Informing practice from research: a museum exhibit evaluation

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Abstract

Scientists are called to take their research outside the academia. In order to do so, scientists are likely to collaborate with communicators and informal science education settings. This study evaluated the case of a natural history museum exhibit, which connects the scientists featured in the exhibit, the communicators producing the exhibit and the visitors attending the exhibit. The evaluation aims to understand what are the variables at play when communicators mediate between researchers and the public.

Twenty scientists, ten communicators and 40 museum visitors participated in the study via email surveys and short interviews at the exhibit. Results indicate that the exhibit is well received by museum visitors and that the goals set for the exhibit are accomplished. Museum visitors walked from the exhibit with basic awareness of the research conducted at the University of Florida and its implications. In addition, researchers and communicators are satisfied with their participation but there are still opportunities for improvement in the interaction between these two groups. Recommendations include strength feedback before and after the participation of researchers, promote the exhibit in STEM departments to motivate more researchers to participate and design and technical suggestions for each of the exhibit component. Results from this study are useful to informed future efforts in museums and other science communication efforts.

Introduction

Increasingly it is becoming a requirement for scientists to include an outreach or communication component into their research proposals, especially for those projects funded by government agencies (Thomas & Durant, 1987; Riise, 2008; MacFadden, 2009; Brossard & Lewenstein, 2011). Given the public support for science and the benefits that science represents for basic daily life decisions (Felt, 2000), scientists are encouraged to share their research not only with their peers, but also with the general public. However, this process is still faulty (Treise & Weigold, 2002). Several reasons account for this: most scientists are unwilling and do not have the necessary skills to communicate with the public (Davies, 2008; Martin-Sempere, Garzon-Garcia & Rey-Rocha, 2008), scientists and communicators efforts to bring science closer to the public are still scarce, especially in basic science topics—not related to health or medicine (Suleski & Ibaraki, 2010), a top-down model of communication from scientists to non-scientists is still pervasive (Mogendorff et al, 2012), only a small portion of the population is attentive to science (Miller, 1986, Borchelt, 2002), and it is not clear which science topics are more important to communicate and which are the best ways to reach the public (Thomas & Durant, 1987; Field & Powell, 2001; Weigold, 2001). Considering these breaches and the need of researchers and the public to close them, it is important to

inform scientists and communicators about how to improve the communication process and how to incorporate the audience perspective in communication endeavors.

The purpose of this project is to evaluate the impact of one of these endeavors—Explore Research exhibit at the Florida Museum of Natural History. This exhibit brings together the main actors in the science communication process: scientists, communicators and the public. The evaluation of this exhibit sheds light on how the communication occurs from the perspective of each group of actors. Results from this study provide information to improve the process. First, it elaborates a set of recommendations for the Explore Research exhibit and second, develops a proposal to feature a specific research project (Panama Canal Project - Partnerships for International Research and Education) applying the recommendations made[1]. This study addressed the need of scientists to include a broader component into their research by developing an exhibit proposal for a specific project. By including the audience's perspective into the proposed exhibit (front-end and formative evaluation), this project tackled a constant call in science communication literature: incorporate the audience needs and interests.

Methodology

Four sets of research questions were formulated in this project:

RQ1. What are museum visitors' experiences with the Explore Research exhibit?

RQ2. What are researchers' experiences with the Explore Research video?

RQ3. What are communicators' experiences with the Explore Research video?

RQ4. What can we learn from incorporating perceptions of the participants involved in a museum exhibit to enhance and produce an effective exhibit for the PCP PIRE?

The methods in this research included direct observations at the exhibit, semi-structured interviews and email surveys. Observations at the exhibit were conducted keeping track of visitors approaching the exhibit. Selected visitors were observed the entire time while at the exhibit keeping track of each of their behaviors with each of the exhibit's component, time spent with each component and order of interaction with each component. The researcher predetermined ten types of visitors' interaction at the exhibit based on preliminary observations at the exhibit and after revision of past exhibits

[1] Proposal is not included in the paper.

evaluations in museums across US[2]. All observations included information on demographics and type of group.

Visitors were interviewed at two points for this research: formative and front-end evaluation. During formative evaluation visitors were asked for feedback following their interaction with the exhibit. During front-end evaluation museum visitors were inquired about their general knowledge of past and present biodiversity for front-end evaluation to provide baseline information for future exhibits. An email survey was distributed to all researchers featured in the videos and to the students producing the videos.

