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Public Engagement in Research: Alternatives to Science News

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Interest has been growing in the genre of Public Understanding of Research (PUR), thanks in part to the efforts of Hyman Field (now at AAAS on leave from NSF) and a conference at the Science Museum of Minnesota in September 2002 (Field and Powell 2001; Bossert and Ucko, 2003). The seven sessions directly related to this theme at the recent ASTC Annual Conference in St. Paul confirm this trend.

The present initiative can be seen as an outgrowth of sporadic past efforts to inform the public about new developments in science and technology. For example, I was involved in one such activity at Chicago's Museum of Science and Industry more than two decades ago. The modest *Science Alive!* exhibition included backlit transparencies, an object case, and minimal visitor interaction. It was discontinued after several "hot topic" change-overs due to the amount of work required to produce what in essence was a three-dimensional version of a science magazine article.

This temporary exhibition illustrates several of the challenges involved in PUR efforts. Response must be more rapid for exhibits on "frontier" science than in those areas that are more established. Interpretation for public audiences may be difficult because results are still tentative. No "cookbooks" yet exist for building devices based on emerging models and experimental results. The ongoing research process is messy, not yet "sanitized" through retrospective histories. Because the outcomes and consequences remain unclear, current research can generate controversy as well.

On the other hand, research represents the cutting edge of science, "where the action is" so to speak. It provides an opportunity to convey the excitement of discovery in exploring the unknown. The inevitable mix of scientific collaboration and competition can lend itself to human-interest stories, some of which may have been identified by the media. Finally, and perhaps most importantly, research provides opportunities for public engagement, as discussed further in this article.

Research Literacy and Content

Research literacy can be defined to encompass a basic understanding by the public of the following three elements: content of current research; the process of research; and potential implications or consequences (Ucko 2004). As in the early example cited, most PUR efforts today still focus on what's new in science and technology, the content component as defined here.

Some museums have developed large-scale exhibit areas, such as *Antenna* at the Science Museum, London and the *Current Science & Technology Center* at Boston's Museum of

Science. Others have developed smaller kiosk-type exhibits, such as *ScienceNOW* at the California Academy of Sciences in San Francisco and *Science Bulletins* at the American Museum of Natural History in New York. Many museums offer educational programs on current science, typically involving presentations by researchers. Examples include *Family Adventures in Science and Technology (FAST)* at the M.I.T. Museum in Cambridge, Mass. and *Curiosity Corner* at the Tech Museum in San Jose, Calif.

Formats that present current science and technology such as these have limitations. They can require considerable investment of staff time and funds, as noted. The public increasingly can obtain the latest information about recent developments online from numerous web sites, such as those of news media and science publications. In addition, simply conveying information about research may be less effective than enhancing PUR through what may be termed Public Engagement in Research. Such engagement can perhaps best be engendered through the second and third components of research literacy, namely involving the public in aspects of the research process or in dialogue on the consequences.

Research Process

It is difficult for exhibitions to portray the process of research in the abstract. I experienced that challenge first-hand in the development of *Inquiry*, an NSF-funded exhibition on this subject. Scientific research is decidedly nonlinear and hardly resembles the formulaic process often portrayed in the classroom. Thus the approach we took (Ucko 1983) was to highlight key characteristics of the process, including the human aspects involved in carrying out experiments and developing explanations. Subsequent exhibits that have grappled with this theme include *Investigate!* in Boston and *Çatalhöyük* in St. Paul.

Another technique provides "virtual field trips" that give the public access to research settings. An early illustration is the *Jason Project* ("Real science. Real Time. Real Learning.") which let students join Robert Ballard for two weeks during an annual expedition. *Live@Exploratorium*, a more recent version of this type of programming, is based on web cast visits to scientific research sites mediated by studio audiences on the museum floor. Perhaps the most effective virtual field trip, although not based on research *per se,* is *Live From…Cardiac Classroom* at the Liberty Science Center in New Jersey. In this school group program, students participate through two-way videoconferencing in actual open-heart surgery taking place in a hospital operating room.

In principle, the best way to help the public understand the research process is to involve them directly through "hands-on research." One example was the 45-minute *Living Labs* program at the now defunct Hall of Exploration at the Columbus Center in Baltimore, MD, in which visitors screened marine chemicals for their ability to emulsify oil. Longer-term participation is possible through programs at institutions with research programs, such as many natural history museums. For example, after completing a certification class, volunteers at the Denver Museum of Nature & Science can assist in paleontology research; several have co-authored the resulting scientific publications.

"Citizen science" programs can involve the public in research in far greater number. The Cornell Laboratory of Ornithology introduced the current use of this term to describe layperson participation in its ongoing research activities. Thousands of children and adults across the nation take part in such programs as *eBird, Project FeederWatch, Project PigeonWatch,* and the *House Finch Disease Survey*. These citizen scientists can enter their own observations as well as access the national database used by Cornell researchers to study the causes and consequences relating to the distribution and abundance of North American birds. Similar programs now include the Denver Museum's Colorado *Spider Survey* and the National Wildlife Federation's *Frogwatch USA*. They provide the opportunity to make scientific research relevant to the public; the key is engaging participants in meaningful activities over a period of time.

