PLACES

Platform of Local Authorities and Communicators Engaged in Science

Modules used: A1, C1

Science Event

2012

This is a standardized version of the original case analysis number 13. Specific names and locations have been substituted from the original document number 13 with generic references in order to preserve the anonymity of each participant.

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Abstract

Background

Science centre which houses an interactive science and technology exhibition and a planetarium. Furthermore, science events for children and adults are held every weekend at the centre. The aim of this case study was primarily to assess the impact on the public as well as investigate the role of actors in the production and implementation of these science events.

Procedure

All participants were approached and interviewed on the premises of the centre.

Results

Visitors were very satisfied with their experience of attending science events during the month of November. Among their reasons for participating were the science and technology issues catering to children's interests, raising their awareness about topics they knew little about, and seeing science in a more experiential, alternative and enjoyable way. Scientists working for the centre have not had formal training in science communication. They described the main challenge they are faced with as being achieving a balance between scientific accuracy, presenting science as fun and communicating it in an appropriate, simple way for laypeople of various ages.

Introduction

Science events are held every Saturday and Sunday all year round. The structure remains the same but the content changes every 4 to 6 weeks. Specifically, the structure followed is firstly a demonstration of scientific experiments, followed by an interactive workshop and finally an interactive narration.

The science events we observed in November were:

- Demonstrations of scientific experiments: ‘We are transported to year 2262 A.D. in a journey through time. A meteorite has fallen on Earth. Large fires are burning a lot of the forest and thick smoke covers the area near the crater in a radius of 11.500 kilometres. The problems survivors must face are huge… Through the demonstration of various scientific experiments, we will discover the consequences such an impact would have on Earth. Furthermore, we will discuss plants and their importance for our planet, as well as the role that oxygen and carbon dioxide play in living organisms. We will also discover how human activities affect the environment and how we can produce energy without burdening the environment’.

- Interactive workshops: ‘Recycle now! Natural resources are running out. This sooner or later will lead to an ecological disaster. During this workshop visitors are informed about deforestation and the importance of recycling by making recycled paper of their own’.

- Interactive narration: ‘Ancient prophecies and the destruction of the world. How did ancient civilizations interpret natural disasters? What do ancient mythological and theological texts say about them and the destruction of the world? What did the Mayas, ancient Scandinavians, Nostradamus say about the end of the world? How ominous are predictions of modern science about our planet? This narration will take visitors on a trip through time, starting from the prophecies of the past moving through to the scientific predictions of the future’.

This structure is a recent development. In fact, when the centre started to hold science events five or six years ago, it typically used the element of sensationalism in order to attract visitors. For example, experiments were very much about explosions or anything else that had a 'wow' factor and thus would make an impression on viewers. Also, these did not follow a specific format or rather were not presented as part of a narration or a story. In recent years, however, the way these science events are presented has changed. With time

and taking visitors' suggestions into account, a structure for three separate types of event has been developed.

Specifically, science experiments are presented in the context of a narrative, story or a theme. To begin with, there is an introduction where the staff present the background or the theory behind a topic, followed by an experiment and an opportunity for audience participation. The staff then build on what has been said and observed with more theory, another experiment and so on. The windup is informal in the sense that the audience can get up from their seats, go up to the bench where all the experiments have been performed and speak to the staff on a one-to-one basis.

Similarly, in the interactive workshop there is an introduction given by the staff on the topic, followed by information and direction with regards to the activity organised. At the end of the activity, the audience is asked to talk about their experience and qualitatively evaluate the workshop.

Finally, in the interactive narration, the member of staff leading the activity starts narrating a story but the audience is free to ask questions whenever they wish. At the end of the activity, the audience is asked to evaluate their experience.

Therefore, while initially, the science events tended to be structured on a one-way communication model, recently they have evolved towards a more dialogic, participatory and interactive model.

Methods

For this pilot study, ‘science events’ were chosen for investigation at two levels, namely ‘Public’ and ‘Actors’. A qualitative approach was used to carry out the investigations.

