presenting new situations which have to be analysed or recognised in terms already taught in lectures or text-books. In this sense, television is very different from computer-based learning, which has great difficulties in handling situations where a wide range of different responses and interpretations from students are all legitimate. There are many areas of study, not only in the Arts and Social Sciences, but also in Science and Technology, where it is important to develop students' skills in handling open-ended situations, or to encourage students to bring not only their learning from lectures and printed materials, but also relevant life experiences, to analyse situations and suggest possible courses of action. This is of particular relevance to continuing education students, especially in areas of professional development and up-dating.

A particular form of television programme which can encourage skills of analysis and application of knowledge is the documentary-style programme. The extract from the programme with the foster mother and

child was a classic example. While documentaries encompass a wide range of production styles and approaches, they tend to have a loose semantic structure (e.g. there is not usually a strong, continuous narrative line), they tend *not* to build in explicit guidance or interpretation in the sound track, they tend to be apparently neutral with regard to the messages they are carrying, and there are rarely explicit links to other course material in the programmes themselves, although the content may be very relevant to the course.

Open-ended documentary style programmes then can be a valuable teaching resource, if used to encourage students to interpret, analyse and problem-solve. However, far too often the educational purpose behind a documentary-style programme is not articulated. In fact, there is strong evidence that these kinds of programmes are often ineffective in developing students' skills of analysis and interpretation.

We conducted a number of studies of such programmes (see Bates and Gallagher, 1977), and discovered what I call the 'one-third rule'. One third of students watching this kind of programme knew what they were supposed to do with such material in their course, and were able to do so successfully. You will probably not be surprised that these students tended to get high course grades. Another third knew that this type of programme was not meant to be didactic, and that they were meant to analyse and interpret it, but were unable to do so. The last third of students not only failed to approach the programme in the way intended, but were totally unaware that they were meant to do so. This group of students were highly instrumental in their approach to studying at the Open University. They wanted didactic programmes, and were annoyed that they were expected to watch, in the words of one student, 'this irrelevant rubbish'. This group tended to have relatively low grades, but by definition had learned how to survive in the OU system.

Students then need to be helped to interpret and use this kind of programme; it is not a skill that comes naturally, and so we need to give guidance, either in the programmes themselves, or as tutors, on what to do with this kind of material.

Control characteristics

So far, most of the points made apply to television in whatever form it is used: as a broadcast, on cassette, or on disc. Nevertheless, the research we and others have conducted indicates that even when television is used appropriately, in terms of exploiting its unique characteristics to assist the learning process, many students still have difficulty in learning effectively from it. Many of these difficulties stem from the ephemeral nature of the broadcast medium, so now I want to look at the impact on learning of the technological form in which the television material is carried.

Before going any further, it may be worth looking at the current figures for video-cassette ownership. In a survey carried out at the end of 1986 (Kirkwood, 1987), 60% of Open University students on new courses had a VCR in their own home, and 77% reported that they either had access at home or 'convenient access elsewhere'. The increase in OU students owning VCRs is not slowing down to any significant degree, and it does seem that on current trends, over 80% will have their own VCR by 1990. It may be worth pointing out that this will far exceed students' ownership of home computers, and there is no problem of standardisation on VCRs (VHS seems to rule supreme). Furthermore, studies by the BBC Audience Research Department have found that ownership of VCRs is not income-related (except for the unemployed), while ownership of home micros is.

Video-cassettes enable learning from television to be much more effective. Indeed, the video-cassette is to the broadcast what the book is to the lecture. Let us compare the control characteristics of broadcasts and cassettes (Table 1, over).

If a major value to students of television is its ability to link concrete examples to abstract ideas, and to enable learners to interpret and analyse material, it would seem essential that they can stop and reflect on what they have just seen before moving on to the next part of the programme, and that they can watch the same scene as many times as

Table 1: Broadcast vs recorded TV

Broadcast	Cassette
Fixed time to view	Available when needed
Ephemeral/once only	Repetition/search/mastery
Difficult to reflect	Analysis/relating/reflection
One speed	Individually paced
Integration more difficult	Integration easier

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necessary to interpret it.

