

Science promotion



Science promotion



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Contents

Introduction	5
Learning Outcomes	6
1 Starting to investigate science promotion	7
1.1 The political climate	7
1.2 Defining science promotion	8
2 Joining in	10
2.1 Institutional science promotion events	10
2.2 'Go See' science promotion events	11
2.3 'Go Say' science promotion events	12
2.4 'Go Use' science promotion events	13
2.5 Public engagement	13
3 The value of institutional science promotion events	15
4 D-I-Y science: independently engaging with science	17
5 Public learning agendas	19
6 Promoting science promotion: the move from deficit to dialogue	21
7 Conclusions	24
Keep on learning	26
References	26
Acknowledgements	27

Introduction

For many years, the view that dominated the science–public realm was that if only ‘the public’ were educated more, they would better appreciate the intrinsic value of science in their lives. Moreover, under this approach, people were too often seen as ‘empty vessels’ waiting to be filled with scientific knowledge that was transmitted one-way from experts to citizens – an idea that you will recognise as the ‘deficit model’ of how ‘the public’ understands science. With a few exceptions, most commentators and policy makers now see the situation differently: it is widely acknowledged that science is not so much ‘(mis) understood’ as ‘understood in context’.

This raises issues of intention and achievement – whether practice reflects purpose – and how ‘success’ is recognised and evaluated. In this course, a critical assessment will be made of how and why science is actively promoted to adults.

This OpenLearn course provides a sample of postgraduate study in [Science](#).

Learning Outcomes

After studying this course, you should be able to:

- demonstrate an awareness of the issues surrounding public understanding of science
- engage with some of the debates surrounding this topic.

1 Starting to investigate science promotion

1.1 The political climate

You may have read a lot about recent political moves to involve the public in science policy making. Some commentators, such as Alan Irwin and Brian Wynne, are in favour of it, while others, such as Lewis Wolpert or Richard Dawkins, are circumspect or even hostile to involving the public in science. However, it is generally agreed that increasing public engagement with science is important and worthwhile, with tangible societal value (in other words it has value for experts, policy makers and other stakeholders, as well as the general public).

The UK Government's White Paper called 'Excellence and Opportunity' (written in response to the seminal House of Lords Select Committee on Science and Technology's Third Report in 2000) sums up the main argument for greater public engagement, when it says:

science is too important to be left only to scientists ... When science raises profound ethical and social issues, the whole of society needs to take part in the debate.

(Office of Science and Technology, 2000, p. 27)

This excerpt implies that greater public engagement in scientific dialogue is needed: it is important for people not otherwise involved to 'take part in the debate'. It is possible to unpack this statement and ask whether their Lordships really mean the 'whole' of society should take part, and whether only 'profound social and ethical issues' should be debated – with presumably some other issues off limits. These points aside, however, the overall message is that there is support within political circles for an increased public engagement with science. Of course, what is less certain is the extent to which a commitment to the principle of public engagement is shared by those scientists and policy makers at the sharp end of public involvement – there can be a world of difference between intended policy and actual practice!

The agenda of public engagement extends beyond the UK, and later in this course we will look at how it is articulated within the EU and elsewhere. Indeed, the EU influence is particularly important to the UK, since it obliges the UK Government to an extra layer of commitment – they need to realise both home-grown *and* pan-European aspirations. Resonant of the House of Lords' sentiments quoted above, the 2002 EU Science and Society Action Plan states that:

If scientific and technological progress is to meet the needs of Europe's citizens and regain their support, they will need to have information that is understandable and of a high quality, as well as ready access to this specific culture.

(EU Science and Society Action Plan, 2002, Section 1.1)

It is worth reflecting on what this might mean in practice. Assuming that the phrase 'ready access to this specific culture' means 'ready access to *scientific* culture', then the EU

Science and Society Action Plan is asking for a higher level of public involvement. Later parts of this course will look at whether these aspirations encourage a wide-ranging approach and thus create new opportunities for public engagement and science outreach. It is perhaps worth noting that literature on this subject is often ambivalent about distinguishing between 'access', 'engagement' and 'outreach', and uses the terms interchangeably. In short, these terms indicate an enhanced relationship between science and society, and not the belief that people should, for example, be able to walk off the streets and into a laboratory or access raw scientific data at will.

Whilst science can be accessed through means such as formal education or media coverage, this course will look at the extent to which it is done via science promotion events. It is a huge task to consider all the different forms of science outreach in the UK, so this course will consider some particular ones. Specifically, it will concentrate on events that people need to actively seek out and then apply themselves to. In other words, it will not look at the popularisation of science through books, magazines or the internet, or at how the mass media might be used to promote science. Brief mention will be made of science museums and centres (see, for example, Reading 2), many of which engage in science promotion activities, but these will not be discussed in detail because they are established institutions and not commissioned events.

1.2 Defining science promotion

A basic definition of science promotion would be useful here: in the context of this course it means putting forward the benefits of science by motivating and engaging non-scientists. You may be aware of the sociological argument that science is open to social influences and constraints, and it is worth bearing this in mind when thinking about whether the benefits of science are necessarily the same for everyone. Likewise, you will need to remember that the public is not a homogeneous mass with uniform interests and understandings. In which case, you might ask if the argument made in the House of Lords' report is achievable – in other words, whether 'the whole of society' can take part in debates and be meaningfully engaged with science.