	Science Centres and Museums	**Science Events**	**Science Cities**
Public	Institutional Sources on Visitors (documents, website, information from organiser) Semi-structured interviews with visitors (including module for repeat visitors about long-term impact): MODULE A1 (n≥ 5 people) Standardized visitors survey: MODULE A2 (n=200 people)	Institutional Sources on Visitors (documents, website, information from organiser) **Semi-structured interviews with visitors (including module for repeat visitors about long-term impact): MODULE A1 (n≥ 5 people)** Standardized visitors survey: MODULE A2 (n=200 people)	Focus group with (ordinary) citizens: MODULE A3 (n=2 focus groups, 4-8 people per group)
Policy Sphere	Semi-structured interviews with observers or stakeholders: MODULE B1 (n≥ 5 people)	Semi-structured interviews with observers or stakeholders: MODULE B1 (n≥ 5 people)	Semi-structured interviews with observers or stakeholders: MODULE B1 (n≥ 5 people) Document analysis: MODULE B2
Actors	Semi-structured interviews with relevant actors: MODULE C1 (n≥ 5 people) Or alternatively, focus groups with relevant actors: MODULE C2 (n=1 focus group, 4-8 people per group)	**Semi-structured interviews with relevant actors: MODULE C1 (n≥ 5 people)** Or, alternatively, focus groups with relevant actors: MODULE C2 (n=1 focus group, 4-8 people per group)	Focus groups with relevant actors: MODULE C3 (n=1 focus group, 4-8 people per group) Or, alternatively, semi-structured interviews with relevant actors: MODULE C1 (n≥ 5 people)

Procedure

Semi-structured interviews were conducted for both levels using the appropriate interview formats from the toolkit. All sessions were recorded and none of our recruits refused to take part in the pilot study. All sessions took place on the

premises of the science centre, either in the offices or in the area hosting the interactive science and technology exhibition and where science events are also held. Data collection was carried out over approximately two weeks. The duration of each interview was between 15 and 30 minutes.

Public level

Visitors

Six visitors were interviewed, three of which were male and three female. All of them were parents accompanying their children to the science events held on that day. There were approached at the end of each event and their interviews were recorded. They were treated as first time visitors as the science events held on that day were new.

Actors

Science centre/museum Representatives

One female individual responsible for the science and technology events taking place at the weekends on the premises of the centre was interviewed.

Scientists

Three scientists, one male physicist and one female biologist who worked as part of the team responsible for the implementation and content of the science and technology events organised at the weekends on the premises of the centre. Therefore, in total four people were involved in the design, preparation and implementation of the science events.

Results

Visitors

Reasons for visiting

One of the main reasons highlighted by parents as a motivating factor to bring their children to the science events was the need to get them to come in contact with the idea of science but in an alternative way. Characteristically, one parent said:

'…for children to see, come into contact with the exhibits, see the experiments but also get closer to the very idea of science, but not through school as we, the older generation did, in class without experiencing it in practice. Part of the science events here (in the centre) are the scientific experiments which allow kids to see how the rules of nature are applied…'

Furthermore, parents suggested that they accompanied their children to these events in order to help children enjoy science more, rather than science being thought of as a chore. One father mentioned:

'*we came last year as well and observed experiments that had to do with lightening which I thought was very important because they also helped with school… they were able to follow the physics experiments at school better*'.

Other parents reported that raising the awareness of their children with regards to the particular topic of the activity (i.e. recycling) was the purpose of their visit.

Finally, one woman said that her daughter had a special interest in science and technology and this was the principle reason for visiting.

Expectations

In terms of content and presentation, all parents reported that their expectations were met and that the topics presented in each of the events were very interesting. They reported that it was a good use of their time and that they felt an obligation to their children, as it was because of them that they had visited the centre. They thought it was an essential part of the children's education and general culture. They thought the activities were well organised and that the staff adequately met the needs of the children. Also, they especially liked the interactive part of the science events where children had to actively build or produce something themselves as they saw it as an opportunity to gain knowledge and retain it as opposed to learning it theoretically at school.

They compared the science events at the centre with other events they has been to where experiments on chemical and natural phenomena were also performed for children. They mentioned other centres which also organise interactive events which, however, were not related to science and technology but rather were of an archaeological, historical and aesthetic interest. One woman mentioned the theatre which was of course much more experiential and interactive however she thought the science event at the centre was very good in comparison.

Views on science

Science presented at the events was not relevant to any of the respondents personally but was of interest to them in a general way. According to all respondents, science and life move in parallel and cross paths often.

Science offers limitless potential and only the employment of rationalism can ensure that it can be used for the greater good. The first example that came to mind was nuclear energy which started off with a noble cause but ended up as a weapon of mass destruction. One of the visitors supported the notion that less severe forms of technological advancement should definitely be favoured but with caution especially because of the consequences these activities can have on nature. Another example that was offered was the internet and adolescents' relationship with the internet. Addiction and inappropriate content were mentioned as dangers and this was mentioned in contrast to the role the internet plays in the life of a working person, i.e. a tool.