The question is: *do* students use cassettes in this way? The evidence to date suggests that they do not. It is worth pointing to the difficulty of studying even on cassette when th elevision material is structured as a continuous, unbroken sequence, as if it was a broadcast. Studies of teachers' use of cassette recordings of broadcast television in schools (Choat et al., 1987) show that teachers rarely stopped the tape in the middle of a programme, but continued to use it as if it were a broadcast. Durbridge (1986) also found that Open University students often preferred not to 'interrupt' recordings of broadcasts, but to watch straight through, although they would often come back to a section of a programme at a later date.

The answer is to design television material in such a way that it exploits the contr.l characteristics of cassettes. You have already seen extracts from a cassette which I made on using television for distance education. We built on experience from . first OU course that attempted to exploit the characteristics of video-casse. s.

So what design features for cassettes can we identify?

Table 2: Implications for programme design of student control characteristics

1. Use of segments
2. Clear stopping points
3. Use of activities
4. Indexing
5. Close integration with other media (e.g. text, discussion)
6. Concentration on audio-visual aspects.

Currently, we are carrying out a study to see how students use Open University television material on cassettes. The evidence to date suggests that students working individually at home rarely stop cassettes, even when clearly instructed to do so. Part of the purpose of the study is to validate this finding, and to find out how and why students use recordings in the ways they do.

The main aim then with cassettes is to encourage greater inter-activity between the student and the learning material. Video-discs, especially under computer-control, provide even more opportunities for interaction between learners and video material. However, quite apart from the even greater costs of video-disc production, there are some learning disadvantages as well. Computer-controlled video-discs can be valuable, where there is a specific educational need involving complex skills or subject matter, a fixed and invariant way of doing things, and many individual points of learning (e.g. the training of bank cashiers). However, computer-controlled video disc production is extremely time-consuming, complex and expensive, and can only be justified where alternative training methods are equally costly. Cassettes in fact, with suitable built-in activities, for either individual or group work, can be a much

more flexible training medium than computer-controlled discs. Investment in video-disc machines as a replay device is not expensive; the main problem though is the lack of suitable higher education programmes to run on video-disc machines. In the meantime, because video-cassettes can be recorded off-air, and can be re-edited, and because video cassettes give greater opportunity for individual interpretation and use, at much lower cost than discs, means that video-cassettes are still the most practical video medium in higher education.

Cassette design, skills development and assessment

In the meantime, a number of points can be made about the relationship between video-cassette design and the development of intellectual skills. First of all, in any situation where there is ambiguity or a variety of legitimate responses, students still need to know what *counts* as a legitimate response. This can be provided in a number of ways. The first is through discussion with a tutor. Perhaps even more valuable is the opportunity to discuss responses with other students. Without this kind of follow-up, the value of such a learning experience can easily be lost. Durbridge (1982) found for instance that students were more likely to stop the cassette and answer the questions in a group situation - where they could discuss the question and compare answers - than when working alone.

Secondly, it is probably not sensible, at least at this stage, to lay down hard and fast rules about the extent to which student interaction should be structured on video-cassettes. The amount of guidance needed depends on the students' current state of knowledge and confidence in the subject, and probably also on their preferred learning style. One of the major advantages of television over computers, for instance, is the students' ability to interact with and interpret the material in a variety of ways. Nevertheless, having said that, students often do need help to use television effectively for educational purposes, and my own view is to lean towards video materials which do exploit the control characteristics of cassettes, and which do encourage student interaction and activities.

The next issue is more serious, and is to do with the relationship between television, learning and student assessment. It is perhaps not surprising that students fail to use television effectively for developing high level skills of analysis and interpretation if the system of assessing or examining students effectively bars us from using television for assessment purposes, nor sets questions which tests those skills. In my view, an excellent assessment of a student's understanding of some of the main concepts in a course would be to give a short television extract and to ask the student to explain or analyse the extract in terms of what has been learned in the course. However, practical considerations at the moment rule out using television in examinations, although if it was considered important enough, I am sure that it is not beyond our ability to develop a feasible way of doing this. If we really are concerned about the quality of our teaching, we cannot afford to waste the potential of television to develop these high level skills, and our assessment procedures should encourage rather than inhibit this.