Moreover, perhaps we should consider whether the government has a particular agenda on public involvement in contentious scientific issues, and whether any political motives define priorities. Is greater effort put into promoting 'science in general' rather than some controversial 'science in particular'? (For example, might science promotion events explain plant genetics, but overlook the debate about whether genetically modified crops should be designed specifically for alleviating food shortages in developing countries?) Or is it possible that the scientific community commands exceptional influence over the science promotion agenda, with events thus representing their professional priorities rather than the ethos of public engagement and debate?

Gregory and Miller (1998) in *Science in Public* warn that the outcomes of science promotion are not necessarily straightforward:

Governments, the scientific community, and business interests have all offered the public new opportunities to participate in scientific events, be they celebratory festivals or critical enquiries into matters of public policy. [but] ... These tensions are not always apparent: the agendas at work are often tacit, and the public's perceptions of and reactions to them are difficult to assess.

(Gregory and Miller, 1998, p. 220)

Of course, this was written before 2000, when the House of Lords report was published and, by the end of this free course, you should be able to evaluate the validity of these quotes in the light of recent changes.

There are a number of ways to try and address these issues. The analytical method used in this course is to try and separate ‘institutional’ and ‘independent’ ways of promoting science, to see what aspects of science they emphasise and what techniques they use.

- Events are categorised as **institutional** if they need some kind of support from an established institution in order to exist – support usually in the form of financial, human and technical resources.
- Events categorised as **independent** are those where public engagement is on a non-institutional, autonomous basis – a do-it-yourself approach, so to speak.

This distinction is made to try and identify the roles played by ‘top-down’ political and institutional impetus versus those played by individual and ‘bottom-up’ impetus. It might be concluded that any such impetus, and the vested interests that may accompany it, makes either no difference or perhaps some difference to what is being promoted.

However, you should remember two important caveats:

1. These categories are just for the purpose of this course and should not be taken as rigid or undisputed divisions (an overlap could occur, for example, when amateur ‘independent’ astronomers contribute to local events as part of National Astronomy Week).
2. No matter how well an event is organised using institutional resources, its reception cannot be easily predicted. Participants might accept the message that is being delivered, or might disagree strongly, and/or be apathetic to certain aspects whilst being enthusiastic about others.

We hope this analysis will help you see if institutional support is *necessary* for science promotion to be successful – however ‘success’ may be defined – or whether people can engage just as well with science through other, more self-determined means. Hence, the next two sections look at the merits and drawbacks of two very different styles of science promotion opportunities for adults.

2 Joining in

2.1 Institutional science promotion events

Nowadays, engaging with science through an institutional science promotion event can be quite straightforward. You can find out about such events by, for example, reading posters in your local library, watching a science documentary on TV or browsing the internet. The range of such outreach events is remarkable – from long-standing mainstream programmes such as the Royal Society Christmas lectures on TV and the annual BA (British Association for the Advancement of Science) Science Week, to more unconventional activities such as the controversial ‘Bodyworks’ exhibition of cadavers and the ‘Science on the Buses’ scheme. Despite their different techniques, these all exist, at least in part, to promote science.

Part of analysing science promotion as a phenomenon is to ask why institutions choose to support these events, and whether there is a recognisable ‘message’ that can be given to a target group. In order to begin answering these questions, it is worth looking briefly at the organisations that regularly back such institutional events.

UK government funding for science promotion at the time of writing (2006) came mostly through the then Department of Trade and Industry (DTI), especially its Office of Science and Technology (OST). Since the 1990s, there has been increasing deregulation in many areas of governance, and hence a greater emphasis on realising policy through non-state action and responsibility. Thus the government fulfils its political mandate for science promotion and engagement through the OST, which gives financial support to other institutions. In 2006, the money went primarily to the grants scheme called ‘Sciencewise’, for research into public dialogue best practice, and to the BA.

Sciencewise grants, established in 2004, are for projects that help facilitate dialogue between the public, the scientific community and policy makers – dialogue that can then feed into public policy decisions. Projects funded recently include:

- a research group looking at public engagement with nanotechnology;
- a workshop series to discuss a new model of dialogue called ‘Convergent Engagement’, and how it might inform changes to the BA Festival of Science;
- a ‘Science Communication Working Lunch’ series to facilitate the sharing of good practice in public engagement and dialogue.

The BA is a charity, set up in 1831, that aims (amongst other things) to ‘obtain more general attention for the objects of science and the removal of any disadvantages of a public kind that may impede its progress’. Its modern remit is to encourage a more open science–society relationship so that science and technology are better received. Its science promotion events are sponsored not only by national government agencies but also by a wide range of benefactors, including local councils, media organisations, industry, research and professional interest groups.

Two other long-established charitable groups lead the science promotion field:

- the Wellcome Trust was created in 1936 to fund research that improves human and animal health, and this now includes activities to promote public engagement with science;

- the Nuffield Foundation was established in 1943 to improve social well being by encouraging creative research.

