

The public's rapport with hands-on activities An evaluation of "Explore-At-Bristol"

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Abstract: *In the summer of 2003, a survey was carried out at the At-Bristol Science Centre (UK) to determine the effectiveness of the hands-on activities of "Explore".¹ The section evaluated included 43 interactive experiences divided into two themes. The first, "Get Connected", consisted of examples of the latest digital technologies, such as a television studio, virtual volleyball, and radars. The second, "Curiosity Zone", was dedicated to natural phenomena and subdivided into three additional groups: "Natural Forces" which presented various forces of nature, "Focus on Light", which dealt with the wonder of light, and "Sound Space", reserved for the science of sound.*

The survey was divided into two phases: the first consisted in observing the public's interaction with the hands-on activities; the second, in consulting the staff. The methods adopted helped determine the effectiveness of the exhibit-design and the evaluation itself highlighted the role of a promoter of science as an evaluator.

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1. Introduction

One of the chief problems of managing science centres is how to determine the effectiveness of the communication and the allure of hands-on exhibits. Evaluation work (in the form of visitor studies) has become an indispensable tool for those working in the sector and a fundamental element for the designers of an exhibit-area. The significance of this work has already been acknowledged, but its elevated cost has limited its dissemination in (large) science centres.

In truth, there is still no one method to plan a survey. A series of tools may be used to meet the requirements of every study. Two main methodologies can, however, be singled out: quantitative research and qualitative research. Using these two methods together, helps to gather the information necessary for precise evaluation work, as proposed in various books on evaluation.²

2. Methods – Observing the public

To determine how well the public used each hands-on activity, an observation grid was created, based on the “check-set” suggested by Alison Kidd.³ With the help of the grid, both quantitative and qualitative information was gathered.

The quantitative data included:

- the time spent at each hands-on activity: both the direct time each visitor spent interacting with the exhibit, as well as the indirect time (when another visitor intervened) were monitored;
- the gender of the visitors;
- the age of the visitors. For teenagers under 18, the divisions made within the museum in the didactic section, were respected. For reasons related to privacy, many a time, evaluators estimated the age of a visitor;
- the number of families, school groups or any other groups visiting the science centre. This information was duly noted only when easily discernible.

Qualitative data gathered:

- a) the visitors’ reaction to the hands-on activities;
- b) noticeable interaction between visitors, encouraged by a hands-on activity;
- c) emotions evoked by the activities.

To gather the qualitative data referred to in a), the following were taken into account:

- **Pre-determined use of the exhibit-area**
Visitors operated the exhibits following the instructions of the exhibit-designer.
- **Unplanned use of the exhibit-area**
Visitors were not sure, or did not immediately understand, how to work an exhibit; they learnt to do so, by trial and error.
- **Personalised use of the exhibit-area**
Visitors chose to operate each exhibit in their own way. This was a positive form of interaction: it implied that the visitors’ imagination had been stimulated and that they had decided to work their way through the area in this particular way.
- **Unorthodox use of the exhibit-area**
Visitors used an exhibit for a reason other than the one it was originally designed for. This did not imply that they misunderstood the exhibit.

To assemble the data needed for the second type of qualitative research, the following forms of interaction were examined:

- Exchanging opinions about an exhibit. The exhibit prompted the visitors to speak to one another.
- Using the exhibit as a pretext to play a game
- Turning a fellow visitor's attention to one exhibit in particular
- Helping someone use an exhibit
- Asking someone for help to use an exhibit

As far as the emotions evoked by the exhibit-area are concerned, the following factors were examined:

- **Positive reaction**
In this case, visitors were evidently satisfied, and enjoyed operating the exhibits.
- **Negative reaction**
Negative emotions, such as frustration, were noticed in the visitors who failed to understand the phenomenon displayed or how the exhibit worked. Otherwise, the reason for their negative response was that they quite simply, did not like the exhibit-area.
- **Not understanding an exhibit**
This was often the case with visitors using an exhibit for the first time. If visitors quickly understood the phenomenon being explained or how to use the exhibit, a feeling of satisfaction swept over them; if, however, they failed to understand, they quite possibly avoided, and disapproved of, that specific exhibit.

These three ways of reacting to the hands-on activities, were only documented when visitors clearly displayed their emotions.

The evaluation work was carried out over a period of three weeks from the 21st July to the 8th August 2003, when "Explore-At-Bristol" was visited by the highest number of people. Visitor studies were completed on weekdays and during two different periods of the day: from 10:30 to 13:30, and 14:30 to 17:30.

The visitors were selected at random. Ten different ways of using an exhibit were observed, but only if it was used for more than five seconds. When an exhibit was used simultaneously by more than one person, all their actions were noted.

3. Consulting the staff

To determine the staff's opinion on the usefulness of the exhibit-area, a special questionnaire was created. The aim of the questionnaire was to answer the following, main questions: "Does hands-on activity x function well in this context? Does activity x, from its current location, attract visitors' attention?". The questionnaire was answered by a total of 80 staff members working in the animation, teaching and maintenance departments. They were free to answer the set questions' and multiple choice sections or write a personal comment.

4. Results and conclusion

(A detailed account of the results of the survey are available in e-valuation @bristol, Conti F. (2004), available on request.)⁴

A total of 961 visitors were observed, 51% of which were female and 49% male. The division into age groups can be viewed in **Table 1**.