Low-cost television

Lastly, I want to say something about using television for relaying classroom lectures. There is suddenly a revival of interest in this use of television, particularly in North America, mainly for relaying lectures to off-campus sites (by cable, satellite or video-cassette). One particular form, which originated at Stanford University for teaching professional engineers, is called TVI (Tutored Video Instruction). The lectures are usually given by leading experts in the field, specially brought in for the programme. In some variations, students, or more usually tutors, at remote sites can phone in questions to the lecturer, who answers live on-air. TVI is a very low-cost form of television, and allows leading experts, needing little extra preparation, to bring their latest work to a wider audience. Let me show you an example. The presenter is Professor Heinz Wolff, of Brunel University, lecturing for the course: 'Space Technology'.

EXTRACT 7

There are two points to note here. TVI exploits neither the unique presentational characteristic of television nor the control characteristics of cassette or discs. The kind of material we have seen could equally well have been presented either as text, or as audio-cassette plus printed notes. TVI programmes are usually played straight through as a lecture, although they could be segmented, if intended to be used on cassette. The justification for using television in this way lies in the low cost and convenience, and the *distributional* characterisitics, rather than in the presentational use of the medium. Unfortunately, there are no published evaluations of the learning effectiveness of TVI, as far as I know.

Organisational issues

TVI though does bring into focus a major problem. If the best way to use television is to exploit the unique presentational characteristics of television, but this is expensive to produce, where will the money come from? There are several ways round the problem.

Using existing material

There are over 1,000 educational programmes a year aimed at adults broadcast in the United Kingdom (BBC, ITV companies on the IBA network, Channel 4, and the Open University). Each organisation has a publication giving brief details of all the series to be broadcast each year. The standard way of using educational broadcasts is to play them through, either on transmission or on cassette, with some brief pre-programme preparation, then questions or discussion afterwards, or some individual work. This mode of utilisation is encouraged both by the style of production, and by the notes accompanying the broadcasts. While there are occasions where this might be helpful to a tutor looking for material to support a pre-determined course of lectures, this is not likely to be the best way to use television. There are several other strategies.

One way is to build a course of lectures around a television series. This appears to be one of the major uses proposed for the forthcoming Open College. Broadcasters will make television series (in this case in the

technical and vocational area) and it is expected that other agencies will run courses around them.

One way round the problem of the broadcast material dictating the curricular approach is to *select* from a range of broadcast material those elements which will best fit into the course you are intending to develop. In this way, only that television material which is directly relevant to your teaching is included. This may mean using quite short clips, and accumulating them on to a cassette, which students access as and when they need to. While this is simple to do technically, though, there are major practical difficulties. First of all, you will need to know which programmes are likely to be useful, and have them available in a recorded version of good enough quality for reproduction. The major problem is that you will need permission from the broadcasting organisation to use their material in this way. Clearing copyright can be expensive and time-consuming, particularly if the programmes contain secondary rights (in other words, the production used material, such as the music in the programme, whose rights were owned by someone other than the broadcasting organisation). Nevertheless, it may be worth the trouble of seeking clearance. Some programmes, when made by broadcasting organisations, have all rights cleared, and it may well be possible to use such material for a relatively small fee to the broadcasting organisation. There are also plenty of hard-bitten educators around though whose view is that it's not worth the effort to try to get clearance to use broadcast material in this way, because of the costs and the difficulties.

It can be seen that despite the availability of a great deal of high quality broadcast television material, it is not a simple matter to incorporate it into lecture material.

In Britain, there are over 200 educational establishments with their own production facilities, ranging from full broadcast-standard facilities at places like the University of Leeds, to small 1/2" recorders and a camera in some schools. The great majority of these production centres belong to the Educational Television Association. Many of these centres have high-quality materials already made and available for sale. Many of these

are listed in the catalogue of another association, the British Universities Film and Video Council. In addition, there are another 200 commercial video and film companies making training and promotional material for industry and commerce. Clearance of rights from these non-broadcast production centres is usually much easier for secondary use, and certainly much cheaper in most cases, than from the broadcasting organisations.