Their work in the Public Engagement in Science and Technology (PEST) field is now often cooperative – for example they often join up with NESTA (the National Endowment for Science, Technology and Arts) and the Millennium Commission, which are both National Lottery funded bodies and principal sponsors of PEST events.

Perhaps not surprisingly, there appears to be a close relationship between long-established charitable organisations from within the scientific community and recently formed government agencies. In the following sections, we will attempt to evaluate **why** these organisations, the government, and others want to run science promotion events. For now it seems useful to look at **how** they do this. Although these are certainly not rigorous terms, it might be useful to group these events according to three idioms: ‘Go See’, ‘Go Say’, and ‘Go Use’. They can be defined thus:

- **Go See** events involve practical demonstrations. People can watch experiments or machines in action and hear scientists explain their ideas and theories. The session may be organised to allow the exchange of ideas. These events may be particularly useful for introducing new topics, raising awareness, and motivating young people.
- **Go Say** events are those where people can debate scientific issues, so they are particularly useful for engaging scientists and the public in dialogue.
- **Go Use** events are those where science is presented in a utilitarian way, for people to make use of, and so are particularly useful for engagement through participation.

Sections 2.2 to 2.4 give some examples of science promotion events to give you a flavour of what an organised science promotion event in the UK can be like.

As you read through the examples, think about the opportunities that might arise within them for open dialogue or whether there may be more likelihood of a ‘top-down’ transmission of facts. Are these idioms useful in understanding how PEST is conveyed in institutional science promotion events? (Another caveat though: it has only been possible to apply these idioms to the idea of ‘institutional’ science promotion and not to ‘independent’ science promotion because of the diverse, informal nature of the latter.)

2.2 ‘Go See’ science promotion events

Every year, the BA (British Association for the Advancement of Science) runs a week-long Festival of Science in a different town or city, claiming it to be the largest public celebration of science in the country. The events are diverse in topic and character. The 2004 Festival in Exeter, for example, included a Presidential lecture on the responsibility of scientists, an exhibition on climate change, and an excursion to a nearby car park to test geometry by chalking lines on the ground. Festivals attract wide audiences, but tickets are costly (around £20 per day for the 2005 Festival, although ostensibly ‘free’ coverage is available on the BA web pages).

Since 1994, the BA have also run National Science Week. This event takes place every March and offers hundreds of public talks, workshops and exhibitions around the country. Sometimes the Weeks are thematic – the 2005 National Science Week was a celebration of Einstein Year – and events may be locally specific (for example related to a local inventor or organisation). The BA says that it runs these events to celebrate the

importance of science in everyday life and to make science and its applications accessible to all.

NESTA (the National Endowment for Science, Technology and Arts) and the Nuffield Foundation run a long-term sponsorship programme of six 'Cities of Science' in the UK, focusing on how these cities and their regions benefit science and, equally, are benefited by science. At the time of writing (2006), the sponsored cities were London, Manchester, Liverpool, Bristol and the South West, Newcastle and the North East, and Birmingham and the West Midlands. The scheme invites the public to learn about historical and contemporary science research in their area and to join local science promotion events – for example going on a tour of an original jewellery factory in Birmingham, listening to an explanation of the telescope inside the London Monument, and going on fieldtrips to quarries and fossil beds in the North West.

'Science on the Buses' was a UK-wide bus poster campaign that was run in nine UK cities in the late 1990s. Designed by Frank Burnet and the Graphic Science Unit at the University of the West of England, the message of the posters was that science is part of everyday life, with scientists sharing the interests and concerns of their fellow citizens. Young adults, identified by the team as being frequent bus users and poorly served by other PEST (Public Engagement in Science and Technology) methods, were the target audience. As a way of evolving PEST communication methods to suit the target audience, the posters were deliberately light-hearted and intriguing rather than didactic, with graphics that resembled nightclub flyers. The event was sponsored by the Millennium Commission, the OST (Office of Science and Technology), the Institute of Physics and the Royal Society of Chemistry.

The 'Pub Understanding of Science' project, started in 1997, used beer mats to further the 'public understanding of science, life and the Universe'. Scientific questions and answers, written by biologist David Walker and illustrator Mic Rolph, were printed on beer mats and placed in pubs across the country. The idea was that these unusual and eye-catching beer mats would inspire drinkers to start talking about science, whether or not they answered the questions correctly. The project was sponsored by the Millennium Commission, Royal Society and BA.

Gunter von Hagen's public autopsies and exhibitions have not only created great controversy – and publicity – for the inventor and his Institute for Plastination, but have also achieved phenomenal success in terms of visitor numbers. The exhibitions, called 'Bodyworlds' and 'Bodyworlds 2', have run almost continually since 1996 and have attracted around 16 million people worldwide – allegedly the largest number of visitors ever recorded for a touring exhibition, according to the 'Bodyworlds' website.

