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Science on TV - active not passive 'learning at a distance'

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1. Introduction

Talk to scientists, broadcasters, educationalists or those working for the public understanding of science and you will get, almost certainly, a view that science has a declining presence in the output of major broadcasters. Even in the area of natural history, reviewed by Jeff Thomas in Chapter XX, there has been a perception recently in the industry that commissions are harder to win, that fewer blue-chip documentaries are being made and that the market for traditional natural history documentaries is declining. These are, of course, received views from insiders, rather than objective research results, but as I will be discussing here, a small-scale survey of main-stream science output on the major terrestrial channels in the UK supports the view that there is a paucity of science coverage. In this chapter I shall be considering the potentials – and limitation – of TV for science education and presenting some data on successful science broadcast projects.

There are two areas to address - TV as a medium for education and a vehicle for exploring science.

TV as a medium for science education

There is no doubt that television educates. When questioned in a recent survey carried out by the BBC, a third of viewers claimed to have learnt directly from television in the previous 3 months. The figure for radio was higher (BBC, 2005). In a MORI survey of BBC viewers in 2004, 'Educational' was second in the list of descriptions applied to the broadcaster, with 47% of respondents listing it. If we consider just science documentaries, in the UK 52% of respondents thought that the BBC produced the best programmes in that genre, compared with 18% who rated Sky best and 3% ITV (MORI, 2004).

So, we could conclude that factual programming, which in general is where science is covered, is both valued and thought to be educational. But there is not much science. In a survey carried out over 2 weeks in 1999 (McSharry and Jones, 2002), factual science took up 5.36% of broadcast time on terrestrial TV and much of that was biological science. Surveying a single week of scheduled programmes for UK broadcasting in 2005, excluding news broadcasts, gave a lower figure of 2.9%, but direct comparison is difficult as there is a greater amount of air time available now than in 1999. In 2005, gardening, archaeology and nature dominate and it is hard to resist the conclusion, even with such a limited survey, that science does not get very much coverage on-screen. Of course this

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survey says nothing about the quality of that coverage. Markl (2003) provides an interesting critique of science broadcasting, analyzing ten so-called sins of science media producers, but an objective analysis of the science content of science broadcast output awaits a keen investigator.

Table 1 Analysis of science broadcasting on terrestrial free-to-view channels for one week in October 2005.

Available broadcast hours*	1022 hr	
Broadcast hours devoted to science	29 hr	
Percentage of available time	2.9%	
Categories of programmes	Earth Science	2 hr
	Gardening	7 hr 15 min
	Nature	7 hr 25 min
	Science	2 hr 35 min
	Science – forensics with archaeology	8 hr 20 min **
	Science – history	1 hr
	Science – medicine	1 hr

*Only channels where science had at least one programme in the week.

** Includes two repeats of one programme within the same week.

TV as a medium for exploring science

Education is no longer a process of the transfer of knowledge. Formal education now should:

- Stimulate an appetite for learning
- Provide a road-map for future self-education
- Raise awareness

- Foster appreciation
- Provide a route to qualifications.

All of these attributes can be applied to television, although the last one is not something that television alone can deliver. However, there can be a clash of cultures when educational television and entertainment meet. The best educational programmes ought also to entertain and one argument runs that educational television only has an educational value of it *is* entertaining. Certainly, in a world of ever increasing choice where the viewer can rapidly jump channels, programme makers have adopted this argument. Has it been successful?

As an example of a successful and series that is both educational and entertaining, consider *Rough Science*, a BBC production for the Open University. *Rough Science* is now in its sixth series and there is a substantial body of research data on the audience that it attracts. The programme is transmitted during peak time viewing on BBC2. The premise on which it is based is that if the scientific content can be made accessible to the viewer in such a way that they believe that they can carry out the experiment or build a device for themselves, that they will take away a view that science is accessible and available to all, rather than being the mysterious province of the specialist. A team of scientists of different disciplines is set a series of tasks each week. They have to complete their challenges using simple materials – definitely no ‘black boxes’ – and have three days in which to do it. The series is set in an exotic location and the scientists are obliged to use the resources around them in completing their challenges. The element of competition is almost entirely excluded and the science is presented as a co-operative venture. Examples of challenges they have faced in the past include:

- measuring the movement of a glacier, having constructed a method and instruments to do so;
- designing and building a variable-buoyancy underwater rover platform for a video camera, to survey a coral reef;
- making mosquito repellent;
- building a light house;
- building a radio;
- establishing their exact latitude and longitude;
- making a tide gauge.