Results

RQ1. From a total of 242 observations, 20 percent of people stopped at the exhibit, 32 percent looked while walking or stop for a few seconds and 48 percent walked by without looking. Out of the 48 visitors that stopped at the Explore Research exhibit 62.5 percent were adult women (19 and older). People older than 60 years old were the more numerous group among participants and only a very small fraction (two visitors) were under 18 years old. Most of the participants were in groups while visiting the exhibit (75%) and usually with other adults. Only 13 people out of 48 participants visited the exhibit with children. Group sizes average was 2.5 people and ranged between two to eight people. Among the four components of the exhibit—videos, object cases, touchscreen and wall case, videos were the most popular among visitors. Out of 48 participants, 33 watched the videos displayed in the exhibit's screens (44%). Videos were followed in preference by object cases (26.67), touchscreen (17.33%) and wall case (12%). More than half of the participants interacted with only one component of the exhibit, mostly by watching videos (56.25%). The rest of participants interacted mostly with two or three components in the exhibit. From those visitors that made their first stop at the videos, only a small portion continued looking or interacting with other component (only 5 out of 23). In the contrary, most of the participants that interacted with object cases first, then stopped at the video, wall case or touchscreen. Videos had a greater effect in attracting visitors to the exhibit but the object cases had a greater effect on

[2] 1. Look only 2. Look at label 3. Reading out loud 4. Point/Touch 5. Conversation 6. Relate to other elements in exhibit 7. Instruct someone else 8. Sit on bench 9. Watch complete video and 10. Other

engaging them and having them stop at a different component of the exhibit. Of those who watched videos 41.7 percent watched at least one complete video and about a third watched more than one video (27%).

People spent an average of 3.1 minutes in the exhibit, ranging from one minute to 22 minutes. Visitors spent more time watching videos than interacting with any other component in the exhibit. On average visitors watched videos for three minutes, a minute in object case and touchscreen, and less than a minute at wall case. Participants were attracted to the exhibit due to a variety of reasons including a particular feature in the components or a more overarching motivation such as a personal interest towards the science or the topic of the exhibit. Twelve out of 40 participants expressed they were attracted to the exhibit as a whole or to a particular component because it somehow relates to their life—either a past experience or a personal interest. There are some preferences for some components across ages. Visitors among 33 and 60 years old were not attracted to the touchscreen, but it engaged people among 19 and 32 years old. A few people over 60 years used the touchscreen (3). Even though it is a small number it was surprising to have them interacting with this component when not a lot of younger people did. Object cases attracted people over 19 years old.

When grouping all the behaviors observed in visitors while interacting with the exhibit, “Look only” was the most common, followed by “Look at label” and “Sit on bench”. Differences are evidenced when looking at behaviors associated with each of the components of the exhibit as some components triggered specific behaviors given its characteristics. For example, “Point and touch” was the most common behavior of visitors when using the touchscreen. “Sit on bench” was the second most common behavior by people interacting with the videos, as benches were placed in front of the screens displaying the videos. Social behaviors such as “Conversation” and “Instruct someone else” were not very common. Other behaviors not expected included taking a video with smartphone and sleeping while seating on bench.

What people learn in Explore Research exhibit can be divided into three main topics: 1. Specifics on exhibit content (62.5%), 2. Awareness of research at the University (17.5%), and 3. Applications of research (15%). Topics emerged from the

answers to the questions about the exhibit's main point and what visitors found particularly interesting.

RQ2. Twenty researchers completed the survey out of a total of 51 recipients, for a response rate of 39 percent. All researchers in this study value science communication. They think it is important to communicate with the public and participate in venues such as public talks, exhibits or videos targeting the general public. All of them have participated in at least one activity to communicate with the public in the last year, 60 percent participated in more than six activities. Most researchers (80%) think of themselves as good communicators of their research to the general public. Most of researchers (70%) were satisfied with their video. Despite most researchers said they were satisfied with the video, most of them (75%) have not use it for their talks or other outreach activities. The few researchers that have used it have posted it on their own websites, social media, show it to students and send it to "interested parties." Most researchers (70%) do not see their participation on the video as a way to improve their communications skills and those who do, considered it as one more opportunity to gain more experience in communicating their research in a simpler manner. Most researchers (75%) found it fairly easy to participate in the Explore Research video. Only two researchers found it hard or very hard. The main obstacle to one of them was being a non-native English speaker in addition to lack of time to prepare for the video.

RQ3. Ten students completed the survey out of a total of 15 recipients, for a response rate of 67 percent. Students producing Explore Research videos experienced a positive changed in their video production skills and science communication knowledge after taking the class. Most students rated their prior knowledge as low or medium and all of them rated high afterwards. This increase in knowledge and skills are reflected on students' satisfaction with the final video. All students rated their satisfaction as high and most of them have received feedback from third parties. Regarding communicating science to the public most students recognized there is a need to use a different language to communicate research ideas. Most students learned that it is necessary to transform complex information into simple, or in other words move from researchers jargon to everyday language in order to reach non-experts. Most students listed the process of scheduling with researchers as their main obstacle in the process.

RQ4. Interviewed participants were satisfied with Explore Research exhibit as they all give it a rating equal to three or greater on a scale from one to five and most of them (85%) rated it with a four and five. 25 percent of participants valued the information given in the exhibit and 17 percent thought information is clearly presented.