2.3 'Go Say' science promotion events

An increasing number of science museums and science centres hold regular organised events that stand apart from their exhibitions. The Dana Centre, which now has a permanent venue in the Wellcome Wolfson Building at the Science Museum, holds 10–20 events each month. They are designed to provoke discussion through a blend of debate, art, multimedia and performance, covering issues such as the ethics of prolonging the life of fetuses, the role of science in alleviating poverty, and what is, and is not, medicine. The Centre is sponsored by the European Dana Alliance for the Brain, the BA (British Association for the Advancement of Science) and the Science Museum. Similar events include the 'Citizen Science' debates at the 'At-Bristol' Science Centre and the 'Talking Point' series at the Royal Institution.

Science Cafés, whereby people join informal scientific debates held in non-academic places such as cafés, bookshops or community spaces, have opened around the UK since their inception in Leeds in 1998. Science Cafés are coordinated by an umbrella group called Café Scientifique and sponsored by the Wellcome Trust (often alongside smaller, local organisations). They aim to let people air their views and ask questions, usually in response to a scientist or science writer invited to give a short talk about their work. Informality and enquiry are strongly encouraged: the Café Scientifique website claims: ‘There will be opportunity for everyone to ask questions, and we welcome those which begin “This might be a stupid question, but...”. These questions are invariably not stupid and often rather insightful.’

2.4 ‘Go Use’ science promotion events

Science shops, created in the Netherlands in the 1960s and now spread throughout Europe, first emerged in the UK in 1988 (at Queen’s University, Belfast). They act as a demand-driven link between a university or independent research facility and the community (usually via citizen groups, such as pressure groups, social groups, consumers and residents associations), putting one in touch with the other upon request. They carry out scientific research on practical, scientific problems at the local community level in a wide range of disciplines. Projects are carried out on behalf of local communities and are usually free of charge. This form of promotion, from society to researchers, is known as the concept of ‘social demand’, and the demand is certainly there: the Queen’s University Science Shop receives more than 200 research requests each year. Its research has included projects on the use and abuse of the drug Ritalin, socio-economic factors relating to participation in kerbside recycling, and a user evaluation of the Ulster Cancer Foundation’s ‘Freefone Cancer Helpline’. Numerous other UK Universities, including Liverpool, Manchester and Glamorgan, now operate Science Shops (or similar schemes) and the EU actively encourages these shops in all member states.

2.5 Public engagement

From the examples outlined in sections 2.2 to 2.4, which are just a fraction of what is available, you could conclude that the UK public are, in general, offered a wide range of science promotion events. These events provide valuable insights into many aspects of science for laypeople, perhaps especially the ‘high tech’ science that they might otherwise never experience. They also provide a useful opportunity for scientists to engage with the public – should that be wanted. And where these events have received government funding, it also means that the government can claim to have fulfilled its mandate to encourage greater public access to, and engagement with, science.

But, numerically, there seem to be far more opportunities to ‘Go See’ science than to ‘Go Say’ or ‘Go Use’ it, and this is worthy of comment (not least because literature evaluating science promotion events is scant and the actual distribution of these events is not clear). Our analysis might take these ‘Go See’ events to be where – generally speaking – a linear transmission of science is endorsed, in other words where a hypothesis or body of knowledge is presented to the audience for their education. Of course, such ‘Go See’ events can be creative – they are not necessarily boring, didactic or dogmatic – and from this an enthusiasm and motivation to participate can be generated. But terming ‘Go See’ events as linear is to distinguish them from a purposefully dialogic style of communication

where participants might expect contributor status, i.e. to listen and be listened to. It may be that this linear transmission is intentional – that these events implicitly take public engagement to mean public education. Or it may be that this is an issue of practicality, in that ‘Go See’ events are often aimed at larger audiences, whereas ‘Go Say’ or ‘Go Use’ events work better on a smaller, more intimate scale. Perhaps, therefore, there is a ‘pay-off’ to be considered here between the reach and the intimacy/dialogue possibilities of the event.

Whatever the precise value of events of the types discussed so far – and you will appreciate that relatively little detailed evaluation has been conducted about public impact – they form an increasingly noticeable element of science promotion. The next section discusses the likely value of such events – essentially why people choose to seek them out and apply themselves, and why many other (non-governmental) organisations feel they are worth funding.

3 The value of institutional science promotion events

There are three reasons why these science promotion events are considered to be valuable.

1. Many people think that these events can be informational, educational and enjoyable. You can meet others of a similar outlook, learn something new, spend quality time with your family, or confront a nagging fear from your schooldays that you 'don't understand science'. In turn, this could motivate you to find out more, either as a citizen and/or as a potential future scientist. Hence, these events can have at least one purpose – that which the Greeks referred to as *eudaimonia* or human flourishing. The chance to learn is part of this, as is the chance for people to share their knowledge about something that interests them. Probably we all like to do this, and many scientists will feel the same. Indeed, a survey commissioned by the Wellcome Trust in 1999–2000 found that scientists were very positive about communicating their research to the public. This is reminiscent of Michael Mulkey's claim that science embodies an ideology of sharing knowledge. In other words, it seems valid to argue that the pursuit of *eudaimonia*, for scientists and the public, is one reason why science promotion events are organised.
2. Commentators such as Robin Millar (1997) and John Durant et al. (2000) argue that promoting a greater understanding of science is an important public service. They believe that a better science awareness is crucial to sustaining economic prosperity in our modern knowledge-based society, since prosperity is dependent on a skilled workforce that is 'scientifically literate'. Millar's argument in *Science Today: Problem or Crisis?* is that a reasonable grounding in science is crucial for democratic involvement – what we might call the 'wise vote'. Science outreach is thereby a means to help society become scientifically literate enough to make a broader contribution to the country's economic and civic prosperity. (You will probably be aware, though, that defining and measuring scientific literacy is difficult – see the differences between, for example, the quantitative Eurobarometer surveys and the qualitative approach of Irwin (1995) or Layton et al. (1993). The paper by Jon Miller (1983) is also useful here.)
3. It can be argued that these events have political currency, letting those who join in feel a sense of involvement in a key knowledge system (and maybe a value system too) underpinning our 'technocracy'. Thus, science promotion events can be vehicles for enhancing inclusivity and a sense of social cohesion. This reflects Irwin's ideas about 'citizen science' – he argues that:

traditional treatments of citizenship have concerned themselves very little with questions of knowledge and expertise. While such questions overlap with matters of empowerment and democracy, they also bring a new element into focus: the linkage between ways of knowing and of acting.

(Irwin, 1995, p. 178)

To summarise, science promotion can be to enhance individual fulfilment, social cohesion and democracy, and industrial and economic potential. If the overall aim is to raise public awareness of, accessibility to, and comfort with, science and technology issues, then this

is a political mandate although one without an associated political party. It might be said, then, that science promotion is *political*, albeit in a broad sense and with a small 'p'.

Some of these institutional events might also be characterised according to a second small 'p' – by seeing them as '*paradigmatic*', or by conforming to current conventions and understandings such as accepted laws and theories, professional codes of conduct and experimental procedures. Thus it is interesting to speculate whether the programmes run by national governments, established institutions and large organisations might be more influential because of the inherent power attributed to them and because they reinforce familiar messages. We then have a third 'p' characteristic to consider – that of the *privilege* afforded to information from certain sources. Some information will be conveyed by these events at the expense of other information; if it is conveyed by an institutional source, then it may enjoy the privilege of association – or indeed the reverse.

We will return to some of these theoretical ideas towards the end of this free course. But to continue the analysis, the next section will consider 'independent' public engagement with science. Remember that these distinctions are not exhaustive or especially rigorous, but are created to try and help you understand the phenomenon of science promotion.

4 D-I-Y science: independently engaging with science

It could be argued that relying on institutional science promotion events might overlook a subtle, but equally important means of people engaging with science: when science is accessed on an informal, independent or non-institutional basis (previously referred to as a do-it-yourself style of science promotion). Rather than seeing this as an anarchistic rejection of formal initiatives (although this might occasionally be the case), it could indicate an extra measure of commitment on behalf of the individual. Not just turning up at an exhibition, for example, but keeping an identifiable momentum to improve one's own knowledge and involvement, takes dedication.

This kind of independent but deep-rooted engagement with science is well established, and certainly pre-dates the PUS (Public Understanding of Science) movement. There is an honorable tradition in the UK of highly involved amateurs, from the naturalists and museum curators of Victorian times to the first computing enthusiasts who built machines at home in the 1970s. Yet it is only now that their contribution is being articulated in the wider political realm. According to Leadbeater and Miller (2004) (see Reading 1 below), there are at least 4500 independent archaeologists in the UK (not counting people who occasionally use metal detectors), 100 000 amateurs actively involved in nature conservation, over one million members of wildlife groups and more than two million active gardeners – a numerable group of 'informal scientists', for sure.

Activity 1

Read [Reading 1](#), an extract from 'The Pro-Am Revolution: how enthusiasts are changing our economy and society' by Charles Leadbeater and Paul Miller (2004). The report, commissioned for the economic think-tank DEMOS, explores the phenomenon of 'Pro-Ams' – committed amateurs who attain a professional level of expertise through their passion and perseverance.

By highlighting the personal and civic value of the efforts of people such as birdwatchers, amateur astronomers and computer programmers, Leadbeater and Miller argue that encouraging Pro-Ams in society will lead to more innovation and a healthier democracy. Do the authors suggest the contribution by Pro-Ams to scientific progress can be across the board, or might it be limited in some types of science (high-tech science, for example)?

Taking this a step further, do Leadbeater and Miller imply that 'expert knowledge' – presumably the knowledge that emanates from a professional person or institution – makes a definable and distinct contribution to social phenomena like innovation and democracy? And how might people best engage with this 'expert knowledge' – is it via organised science promotion events? 'Independent' does not necessarily mean solo – although some Pro-Ams do work entirely alone, Leadbeater and Miller claim that most do not. Like scientists working in institutions, many Pro Ams want to spread their message and share their knowledge, but they do this through autonomous clubs, magazines, networks and digital technologies rather than through organised public events. The

deduction is that Pro-Ams do not necessarily need institutional science outreach events in order to engage with science.