The team of scientists were largely unknown on TV before the series, with only the presenter being a known ‘face’. Since appearing on *Rough Science* most have done other TV science work. Table 2 shows the audience response to the 4th series, which was set in the Arizona desert and Table 3 the 5th series, which was based on marine projects in

Zanzibar. The series is perceived as interesting, modern and, above all, innovative and it attracts just under 2 million viewers or 7% of the available viewers at that time. Clearly it is attracting viewers in excess of the average for that time slot, but do they find it educational and do they learn anything? The proportion of viewers who perceive the series as educational is just over 40% (Tables 2 and 3). Interestingly if we compare figures for all five series for the question ‘Did you feel that you had learnt a lot from watching the series?’, there is a continual growth over time, from 42% to 54% (Table 4). So, a larger proportion of the audience felt they were learning (Table 4), than believed the series to be educational (Table 3).

Table 2. Audience response to the 4th series of *Rough Science* (sample size 4677 of whom 561 had watched at least one episode).*

Average audience (millions). Average for transmission slot in brackets	Share of viewers. Average for transmission slot in brackets	Appreciation index. Genre average in brackets	Perception					
			Target figure in brackets					
			Interesting	Educational	Enlightening	modern	innovative	compelling
1.82 (1.30)	7.4% (6%)	74 (73)	56% (51%)	41% (44%)	30% (35%)	23% (15%)	39% (20%)	14% (13%)

Table 3 Audience response to the 5th series of *Rough Science* (sample size 3966 of whom 435 had watched at least one episode).*

Average audience (millions). Average for transmission slot in brackets.	Share of viewers. Average for transmission slot in brackets.	Appreciation index.	Perception					
			Target figure in brackets					
			Interesting	Educational	Enlightening	modern	innovative	compelling
1.68 (1.30)	7% (6%)	73	59% (51%)	53% (44%)	38% (35%)	20% (15%)	40% (20%)	17% (13%)

Table 4 Comparison between first five series of *Rough Science*.*

Series	1	2	3	4	5
Proportion of viewers who felt that they had learned a lot from watching	42%	47%	49%	50%	54%
Level of awareness/viewing of <i>Rough Science</i> amongst UK adult population (base: all adults).	25%	35%	43%	45%	41%

*Data in Tables 2 to 4 from Jeremy Leach Research for the Open University.

The success of this science series is based, in part, on the personalities of the presenter and scientists. Changes in the scientist team between series do not seem to have influenced success but having a team that work well together and complement each others skills and knowledge is key to getting the entertainment value right as well as the science. There is within television a cult of the celebrity, and many programmes are fronted by a celebrity who is not always an expert or indeed, some would argue, appropriate. Clearly there is a trade-off, as far as science is concerned, between the drawing power of a big name and the level of expertise that they have. Of course, some professional scientists are also professional broadcasters and celebs in their own right, but inevitably there are few of them and is it an accurate reflection of science if a small number of big names present everything?

Rough Science shows that you can have education and entertainment in a science series. However, TV is an ephemeral medium, despite the ubiquity of the VHS recorder, and to achieve real impact for a learning agenda we have to look at other new developments in science broadcasting.

2. Building audience engagement

Drawing in a large audience to a science programme is obviously a primary aim but for the programme to encourage learning it needs a 'Call to action': something that members of the audience can do for themselves. A recent example that exemplifies this approach is the observation of the transit of Venus across the sun on 8th June 2004.

A programme previewing the transit was broadcast on 5th June. The event itself was broadcast live on day-time television with a highlights programme in the evening. Viewers were invited to make their own observations. Briefly, by measuring the time taken for Venus to cross the Sun's disc, it is possible to calculate the astronomical unit (AU) – the distance from the Earth to the Sun. The programme encouraged viewers to make the observation of the transit time themselves or, if they could not do it directly, to

record the time using the live pictures. A calculator on the programme web-site then enabled them to get a personal value for the AU. Of course both the website and the broadcast included background information about the significance of the event and the value of the measurement, with the website also explaining the theory behind the calculation. In addition, the website provided a discussion forum, moderated by experts. The response to the programmes is shown in Figure 1. The audience share, the percentage of the total number of viewers of all terrestrial channels in the UK at that time, exceeded 30% for the live broadcast, with 1.28 million viewers. There is strong evidence that viewers were motivated to go further, from the large peak in web traffic on the day of the broadcast itself (Figure 2). The web forum was also active, with 1025 postings. So, if the combination of programme plus 'call to action' is attractive

Figure 1 The Transit of Venus broadcasts – audience size and share. The programmes were produced by Screenhouse Productions for the Open Univesity and the BBC.