Most visitors interviewed (40%) recommended to have more information either by having a more detailed explanation of research in the exhibit, specially in the videos, having more number of videos, not only four as at the moment of the interview and have longer videos. Some participants (20%) also suggested having more information by adding labels to the exhibit or specific components. When asked about what topic they would like to see featured in Explore Research, most participants (45%) named a specific topic based on their own interests. Such topics were highly varied so the cannot be group into one overarching topic.

Students' suggestions are related to their main challenge: scheduling with researcher. Therefore students suggested improving this aspect by having a longer list of researchers to choose from and allocate more time to contact them. Other students recommended adding a science communication component and videos to researchers prior to the interview. Researchers' suggestions were also related to preparation of the interview prior shooting including sending questions beforehand and prepare a script for the moment of the interview.

Museum visitors were inquired about their understandings of past and present biodiversity during the summer of 2012. Museum visitors' understandings of past and present biodiversity were classified into five categories: Biodiversity, Connectedness, Change, Tropics and Neotropics and Scientists. These results were incorporated in the planning of the exhibit.

Discussion

Results permit to make recommendations to address the gaps found in the relationship among science research and the general public. One of these gaps refers to the scientists' need to increase efforts to communicate their research outside academia (Suleski & Ibaraki, 2010). Researchers participating in this study not only recognize the importance of this task but also report a frequent participation in public communication

activities. However, most of them have not used their Explore Research video in any of these activities, therefore they are not making the most out of their participation in Explore videos failing to use the video on their personal websites, blogs or public talks.

In addition, researchers surveyed in this study see themselves as good communicators and perceived their participation in the video as a fairly easy task. In contrast, some students found it difficult to coach scientists in order to have them explain their research away from jargon. Students' perception agrees with another gap reported in the literature: scientists' lack of communication skills (Davies, 2008; Martin-Sempere et al., 2008; Maille et al, 2010). The above discrepancies reflect a disconnection between scientists and communicators.

The interaction between researchers and communicators materialized in the Explore Research exhibit was successful from the point of view of the target audience. Museum visitors ranked well the exhibit and valued the way the information was presented. In this case, researchers and communicators succeeded in conveying a scientific message and place research into a bigger picture (Christiansen, 2007). Museum visitors recognized aspects related to what Stocklmayer (2005) defined as the utilitarian and social benefits of communicating science to the public. First, museum visitors acknowledged the utilitarian benefit of scientific research when valuing it in terms of its implications, applications and how it relates to their life. Second, museum visitors understood the social benefit of research when they walked out from the exhibit aware of the scientific research conducted at the University. Scientists featured in the video are accounting for their research to taxpayers—museum visitors. Such form of accountability is part of the social contract between science and society (Durant et al., 1989).

A number of scholars have referred to the deficit-knowledge approach regarding science communication. They state that providing information is not enough to reach the general public and that it is also necessary to address the implications of such information to people's life. Yet results from this study agree with both approaches. Museum visitors value science information for its own sake by considering an explanatory exhibit as positive and successful. Applications of research (i.e. medical research) and the connections that visitors were able to make with the information presented were also valued. This connections were present not only in the form of how research affects

people's life but also in what Falk and Storsdieck (2010) referred as connection to self. This was evidenced when people recalled some past experience that made them stop at the exhibit and connect their prior knowledge with new knowledge. One of the needs addressed in the literature refers to the scarce points of reference about which topics should be a priority to communicate (Thomas & Durant, 1987; Field & Powell, 2001; Weigold, 2001). Results from this study suggest that communication efforts should include a wide variety of topics and avoid focusing on specific topics i.e. health or environment. Museum settings and mass media are opportunities for science communicators to reach to people's interests and increase awareness towards science issues.

Conclusion

This study took the case of a museum exhibit to understand how researchers, communicators and a general audience interplay in the process of science communication. Such understanding is a valuable source of information to evaluate the effectiveness of the exhibit and to inform future practices. As a result of this evaluation, this study suggests ways to improve the exhibit and applies such recommendations in a proposal for a specific research project at the University of Florida.

The collaboration among researchers and communicators proofed to be successful in this case. Museum visitors got an appreciation of the work of researchers and the implications of the studies, communicators were able to mediate between the technical scientific environment and the need to reach a non-specialized group and scientists had an opportunity to put their research away from jargon and are equipped with a material that promotes their research. Nevertheless, there are still ways to strength the process. Scientists are not taking maximum advantage of their participation in Explore Research videos relying mostly on the museum as a venue to promote it. Scientists still need to maximize their efforts in reaching the public and make a better use of the opportunities offered in this regard. Scientists could be more diligent using their video in their lab webpages or in public talks. At the same time, communicators could enhance final feedback to researchers and make recommendations on how to use the video or other resulting products. Explore Research exhibit is an opportunity to channel the current need

of researchers to meet funding agencies outreach requirements. Scientists cannot overlook this opportunity.

Science communication is an increasing point of interest for several sectors of society and it is likely that this attention will increase. This study is a way to address the topic by using research to inform practice.

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