The realisation that members of the public can educate and empower themselves in a realm that, historically, has been populated by an intellectual 'elite' gives substance to several ideas. First, it reminds us that science–public relations can evolve to become more dialogic and mutually supportive, as suggested by David Layton's 'Interactive Model' and Alan Irwin's 'Democracy Model' of communication. Secondly, it reflects claims that lay people can be highly adept at seeking out and using scientific information when they want to or need to – claims made in the course material by, for example, Irwin and Wynne (1996) and Edgar Jenkins (1997). Thirdly, it opens up the question about what constitutes an 'expert' and the role they should play in public policy decisions.

But is the knowledge, experience and social cohesion of Pro-Ams a *valid* contribution towards science promotion in the UK, or should there be some level of established professional review, so that the public are given only facts and theories that are widely accepted? This is not just a theoretical riddle. If the argument, made in Reading 1, that Pro-Ams are a key part of the country's scientific knowledge base is accepted, perhaps they should be invited to contribute openly to a national science promotion drive. Yet whilst the Pro-Am story may be inspiring, it is not clear how viable this contribution would be.

Clearly, Leadbeater and Miller support the idea of 'Pro-Ams', and see their value as autonomous individuals/collectives and as partners in networked teams made up of professionals and amateurs. Indeed, it will often be the case that there is no neat separation between the two when it comes to review and promulgation of findings and recommendations. This raises the issue of complementarity, and how it might be best achieved. It may be that the fundamental assumptions and established agendas within the PEST (Public Engagement in Science and Technology) movement need to evolve. This is the subject of the next section.

5 Public learning agendas

So far, this course has argued that public engagement with science can be through both institutionalised events and independent contributions – hopefully, something for everyone. But to what extent will this be a consistent move towards dialogue and understanding, as requested by the UK and EU policies mentioned in Section 2?

Reading 2 suggests a move towards genuine interaction is possible if there is enough political motivation to enhance community learning of science and technology – referred to as ‘public learning agendas’. Reading 1 (the Pro-Am paper) essentially looked at the local level. Reading 2 moves up to the ‘national’ level, arguing that if the political impetus is there, then it is possible for public learning agendas to be redefined to encompass lay knowledge and interests. Interestingly, although the paper is by two Australian authors and makes some reference to that context, it is still markedly international, citing sources and scenarios from the UK and elsewhere with which you may be familiar. This suggests that there are themes and lessons to be drawn from cross-cultural comparisons and conversations: science promotion is not necessarily a single nation's endeavour.

Activity 2

Read [Reading 2](#), ‘The communication of science and technology: past, present and future agendas’ by Leonie Rennie and Susan Stocklmayer (2003). This paper has two uses for you. The first half of the paper is a valuable overview of how science is promoted in formal institutions such as science centres and museums – an aspect that is related to this course but purposely not covered by it. The second half of the paper – page 765 onwards – offers a conceptual discussion on some of the issues that we have covered about the role of science promotion within the political mandate for PEST (Public Engagement in Science and Technology). The authors argue that both scientists and the public should contribute fully to the science–policy domain, but they raise the question of how this might be achieved.

The authors argue that:

idea of ‘engagement’ still seems to place responsibility on the public to make the overtures to learn more about science and technology.

Our view is that the notion of ‘science and technology’s engagement with the public’ may better represent the way forward.

(Rennie and Stocklmayer, 2003, p. 768)

Yet two pages later, they note that:

If there is important knowledge to be shared, such as the need for immunisation of children, how do we set about making it known in the wider community?

(Rennie and Stocklmayer, 2003, p. 770)

Once again, the tension emerges between intention and achievement, or whether practice reflects purpose. Should a distinction be made between science that has to be transmitted to the public, and science that can be left open to discovery, if the motivation exists? Who would decide which was which?

Rennie and Stockmayer (2003) thus reflect an idea expressed at the start of this course – that there is fluidity between formal and informal objectives in science promotion. It raises the issue of which science is actively promoted by these events and which science is left out. At least two scenarios might arise from this, both of which were mentioned in Section 2 of this course. One scenario is that political imperatives determine priorities in science promotion events, with dialogue about controversial science marginalised in favour of exhibitions about acceptable ‘science in general’. The other scenario, highlighted by the House of Lords quotation in [Section 2](#), is that the public only get to debate controversial issues. Rennie and Stockmayer try to address this lack of clarity by asking (but unfortunately not answering) a similar question on page 768, ‘Should we concentrate on science as process, science as history, science as uncertainty?’ What is your opinion?

Furthermore, on page 767, Rennie and Stockmayer report that ‘it is a common view among scientists, particularly older ones, that responsibility rests with the public to learn more science.’ This echoes the deficit approach to science–society relations, and of the early ‘public understanding of science’ (PUS) programmes with their remit to educate the public (compared to recent requirements for some kind of public engagement activity as a condition of grant awards).

But here emerges another question – one that perhaps has no fixed answer. Do these scientists have a point that it is the public’s responsibility to increase their knowledge if they want to engage in current science–policy debates? Arguably, the answer to this question depends on context. It would be hard to have a progressive and fruitful debate if participants are unwilling to learn about the other perspectives being presented (the scientific realm has been criticised for not engaging with social or ethical issues; it is equally valid to be concerned if public participants refuse to engage with technical issues). Yet, seeing science only as a way of allowing people to address specific questions could lead to an overly utilitarian approach to science promotion; there is not much scope for encouraging *eudaimonia* or enlightened dialogic citizenship if this were the case. The next section tries to look at the future of science promotion and to evaluate how it might herald a genuine move towards interactive dialogue and understanding on local, national and international levels.