However, one needs to be very careful in using this material. It can be very patchy in quality, and tracking down just the right example or insert will in most cases be extremely time-consuming. In many cases, the material may not exist in the form required.

Making your own programmes

It is not surprising then that in most cases, people generally end up wanting to make their own materials for a particular course. Making your own television materials is never going to be a cheap option, but it may cost a lot less than you think. Before embarking though on making your own programmes, it is important to be clear about what you want the television programmes to do.

This is certainly the most important, and perhaps the most difficult, step to take, and one where professional advice is likely to be essential. *Why* is television to be used, and for what *teaching purposes* ? If the aim is to exploit the unique *presentational* characteristics of television, then three kinds of expertise are required. The first is knowledge of what television can do, related to the subject matter to be taught. This is important, because a skilled television producer may be able to suggest ways of using television which would never occur to a teacher without any experience of using television. The second is knowledge of the subject matter, and valid and effective ways to teach that subject matter. The third is expertise in instructional design, how to integrate the television material with the other teaching material, and how to help learners get the most from the television material. These three kinds of expertise rarely exist in one person; therefore a team approach is required, where those with different expertise work together to create the whole package.

The team approach though takes time, and costs money. Speed and cost may be of the essence. If the main purpose is to get the latest information on new developments out as quickly as possible, or to up-date those with already a good grounding and basic understanding of a subject, then the illustrated lecture may be the best approach, since the television production time is less, and it needs less preparation time for the subject experts, for whom this may be an important consideration. This assumes though that the alternative of audio-cassette or print production has been considered and dismissed.

The most difficult question though is how to organise the teaching to exploit the use of television and at the same time to justify the costs involved. Once material is available on cassette, it can be used not only as part of a lecture course, but by students for independent study. Indeed, it may not be necessary for students to attend lectures at all, if the video material is properly integrated with specially prepared notes and set reading. This may allow more students to be handled on a course, with teachers spending more time on individual or small group contact. This however is beginning to resemble open learning, an issue which is developed in more detail in another presentation. What is clear though is that significant use of television in higher education does require a major re-think about the organisation of teaching. Using it merely as an extra to classroom or lecture hall teaching merely pushes up costs.

Conclusions

Television can provide unique learning opportunities for higher education students. However, exploiting the presentational characteristics of television is costly. Where high quality learning is required, i.e. where students are required to develop deep comprehension or higher level learning skills, there are good pedagogic reasons for 'high-quality' production which exploits the presentational characteristics of television. This may be particularly important where students have little previous conceptual knowledge in a subject, or have had little previous experience in developing skills of analysis, interpretation, application or problem-solving.

There is also some evidence to suggest that 'high-quality' television production can also reduce drop-out due to conceptual difficulties faced by students, and is associated with higher grades.

'High quality' television is also a very different medium from either text or computers. Television is not a good medium for teaching large quantities of dense, abstract ideas or for comprehension of detailed arguments or facts. It also lacks the ability to provide student feedback. It can though help students acquire difficult abstract ideas through the use of concrete examples, it can deal better with ambiguous or open-ended situations, and does have the capacity to stimulate a very sophisticated level of thinking from learners, leaving the interpretation and analysis open to the student. These are generally areas that both text and computers find difficult to handle.

The ephemeral nature of broadcasting makes learning more difficult. The permanence of recorded material opens up a whole new range of possibilities for increasing learning effectiveness from television. There is some evidence though that the potential even here is difficult to realise. It is difficult to find the right balance between structuring material and inhibiting the way students wish to use television. More research in this area is urgently needed. One strategy that might be considered, particularly for courses with relatively low enrolments which nevertheless really need television, is dual-purpose production. In other words, material would be collected, edited and broadcast in the 'standard' format for the public at large, but then re-edited to exploit cassette characteristics, and made available in the re-edited format for on-campus students.

Lastly, the pedgagogic rationale is not the only, indeed probably not the most important, criterion in deciding whether or not to produce 'high quality' television. Costs, publicity, student numbers, ability to access easily the material, teacher and student convenience, and organisational and political factors are all important, and are likely to outweigh the pedagogic arguments.

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