Lessons from the visit

The visit has given them food for thought that would not otherwise have come up and that the requirements of daily life would not have allowed. Also, it has given them a glimpse of the future by escaping their own world and looking at the bigger picture. One woman said that she might not have learnt anything new from a particular science event however she has learnt through other features of the centre such as the planetarium or the interactive science and technology exhibition, especially as she came from an arts background and this gave her confidence to talk about these issues with others in her circle. She went on to say that all activities and events organised by the centre are conscientiously planned.

However, she added that she thought it was a bit on the expensive side and that the cost should really be adjusted to match the current situation in the country so that it is accessible to the wider public. Another woman reported that the topic was not relevant to her work but that she had learnt new things along with her child. She also added that, through her visits at the centre, she had learnt about the natural sciences, which is not her background while it motivates

children to research certain topics further, in a similar role to university, which arms you with the methods and techniques to find out information, critically assess information, etc.

One man said that it definitely made him more confident about his knowledge with regards to the topic discussed and helped him to brush up on the knowledge he had acquired as a child.

Other

Economic reasons were also cited for not attending the science events every month or on a regular basis.

Actors

Common themes

One of the main themes that came up was the issue of science communication. Neither of the scientists have had formal training in science communication but learnt on the job. Both talked about the balance they needed to find between scientific accuracy, presenting science as fun, and communicating it in an appropriate, simple way for laypeople of various ages.

Another theme that came up in both interviews with the scientists was that the impact of their work is visible straight away. In other words they are getting feedback directly from the audience during and after the demonstrations/ science events.

Individual Differences themes

First and Second Scientist

First and Second Scientist's role

The scientists' role is the organisation and implementation of the science events. They work in a team and all team members are responsible for everything with regards to the science events, ranging from the initial idea or conception to the final result. More specifically, team members are responsible for choosing the idea, researching the scientific theoretical background, getting hold of materials, developing a scenario, coming up with experiments, testing out activities, and more importantly deciding on the most appropriate way of communicating their subject to the audience.

Personal satisfaction

Scientists mentioned that they get a lot of personal satisfaction from their work. One scientist said that the reason for this is that they have the freedom to use

their knowledge and employ their creativity to create science events. Unlike other jobs, there is no routine and the work is very interesting as the content of the science events changes regularly. Furthermore, there is interaction with the audience so that they have the chance to receive feedback on their work on a daily basis. They described the impact of their work as being immediate and very powerful.

The interaction with the audience gives them food for thought and ideas for new activities or events and even sometimes requires them to go back to the drawing board and present something in a different way or look up more information with regards to the scientific background of each event. This makes them develop as people and professionals and improves their science communication skills. They can also identify and correct misconceptions about science or scientific issues that children may have, acquired either through school or the media, e.g. regarding DNA and the double helix, which people think they can see under a microscope.

Science communication

The scientists have not received any formal science communication training, nevertheless, this has been acquired on the job. They also mentioned that their audience is so broad that it can range from primary school students to university professors and this is where the difficulty lies. The essence of the issue needs to be communicated in simple terms, without distorting the science.

Collaborations

Cooperation with other centres or institutions does exist, though not often. For example, when the centre put on a series of events—talks about neuroscience— the scientists collaborated with a university and a scientist from the neuroscience group provided samples from her own research so that interested members of the audience could see neural tissue, nerve cells, etc. under the microscope.

Interaction with the audience

The science events are created to appeal to both younger and older audiences. After the events, the audience comes up to the scientists either to ask them to repeat something or to ask a question or even to ask how to get hold of materials to repeat the experiment at home.

The interaction with the audience did not help any of the scientists with their own research interests but it did aid their science communication skills. Sometimes the audience may have objections to what is being said, e.g. Darwin's theory of evolution, which is not something taught at school. In such a case the scientists talk to the members of the audience at the end and explain

to them what they know with regard to scientific facts. The audience attends in good faith and does not usually dismiss what the scientists say or doubt their scientific competency. Generally, the public responds well to the centre's efforts, events and activities. It is a time where they learn about science and enjoy quality time together which brings them closer.

Third Scientist's role

The audience is very responsive and comes here to learn but also enjoy themselves and this defines the work the scientists do, that is to say the staff always try to make science fun but impart accurate information regarding an issue and also 'plant the seed', in other words spark an interest so that the audience can go away and look up more information on a topic. Thus, the role of the scientist here is also to help the audience enjoy science and reinforce a positive view of science, while making science relevant to them. '…it's not something that concerns only crazy people in the lab'.