6 Promoting science promotion: the move from deficit to dialogue

This course has tried to distinguish between institutional science outreach events and independent alternatives by recognising some of their characteristics and evaluating the extent to which they fulfil (and even create) a political mandate for PEST (Public Engagement in Science and Technology). Although institutional events sometimes involve the deficit style of ‘top-down’ transmission of facts, the examples provided in this course suggest that they are increasingly imaginative and unusual. Arguably, there is often a linear message being presented to the audience for their education, but there is also a tangible effort towards greater public engagement.

It seems worthwhile to reflect on the idea that these events offer an opportunity to institutionalise (and thus probably reproduce) better styles of science–public dialogue. In the UK, this ‘institutionalisation’ is via the government, which has political obligations to fulfil a PEST agenda, and via organisations such as the BA (British Association for the Advancement of Science) and the Wellcome Institute. Science–public debates in other countries will also influence the UK agenda by way of providing a more dynamic context. Rennie and Stocklmayer showed that this debate is vibrant in Australia, and you may be aware of initiatives in the USA and elsewhere in Europe. The EU ‘Science and Society Action Plan’ has already been introduced in this course and, at the level of the United Nations, UNESCO has *Project 2000+*, which aims to improve scientific and technological literacy around the world. It thus seems increasingly important to recognise how international factors may influence the move from deficit to dialogue in science promotion.

While thinking about how international agendas might be influential at the local and national level, a question was posed earlier about whether the opportunities that arise from also having to fulfil international commitments might encourage a wide-ranging approach to science outreach, or if in different countries obligations might be fulfilled reluctantly, perhaps reverting to ‘tried and tested’ deficit style events. This seems particularly apt to think about because of the commitments to the EU Science and Society Action Plan that the UK needs to fulfil.

The EU claims to work on behalf of its citizens as regards science and society, but by 2007 this covered half a billion people in 27 member states. It begs the questions of how achievable its shared aims are, and what major challenges lie ahead. Indeed, there are notable differences amongst EU countries in how science is perceived in society, although not necessarily in any uniform pattern. Whilst there is a common international language on the need to improve public engagement with science (largely for the reasons outlined in Section 4 of this course), there is also disparity amongst the EU countries.

While the reliance on survey methods to test scientific literacy is problematic, it might be worth reflecting briefly on the findings of Durant et al. (2000). They found a positive correlation between a country's level of industrialisation and the scientific literacy of its citizens, and between the length of time that a country has been industrialised and the optimism of its citizens about the extent to which science could solve broader societal problems. If such correlations do exist though, it may be difficult to maintain a pan-European ethos of public engagement amongst 27 different countries when some are more industrialised than others. Likewise, although there are still generally high levels of confidence and appreciation of science around Europe, in some EU countries

(e.g. Britain) it is also an increasingly sceptical view. That said, the EU Action Plan might be fruitfully seen as a means to address this scepticism by institutionalising a move towards dialogue and greater public access to science on such a large scale. Reading 3 is an opportunity to reflect on some aspects of the EU Action Plan.

Activity 3

[Reading 3](#) is two excerpts from Section 1 of the EU's Science and Society Action Plan (2002) called 'Promoting scientific education and culture in Europe'. Section 1.1 is called 'Public Awareness' and Section 1.3 is 'Dialogue with Citizens' (Section 1.2 'Science education and careers' is not especially relevant to this course but, of course, you can follow it up yourself if you wish).

As you read the two excerpts, reflect on whether they illustrate all that science promotion could be.

- Can you recognise an overall style of science promotion, perhaps one that fits the 'deficit' or 'democracy'/'engagement' model (or both)?
- Is there any acknowledgement of the cross-cultural tensions that might emerge from trying to encompass so many different countries and cultures, or does the Plan presume that science outreach is unaffected by local context?

Reading 3 seems to embody a common and contradictory rhetoric about science's place in society and how it might be best promoted. It recognises scientific expertise as a crucial part of modern democracy, yet assumes this will be supported by greater scientific literacy amongst the public. In *theory* it advocates the interactive model of science–public relations, but in *practice* it employs the deficit model. For example, Section 1.1 maintains that scientists have special knowledge and distinguishes science communication as a way to 'present issues of interest to the public', without once acknowledging the potential contribution of lay knowledge (arising from Pro-Ams, for example). Likewise, the Plan sees science promotion as essentially 'top-down', citing exhibitions and documentaries as especially useful mechanisms, and proposes a European Science Week to replicate successful events from around the EU (see Actions 6 and 7).

This is somewhat contradicted by Section 1.3, which is more progressive in its support for dialogue. For example, the EU is very supportive of Science Shops, mentioned earlier as characteristic of 'Go Use' events. Its support has allowed an international network to evolve, with Science Shops now in Austria, Denmark, France, Germany, Italy, Spain and the UK. This international network trait allows the Science Shops to flourish autonomously whilst still benefiting from the resources and associations generated by the EU – presumably a way of encouraging complementarity between the public, research organisations and political institutions.