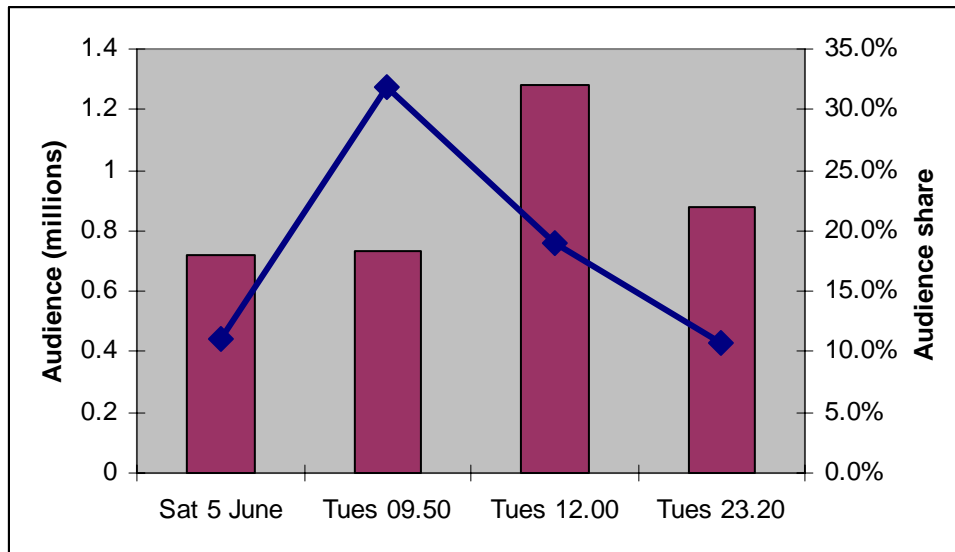
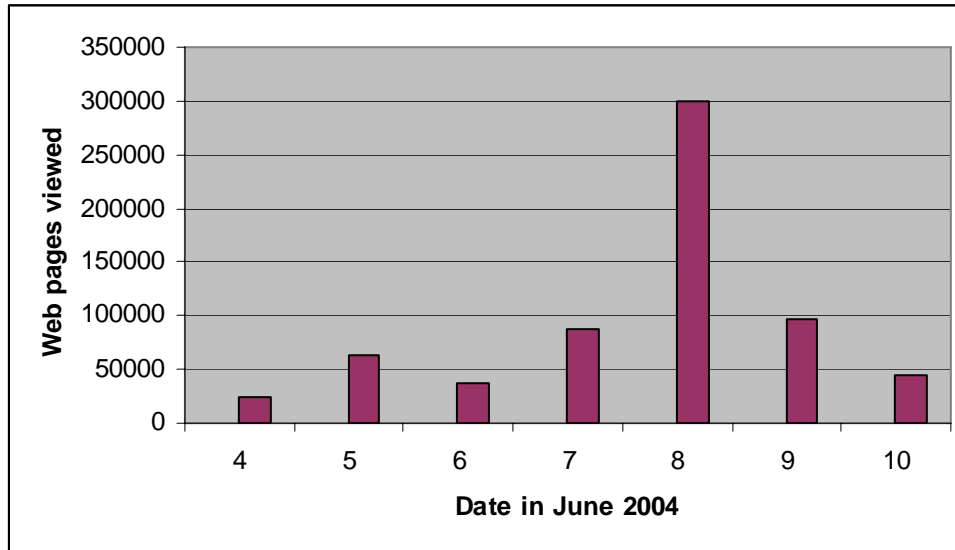


Figure 2 Web traffic on the broadcast web site (www.open2.net) around the Transit of Venus. The website provides resources for all Open University broadcasts.



The strength of these particular broadcasts came from embedding the call to action within the editorial of each programme so that the web activity was well integrated with the television. Additionally, promoting the idea of making direct observations – getting out and doing it for your self – added to the scientific value of the programmes as well as to their appeal. This broadcast package is a model that will be increasingly used in future.

3. Moving from broadcast to multiple media

It is difficult to build a participative element into a TV transmission on its own. Designing a complete package of media, activities etc around a TV transmission will become a standard for factual broadcasting in the future. To achieve this, the production team will need to integrate the on-screen editorial with the editorial of components in other media. Different audiences are likely to use different media or forms of technology so a multiple media approach to learning through TV can reach a wider group of people. There are two recent examples of this integrated approach *British Isles: A Natural History* in 2004 and *Coast* in 2005.

British Isles: A Natural History was broadcast in autumn 2004. The theme of the series was the development, through time, of the landscape of the country. Each 50 minute documentary, fronted Alan Titchmarsh (a well-known ‘face’ on BBC TV) was followed by a 10 minute programme specific for each of 12 regions in the UK (9 English regions and 3 nations). The regional programmes featured a ‘call to action’, which was to get out and look at the landscape in your area and the programmes gave examples of what to look for. Each programme also promoted a website featuring a local ‘Walk through

Time' which was specifically tailored to the series. Viewers could send off for a free learning pack, entitled *Become a Landscape Detective*. Local radio organized specific events at which local people could take a guided walk in their own area. The digital channel, BBC4, had a series called the *A User's Guide to Natural History* that ran later the same evening and gave practical advice about studying the landscape.