Table 1. *The number of visitors observed, divided into age groups with the corresponding percentage.*

Age groups	No. of visitors observed	Percentage %
< 6	112	12
7-11	432	45
12-18	91	9
19-50	258	27
> 50	68	7

As far as consulting the staff is concerned, twenty-nine members of the staff willingly completed the questionnaire.

Because both the quantitative and qualitative methodologies of collecting data were used, an exhibit card could be created to evaluate the effectiveness of each exhibit. *Appendix 3* contains three examples of these exhibit cards. The first card looks at the interactive experience called “Play TV”, which proved to be a success with the public, but a problem for the staff; the second card evaluates “Whisper Dish”, a meritorious exhibit which could still, however, be used more effectively, and the third card is on the exhibit “Colour Mixing”, whose purpose is clearly questionable.

Thanks to this study, not only have results on each exhibit (by means of the exhibit cards) emerged, but conclusions of a more general nature have also been made; conclusions about the use of the exhibits, the public’s rapport with hands-on activities, and the significance of acknowledging hands-on activities as part of a specific context.

As far as the use of the exhibits is concerned, the survey showed that each hands-on activity is used by a particular target group, determined by gender and age. An example is the “Zap Scan” activity, which allows visitors to see the drawings they have just done projected on a screen. This exhibit is used predominantly (67% of the time) by female visitors and above all by children under the age of six. The “Virtual Volleyball” hands-on activity, on the other hand, which invites visitors to play volleyball with a virtual ball, was used, 75% of the time, by male visitors and mostly by teenagers.

The amount of time spent interacting with a hands-on activity can be very useful for the creators of the design, as it helps them determine how much of the phenomenon is understood and internalised. This study showed that visitors spent an average of one and a half minutes interacting with “Explore’s” exhibits. Visitors interacted with certain hands-on activities for less than thirty seconds (eg. “Infinity Mirror” - a mirror with an infinite number of reflections - which was used for +28.4 seconds), whilst interaction with others, lasted for more than nine minutes (eg. “Play TV” which was used for +584.78 seconds). Exhibits used with the aid of computers required more than three minutes of interaction time, whereas exhibits which simply illustrated a phenomenon, could be used a lot faster. The hands-on activities that the public interacted with for less than thirty seconds, proved to be less effective. When visitors were encouraged by the hands-on activity to play a game with their fellow visitors, they spent a lot more time at that specific exhibit. When, however, interaction was limited to “pushing a button” to activate the activity, visitors showed less interest.

Once the public’s rapport with the hands-on activities has been determined, evaluators can begin to ask themselves more noteworthy questions related to the educational value of a hands-on

activity, how visitors can use the new information they have learnt from this experience, or what factors play a role in determining the use of an exhibit by one age group and not another, by one of the sexes and not the other. The results of this study can in fact, be used as the basis for the carrying out of other, clear-cut research.

The public's interaction with the hands-on activities clearly indicated that using an exhibit can be a salient social moment. The exhibits used simultaneously by at least two visitors were the most popular. The most frequently observed reaction to the hands-on activities (64.9%) was that of visitors talking to one another and exchanging views on what they had just experienced. Visitors reacted positively and lingered around an activity which incited them to play an amusing game, as in the case of the "Bendy View of You" exhibit - deforming mirrors which encouraged entire families to participate in a fun game.

This study clearly showed the importance of creating more similar activities for one central theme, a theory upheld by Oppenheimer (Oppenheimer, 1976) and substantiated at "Explore-At-Bristol" by the allure such interactive activities had for the public. On average, visitors spent more time at an exhibit which explained a phenomenon they had already viewed in the surrounding exhibits. That is why the "Focus on Light" sub-section was so popular, because all the hands-on activities were centred around the wonder of light. The "Natural Forces" sub-section proved to be a problem, because diverse natural phenomena were displayed eg. lightning, tornados and waves.

5. Multi-phasal evaluation and a science communicator's role

This study showed the importance of carrying out a step-by-step evaluation: first comes the preliminary research and at the end, the results are revealed. Thanks to the preliminary research (desk research) carried out, crucial information was gathered for the planning of this particular study and for describing the various hands-on activities. Analysing the evaluation work previously carried out at the at-Bristol Science Centre proved to be most helpful when planning the study. The staff was also encouraged to actively participate in the evaluation work. In a preliminary testing phase, the evaluation project was discussed with them. Much attention was paid to the creation of the exhibit cards, a readily available tool which, thanks to its simplicity, could be used when publishing the results of the study.

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Notes and references

¹ Translator's note: "Explore" or "Explore-At-Bristol" is "the first true science centre of the 21st century that combines the best hands-on activities with the very latest multi-media techniques." (www.at-bristol.org.uk)

² See Diamond J. (1999). *Practical Evaluation Guide: Tools for Museum & other Informal Educational Settings*. Walnut Creek CA: AltaMira Press.

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³ Kidd A. (2001). Technology Experiences: What makes them Compelling? HPLabs Internal Report.

⁴ Conti F. (2004). e-evaluation @bristol. Tesi di Master in Comunicazione della Scienza Trieste: SISSA. (available on request)