However, the tension between 'linear' (deficit) and 'contextual' (dialogic) science promotion styles is still evident. The Plan surmises, for example, that 'The scientific and technological community will play an essential role by presenting issues of interest to the public at large, and by contributing to the debate' (p. 14). But if this is to be followed, it does require scrutiny over issues such as how the EU intends to evaluate the 'success' of its science weeks, and how it will recognise those scientists that have 'communication skills', so they can be entered on its database (Action 2), and whether it is wise to rely on the media as a sympathetic vehicle for disseminating information (Action 1).

The simplifications in this part of the Action Plan are perhaps a little surprising. They seem to overlook the hard lessons learnt in the UK and elsewhere over the past fifteen years about making science–public relations genuine and interactive. It may also be worth considering the impact of the Action Plan's message in those countries outside the EU. The Rennie and Stocklmayer paper, for example, indicates some current thinking in Australia and yet many of their references are to the UK debate. Do you think there is a global agenda for PEST, perhaps in the light of issues such as HIV/AIDS and GM crops, or is the public mood for engagement in Australia one of the few examples of an agenda outside Europe and North America?

However, to be optimistic, the Action Plan also asks that 'A true dialogue must therefore be instituted between science and society' (Section 1.3, p. 14), through schemes like forums, hearings and Science Shops, operating at all levels within the Union. Their use of the word 'instituted' is interesting: perhaps the new generation of organised or institutional science promotion events will have 'true dialogue' as a key feature. Given all the diverse starting points within the EU, perhaps this is a step in the right direction, out of which more can grow.

7 Conclusions

Throughout this course, numerous examples of science promotion have been given, from the individual level of Pro-Ams to the supranational level of the EU Action Plan. Is there an appropriate political level for initiating science promotion or might a multi-level approach be more fruitful?

Certainly there is evidence that local or sub-national initiatives can engage people – from Science Cafés and Cities of Science, to the Pub Understanding of Science beer mats with scientific questions and the informal networks of Pro-Ams. People may be inspired to access science by it having a local presence, by it representing a strong regional tradition or by the desire to join a local knowledge community. Thus, we might find that people are joining in some element of science outreach as a means of generating (or maintaining) social cohesion. The Leadbeater and Miller paper (Reading 1) argued this well:

The fact that people can pursue amateur hobbies and interests without state censorship or interference is a good measure of freedom. People with passions that draw them into civic life are more likely to have a stake in a democratic process that defends this freedom of association.

(Leadbeater and Miller, 2004, p. 54)

There are also reasons to encourage science promotion on a national and international level. Nationwide schemes may have more resources to initiate diverse events and techniques, and any subsequent success may reach a wider audience and thus become self-reinforcing. The paradigm of linear transmission in science promotion is still common in the UK, but this paradigm is being modified as the social and political momentum towards dialogue and interaction gathers pace. Indeed, as Rennie and Stockmayer (p. 766) observe: 'With extraordinary speed, the tone of debate in Europe has changed to one of dialogue, openness and accountability'. However, you'll appreciate that while the rhetoric from 'on high' may have changed, the problems of how engagement might work in practice and getting scientists and policy makers fully committed to the idea remain.

It is perhaps not surprising, therefore, that Rennie and Stockmayer go on to warn that 'decisions about science and technology education and informal learning, for the many people whom these areas aim to reach, are no closer to resolution than before' (Rennie and Stockmayer, p. 766). To achieve resolution will involve many players on different political levels – not just the relevant office of the appropriate government department, but also the research community, industry, NGOs, opposition parties, the education sector and citizen groups – as well as individuals not part of a recognised grouping. Within this, we should recognise the contribution of the 'subculture' of independent collectives and individuals, such as the Pro-Ams, but we need to be sensitive about the extent to which that contribution is formalised since trying to do this may spoil its very essence.

Furthermore, initiatives at all geo-political levels could emphasise the cross-cultural cohesion that might be gained from enlightened science promotion. Clearly there is momentum for greater public involvement in the science–policy realm, but it is not always clear what the motive is for those who initiate science promotion programmes. Thus science promotion also needs to be genuinely dialogic and interactive, with an explicit agenda of public access and inclusion – as such, it actually needs to be *more* political. Perhaps this makes the case for all the types of promotion considered in this course –

institutional and individual, 'Go See', 'Go Say' and 'Go Use' – to be considered as viable means of science outreach and public engagement.

This course has taken you on an analytical journey, from local science promotion events to international PEST (Public Engagement in Science and Technology) strategies, with many concepts and readings along the way. As a bit of light relief (but with a serious message, of course), you might enjoy the activity.

Activity 4

Do you recall the 'event' of 'Pub Understanding of Science' beer mats? See for yourself if they work – cut out the mat (attached as a pdf below) and see if it inspires your friends and family to engage with science.

['Pub Understanding of Science'](#) beer mat for use with the activity.

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Reading 3: European Commission (2002) Science and Society Action Plan, Luxembourg: Office for Official Publications of the European Communities, Sections 1.1 and 1.3.

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