The British Isles series was designed to motivate viewers and provide them with a pathway that would enable them to learn more about their own local landscape and perhaps encourage them to study further in an informal or formal arena. The concept of a learning journey, stimulated by broadcast TV is well illustrated by this series. How did it perform?

Around a quarter of the viewing audience watched *British Isles: A Natural History*, 5 to 6.5 million for each episode. In the first month of the series over a million page impressions were recorded for the walks. Over 25000 people requested the learning pack. Many of the guided walks were fully booked. This series had a major impact, measured statistically and subsequently book and DVD sales have prolonged the interest. The series certainly had science content which reached a large audience. Although the 50 minute documentary broadly continued the tradition of Sir David Attenborough, Jacob Bronowski, Aubrey Manning, Simon Scharma and others in being a single person leading the viewer through the subject, both it, the regional programmes and those on the digital channel were very clear about the audience 'getting out there' for themselves. This was not intended to be arm-chair science and nature and with its mix of media - TV, digital TV, DVD, internet, print and events – there were multiple routes for reaching and involving an audience.

4. Audience selection

The examples that are analyzed above highlight the problem of the audience for science broadcasts. Experience suggests that programmes about Astronomy reach a niche audience of loyal viewers. On the other hand, if the aim is to encourage learning amongst viewers who are not already enthusiasts, then programmes must reach a mass audience. *British Isles: A Natural History* and the long sequence of highly successful series from Sir David Attenborough (Chapter XX in this volume) demonstrates that you can achieve this. The subject matter must, therefore be matched carefully to the target audience. Selection of a call to action must also be highly sensitive to the intended audience. It is instructive to consider the examples quoted here, and a few other science programmes, and look at the audience profile (Table 5). This is a relatively crude measure, particularly since the age profile of the audience varies with time of day, but a general trend emerges of a viewing audience with an average age above the population average (Table 5 Line 1) and an income that is also above the population average. These are probably audiences likely to have an interest in learning.

Table 5 Audience profile for a number of BBC science series.

Series	Proportion of audience over age 45	Proportion in higher social groups
Population Average	46	46
Rough Science	64	52
British Isles: A Natural History	68	52
All Night Star Party (Astronomy)	45	46
Transit of Venus	64	54
Science Shack	59	47
Ever Wondered About Food (Science)	46	46

*Data in Table 5 from Jeremy Leach Research for the Open University.

5. The future

The future of fast-moving technologies is very difficult to predict, but the continuing fragmentation of the airwaves and the increasing number of channels offers two possibilities for science. As the reach of channels extends, the potential audience becomes much larger. Series like Rough Science, which are also shown on BBC World, reach a very large audience indeed. Designing science broadcasts for a mass audience can bring great gains, but of necessity the programmes have to have a very wide appeal. An alternative is to capitalize on the proliferation of channels to provide niche broadcasts to smaller, but more highly motivated audiences. At present, there is a lack of evidence of the viability of such channels. The success of astronomy programmes that attract a loyal following could indicate that niche broadcasting might be viable, but defining a suitable financial model would be difficult.

The BBC is planning a pilot for television viewing on demand, similar to the radio 'Listen again' facility. Viewing of complete programmes on the web is already offered in the UK by Teachers' TV and there are 30 science programmes on offer already (Teachers' TV, 2005), of a total of 508 in all subjects. This will increase access to science broadcasts and will also help the development of the learning component of broadcast packages, as missing the programmes on transmission will not be a barrier to taking part.

A further development is the availability of science programmes, or excerpts, for download and editing by individuals (Creative Archive, 2005), which will open up a range of new possibilities for adding components to a learning journey stimulated by broadcasts.

6. Conclusion

Science on TV is not in a healthy state, but particular series have shown that there is an appetite in the mass audience for good science programmes. Natural history dominates science broadcasting and, at least in the UK, there are very few science magazine programmes or regular science series. A distinction between science and nature is apparent in broadcasting, particularly on the BBC. Indeed on the BBC website that distinction is firmly embedded in the title 'Science and Nature' (see review by Jeffries, 2003). There will always be a large audience for natural history programmes, but the recent series '*Coast*' has shown that combining science, history, anthropology and nature around a common theme can attract similar sized audiences.

The development of broadcasting packages that have embedded learning is an encouraging initiative and science education could really benefit by embracing the idea. The broadcasting landscape changes rapidly, and new styles, formats sweep across the airwaves (eg. make-overs) and then disappear. Science programming can copy the trend and reap short-term success but the real goal is to establish science formats that can weather the winds of change and endure.

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