Research Implications

Science museum exhibits have tended to stay away from the issues raised by science and technology, whether current or historical. A notable exception, which opened in 1983 at Chicago's Museum of Science and Industry, was *"Technology: Chance or Choice?*" (Ucko 1983). It encouraged thought and discussion of both the positive and negative consequences through selection by visitors of statements best representing their perspective, letting them compare their own choices to those of others on computers (Texas Instruments TI-99s!). This technique has since been applied to other exhibits, most commonly those dealing with biotechnology and its possible implications.

Theater offers a very different approach, one that is well suited for exploring complex issues. The acclaimed Michael Frayn play *Copenhagen*, based on the meeting between nuclear physicists Niels Bohr and Werner Heisenberg during World War II, demonstrates the potential of this medium to raise critical questions. The challenge, particularly for museums, is to present in a professional manner work of quality that integrates art and science. The International Museum Theatre Alliance serves as a resource for institutions interested in pursuing this direction.

Forums, debates, and conferences provide the most direct formats for involving the public in the implications of current research. European museums have gone farthest in this area, including *The College* at La Cité in Paris, which offers an ongoing series of programs related to the consequences of science and technology. The *Café Scientifique*, in which the public and a scientist converse over coffee or wine, represents a rather more informal approach; *Science in the Pub* is the Australian version.

This direction is being pursued on a large scale by the Science Museum in London with the opening of its Dana Centre. Here the focus is a café-bar (described by one observer as "Ikea on acid") accompanied by programming that includes stand-up comedy and events designed to stimulate dialogue. Although children are not strictly barred, its target audience is 18 to 45 year-olds. The Centre seeks to adults in provocative debate on hot science topics "away from the 'safe' family environment" typical of museums. Led by Graham Farmelo, it's an important venture to follow.

Programs on the implications of research can fill vital local or regional needs by providing community forums for informed discussion on relevant topics. They can create opportunities for civic engagement by enabling museums to become "community centers" in a real sense. Dealing with charged topics is challenging, however. It is important to establish dialogue under conditions that minimize polarization and crowd psychology such as skilled moderation and balanced expert information (Macoubrie, no date).

Collaboration

Regardless of which aspect of research literacy is pursued or methods used, collaboration is essential. Scientists are obviously primary sources for the research content and process. Unless the work happens to be going on in-house, collaboration with universities, research centers, professional organizations, or media is necessary to identify interesting work and scientists. In this regard, university Public Information Officers (or Public Affairs Officers) can provide valuable assistance, as well as networking through such organizations as the American Association for the Advancement of Science, Sigma Xi (The Scientific Research Society), and even the Society for Amateur Scientists. In addition to serving as advisors, scientists can become sources for citizen science projects or present programs if they have the requisite communications skills. Unless staff are cognizant of the field and key players, validation of the research may be necessary from other scientists to assure significance and quality.

Fortunately, more scientists are beginning to acknowledge the value of outreach. Requirements by granting agencies, such as NSF, for "broader impact" are helping stimulate this change in attitude. Exposing the public to their research can help attract undergraduate and graduate students to faculty members' programs. It can make possible data collection through citizen science, if relevant to the research. The academic stigma of public communication is diminishing, and some institutions even recognize faculty for such efforts.

Partnering with media may be less essential than with scientists, but can enhance PUR efforts nonetheless. Media can be sources for breaking news and resources for graphics, animation, and video. Since their focus is the human-interest angle and storytelling, these approaches can help museums relate research to visitor interests. In addition to possible assistance during exhibit or program development, media partners can provide channels for promotion and cross-dissemination at reduced or no cost.

Although museums often solicit such partnerships as charitable contributions, media benefit significantly as well. Museums offer physical sites complementary to the on-air presence where media representatives can interact directly with their audiences. These settings offer opportunities to run focus groups, test new formats, present live programming, and stage special events, as well as provide a complementary channel for educational outreach.

In addition to specific partnerships, regional collaboration can generate further prospects for sharing resources. Representatives of museums, media, universities, libraries, and other organizations could meet on a regular or occasional basis to explore areas of common interest and exchange information; just creating an e-mail and phone directory for networking can be valuable. Nationally, consortia similar to the exhibit collaboratives can help institutions develop materials or programs that get jointly subsidized and disseminated to all participants. Cross-field information sharing can be stimulated through articles or information provided to complementary publications and list serves.

Conclusion

Although certainly no panacea, PUR offers an alternative framework for viewing exhibits and programs, one with its own set of challenges and opportunities. For those institutions choosing to pursue this direction, each will need to determine the most appropriate "mix" of research literacy components, whether for particular projects or overall. Ideally, exhibit and program elements would be integrated across the three components to achieve increased length of visitor engagement and resulting impact.

The most effective approach may well be Public Engagement in Research through involving visitors in the process through "hands-on research" programs such as citizen science and in the consequences of research through formal or informal dialogue. Supported by end-to-end collaboration with scientists, media, and other institutions, these kinds of programs can provide a worthy alternative to activities that focus primarily on science news or the content of current science and technology. Further information on this topic can be found in the forthcoming AltaMira Press book *Creating Connections: Museums and the Public Understanding of Current Research*.

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