HOT TOPICS

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ABSTRACT

The aim of this work was to develop a new way of using drama to draw targeted audiences into discussion of issues raised by science for society. The approach was to develop events run by two presenters which used scripted or semi-scripted elements to trigger discussion and debate.

Two events have been developed to date. One exploring the implication of genetic screening for individuals and another focusing on the roles that robots do play and might play in society. Both events have been very well received by their target audiences and were designed to maximise the likelihood that they will be repeated by the 12 presenters who have been trained to deliver them. The project points to a way in which science shows can include issues based two way communication in repertoires that, it could be argued, are more often focused on telling and explaining

INDEX TERMS

two way communication; drama; dissemination; dialogue; discussion; robotics; genetic screening; family; post-16; science centres.

INTRODUCTION

The aim of the Hot Topics project is to find new ways of generating discussion amongst young people of the potential impact of scientific innovation on society. It is a contribution to a growing body of work which is seeking to replace one way "explaining" models for communicating science with two way approaches that lead to engagement with issues. The work continues a relationship between science and theatre which has recently been discussed by Barbacci [2004] who suggests that what he describes as science theatre can be divided into that which has principally a pedagogical purpose, like for example the use of puppet theatre in India [Tyagi and Sinha, 2004] and that which was designed to raise and explore issues like the relationship between scientists and the cultural settings in which they work. Interestingly, in the context of this paper, one of the first plays of this kind, written in 1920 was Rossum's Universal Robots by K Capek. Use of drama explicitly to trigger subsequent discussion by the audience has been pioneered in the UK by Y-Touring who, since 1996, have commissioned and performed a series of plays designed to generate debate. These plays, which have covered issues as diverse as stem cell

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therapy, genetic selection and mental illness, were followed by a facilitated discussion during which the actors remained in character and the audience was drawn in to expressing opinions on key issues raised during the performance. Evaluations of this work were positive but there is a potential problem with the delivery method in that it is labour intensive and therefore expensive. A difficulty that has been partially addressed by converting several of the dramas to a web format [Anon] and also producing video versions of some of the plays [Anon A].

The objective of Hot Topics is to build on this initiative by devising low cost, easy to mount and disseminate events that use drama, with comedic elements, to promote informed debate about potentially controversial areas of science and technology in informal learning environments, like science centres.

THE SCIENCE COMMUNICATION PROCESS

The Hot Topics project has to date involved two initiatives which have been collaborations between scientists, script writers and presenters. The first, originally devised for Czech Science Week 2003 was "*Meet the Mighty Gene Machine*", an event for 16 – 19 year olds that used a ten minute long mini-drama performed by a male and female student. The scenario, which was set 30 years in the future, was that the host of a game show volunteered to have his genetic profile read by his guest, a scientist who had been invited to bring her newly invented Gene Machine along to the studio. All starts well as the rather vain host is told he carries genes that pre-dispose him to have several positive attributes, like athletic ability and musicality, but the atmosphere becomes progressively tenser as he discovers first that he is a carrier of the Cystic Fibrosis gene and then that he could be at increased risk of bowel cancer and alcoholism. At this point the host calls an unscheduled commercial break and there is an angry off screen confrontation during which the host asserts his right to privacy and demands to know how it could be that he was placed in such a humiliating position on live TV. The scientist responds that the information is useful to him and that everyone should be able to have access to their own genetic data. The confrontation ends with them agreeing to settle their argument by getting the opinions of the studio audience. The commercial break ends and the two performers go into the audience to get their views about both personal and ethical issues raised by genetic screening. The discussion was guided using a series of prompt questions, the first of which was "Who should have access to the genetic profile of an individual?"

A second version of *Meet the Mighty Gene Machine* was then created which differed from the first in that the TV show model used was a day time TV chat show and both performers were female. The script contained several of the previous version's themes but was adjusted on the basis of audience feedback and contributions from an advisory panel whose members included a genetic counsellor and clinicians. As a result of these inputs the script was modified to emphasise more strongly the role that an individuals environment plays in determining how their genetic characteristics are expressed. The six performers recruited had all been trained to present science shows within a science centre environment, but only one had acted since leaving school, in a local amateur drama group. Their training programme was extended to include both a briefing about the current state of the art in genetic screening and training in how to facilitate discussion. The new version of *MMGM* was then performed across Wales a total of 7 times in three different types of venues; a school hall, the theatre of a

science centre, and a lecture theatre. Evaluation involved both audience questionnaires and observation by evaluators.

In a separate initiative, the transferability of the concept was tested on a younger audience by devising *Robot Thought* an event for 5-11 year olds and their families designed to stimulate discussion about the roles that robots do play and will play in our lives. This event was specifically designed for performance within the gallery of a Science Centre [at-Bristol] and differed in format from *Meet the Mighty Gene Machine* in that opportunities for discussion were interwoven with the presentation thus enabling audience members to come and go at will while still having opportunities to make comments and offer opinions. The event used two presenters and the show consisted of five short dramatic vignettes. Each vignette was based around a critical theme in robotics as identified by the project team, and found to be of interest to the target audience during pre-research. The topics of the five vignettes were:

1. What is a robot?
2. Why aren't robots more advanced?
3. What do we want to use robots for?
4. State of current research
5. What do we want for the future of robotics?