Personal satisfaction

The third scientist said that he personally has gained a lot as well. Specifically, he said that, in order to explain a scientific issue to a layperson, you have to know it very well, so for all issues outside his field he has to study and research a lot before he can put together a presentation or an activity. In this way, he has become a better scientist and communicator 'I moved from 'I think I know this' to 'I definitely know this''. Furthermore, he reported that he came to appreciate the power of non-formal education

> *'…until then it did not cross my mind, but this job offered me another view: how important non-formal education is for the public and this made me love my work here…'*

Collaborations

Collaborations are frequent between the centre and other natural sciences centres, which have been originally created to help or complement schools, in order to come up with ideas, fix equipment, borrow equipment and materials, get advice, etc. Internet and books have also helped the staff to come up with ways to demonstrate natural phenomena in a certain way and perform variations of experiments shown elsewhere. Right now they are at stage where they have been doing this long enough so as to come up with their own ideas. For the past three years, the centre staff has also paid an annual visit to the department of pedagogy of a university in order to demonstrate natural sciences experiments to trainee primary school teachers. The centre staff also visits remote islands on an annual basis in collaboration either with the schools or the municipalities.

Interaction with the audience

The interaction with the audience after the science events is a very frequent occurrence. They want to know about materials, to express their gratitude and enthusiasm and sometimes people who work in the field of education might tell staff about what they do at school with their students. Ideas and corrections can also come from the audience.

Representative's role

The role of the representative is to coordinate and organise the science events held every weekend at the centre. The management of staff also falls within her role, as well as dissemination and promotion of these events to the public through social and traditional media. Her motivation for working at the centre is the fact that the work is so closely related to her expertise and academic background.

Personal satisfaction

On a personal level, she reports that it is a job where new things are happening all the time, it requires her and the rest of the staff to be creative and it never feels like a routine. Furthermore, it requires creativity and very good communication skills. Working in a team of young people who are very eager to produce new and exciting material is important to her.

Personal contribution

Every activity is a product of team work, so part of the team prepares an event and the rest of team helps with the presentation and communication to the audience. She feels that her academic background helps with this to an extent.

Institution competitiveness

When asked about the competiveness of the centre, the representative reported that there is very little competition within the city. However, she stressed that the centre is different to others in the sense that the team tries to come up with new material that has relevance to people's daily life and also tries to choose scientific topics that are a bit of a mystery, so that the public finds them interesting.

The centre asks visitors for feedback but not on a regular basis. Surveys have been conducted at times, either by asking visitors to rate a particular activity or to rate the experience as a whole before they leave the centre.

Informal comments and feedback are received in person and via the social media and generally the team tries to take everything into account and

make adjustments, changes, e.g. with regards to the time an event is held, or incorporating a new topic into the programme, etc.

Collaborations

Successful collaborations are on-going and new ones are added all the time. The centre collaborates with a lot of universities in the context of an on-going programme where new scientists come to talk to an audience about their research in an informal manner. In March last year, a collaboration was initiated between a neuroscience association and the centre. There is also a new collaboration with an aquarium about a new project.

Evaluation

There is a plan to evaluate the centre on a regular basis, more systematically. One idea is to get the public to evaluate each activity or even the whole experience of visiting the centre via easy to use, touch screen equipment, e.g. an iPad with the help of the staff.

Conclusions

Visitors were very satisfied with their visit to the centre to attend the science events held during the month of November. Among their reasons for visiting were science and technology issues catering to children's interests, raising their awareness about topics they knew little about, seeing science in a different light, in a more experiential, alternative and enjoyable way.

Their overall view of science was positive but they recognised the negative aspects and thought scientific advancement should be treated with caution.

Their visit to the centre and their attendance of the science events offered them new knowledge they were interested in. This new knowledge made them more confident in conversation within their own social circle.

One of the main themes that came up in the interviews with the scientists was the issue of science communication. Neither of the scientists have had formal training in science communication but have learnt on the job. All talked about how difficult it is to achieve a balance between scientific accuracy, presenting science as fun and communicating it in an appropriate, simple way for laypeople of various ages.

The scientists also said that the impact of their work is visible straight away. In other words they get feedback directly from the audience during and after the demonstrations/science events.

The representative of the centre said that this centre was different from others, in the sense that the scientific team tries to come up with new material that has relevance to people's daily life and also tries to choose scientific topics that are a bit of a mystery so that the public finds them interesting.

Informal comments and feedback on activities and the centre as a whole are received in person and via the social media. There is a plan in place to evaluate the centre on a regular basis, more systematically.

An informal internal evaluation process takes place when the team that has prepared a new activity presents it to the rest of the group. In other words, every activity is peer reviewed by a multidisciplinary group.

The centre collaborates with a lot of universities in the context of an on-going program where new scientists come to talk to an audience about their research in an informal manner.

References

1. De Semir et al. (2012) *The PLACES toolkit for the impact assessment of science communication initiatives and policies*. Barcelona: Universitat Pompeu Fabra.