Certain constraints were placed on the event structure in order to maximise transferability and flexibility. These included:

- No requirement for specialist staging, for example sets, lights, etc
- All effects were deliverable through a laptop and a data projector
- No requirement for professional actors

Evaluation

Meet the Mighty Gene Machine was performed six times during Czech Science Week 2003. The total audience was in the region of 500 young adults. A total of 404 evaluation questionnaires were returned from the first five performances.

Key findings were that the target audience enjoyed the sessions and engaged with the content of both the drama and the debate which independent observers scored as lively and purposeful. The majority of the audience reported that the experience had made them think and that they would recommend the event to a friend. Observers reported that the quality of the debate relied very heavily on the atmosphere that had been built up during the performance and the quality of the presenters as facilitators. A full version of this evaluation can be found on the Graphic Science Unit website [Anon B]

These results were seen to be sufficiently encouraging to merit expansion of the work and a successful application for funding was subsequently made to the Wellcome Trust in partnership with Techniquest, Cardiff and the Education Officers of the Welsh Gene Park, to use the results of the evaluation of the first version as the starting point for the devising of an improved event.

Main areas in which improvements needed to be made were firstly ensuring that the script communicated effectively the role that interaction with the environment played in determining the impact of genetic variation on an individual; secondly providing facilitation training for the presenters and detailed briefing about the current state of

scientific knowledge in the subject areas covered. The structure of the discussion session was also altered to avoid the use of a data projector and instead use flash cards deployed in a ranking game played with the audience who were asked to judge the extent to which a series of attributes and diseases were genetically based. A full evaluation report has yet to be produced but preliminary findings are that the event was enjoyed by its target audience and also by professionals who attended it, like genetic counsellors and teachers. In many cases audience members reported that they had been triggered to think about important issues which they had not considered previously.

Robot Thought was performed twice daily for three consecutive days within at-Bristol a custom built Science Centre. The three days coincided with school half-term when visitor numbers are at their highest.

All of the performances were observed by an evaluator, who took extensive contemporaneous notes on the size, composition and reactions of the audience. The reactions of adult members of the audience were captured using a questionnaire based interview made up of both open and closed questions.

All of the performances were well attended by members of the target audience and as anticipated audience sizes fluctuated during each performance, but tended to be slightly greater at the end of a performance than at the beginning. All audience sizes were well in excess of those normally attracted to events within at-Bristol and very few children left the performances early once their attention had become engaged with the show and its content. Audience demographics were very similar for those of at-Bristol visitors, being skewed towards the higher end of the socio-economic spectrum. Adult members of the audience reported that they had enjoyed the show, and found it interesting, educational and thought provoking.

The majority of the adult audience were concerned about ethical issues arising from robotic technologies, but were satisfied that they had been given sufficient opportunity within the event format to express their views

DISCUSSION

The work to date carried out using the Hot Topics format has re-affirmed the power of drama to trigger discussion by young adults of the impact of scientific innovation on society and it has also shown that the approach can be effectively adapted for younger children and their families. It has also shown that events of this kind can be created without use of professional actors or a theatrical set. The only specialised prop required for *MMGM* was the Gene Machine itself , which was custom built for the performances of the second version of the event but was simply an old but impressive looking pH meter with a few minor adaptations in the original events in Prague. *Robot Thought* was also easy to stage requiring only the purchase of the toys and gadgets used in the ranking game that begins the event and a number of cutting edge research robots supplied and demonstrated by staff based at the Intelligent Autonomous Systems Laboratory of the University of the West of England.

This demonstration of the feasibility of simplifying the event format whilst maintaining its impact is an important outcome of this project. Principally because sustainability is a great challenge for the devisers of science communication events who too frequently see work that is well received have few repeat performances often because of over reliance on specialist equipment or personnel. We suggest that it is

instructive in this context that events like Café Scientifique [Anon C], which have spread rapidly across the UK meet these criteria since their only requirements are a venue, which is usually free, a speaker, and possibly a facilitator, and an audience which is largely self recruiting.

In addition to the simplification of the format, we have also sought to enhance the sustainability of Hot Topics events by training as many people as possible to deliver them and encouraging our trainees to take ownership of the initiative and play an active part in ensuring it is widely disseminated. To date we have trained a total of twelve presenters to deliver one of the shows based at as many geographical locations as possible to enhance the likelihood that they will play a role in making the initiative travel. We are also receiving requests to devise events with other themes, like Climate Change, and see this as an opportunity to explore further how discussion can be triggered by specified target audiences in informal settings. An opportunity also exists to adapt the model for use within the formal science curriculum, particularly since a recent pupil driven survey of reactions to the existing science curriculum [Anon D] identified making it more issues sensitive and , moving away from a didactic style as something that would encourage children to continue to study science at higher levels

CONCLUSION

Presenters of science shows are working in informal and formal educational settings in many parts of the world. Their shows tend to be targeted at children and place strong emphasis on the communication of factual information. Hot Topics has shown that these individuals can also be trained to present events designed to draw audiences into discussion of issues raised by science for society, and furthermore that such events can be mounted at low cost and have a high impact. These findings make it feasible to disseminate two way communication models significantly more widely than previously, particularly if science presenters are actively encouraged to add issues based events to their repertoires.

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