CONFERENCE ARTICLE

The Natural History Museum: Taking on a Learning Agenda

MARY ANN STEINER AND KEVIN CROWLEY

Abstract Carnegie Museum of Natural History and the University of Pittsburgh are engaged in a research and practice partnership to bring new learning sciences findings and theories into contact with the design and deployment of innovative natural history learning experiences. In this article, we describe four strands of work: 1) connecting people to nature; 2) engaging people of all ages in complex and current scientific debates of regional consequence; 3) partnerships to build a strong regional learning ecology for nature and science; and 4) iterative professional development to support staff as they work with new definitions of learning and engagement in the museum.

At the Twenty-first Century Learning in Natural History Settings Conference at the Smithsonian Institution in Washington, D.C., curators, educators, evaluators, and researchers gathered to discuss the future. We began by agreeing on the past. Natural history museums have played a vital historical role in science and science education. They house extensive and important scientific collections. They have provided homes for working scientists from a range of disciplines who have advanced the frontiers of science. They have been powerful educational environments, inspiring and supporting the inquiry of generations of children and adults interested in science and nature. And finally, our museums are treasured cultural assets that are admired, valued, and supported by the local, regional, and national audiences we serve.

But besides appreciating these historical virtues, conference attendees also expressed concern for the future. There was a widely held belief that natural history museums are at a tipping point. In the near future these institutions must evolve to meet changing needs of the public or else face a very real threat of extinction. Though natural history museums were once strongholds of scientific research, these institutions today face difficulties in their ability to afford to support scientific research. They are trimming their science staff—or thinking about eliminating their mission to conduct scientific research altogether. Museums are struggling to hold onto traditional audiences, while recognizing the urgent need to reach out and build new ones. Fifty years ago, natural history museums, zoos, and botanical gardens were among the few out-of-school environments where the public could by exposed to and learn about science. Our institutions now sit in the informal science education niche alongside many others, including science centers, children's museums, community programs, nature centers, and a range of science media, gaming, as well as technologically supported and Web-based learning experiences.

Mary Ann Steiner (SteinerM@CarnegieMNH.Org), director, Research on Learning, Carnegie Museum of Natural History, 4400 Forbes Ave., Pittsburgh, PA 15213. Kevin Crowley (crowleyk@pitt.edu), associate professor, Learning Sciences and Policy, University of Pittsburgh School of Education; and director, University of Pittsburgh Center for Learning in Out-of-School Environments, Learning Research and Development Center, 3939 O'Hara Street, Pittsburgh, PA 15260.

The conference focused on ways to build from our traditional missions and strengths in order to transform our museums into vital forces for education, science, and change in our communities. Some of us spoke of how we had grappled with this transition and had found success; others were making the effort and encountering difficulties; and still others were wondering whether change was even possible given their circumstances.

From the perspective of those of us who attended on behalf of the Carnegie Museum of Natural History, there were two particularly inspirational themes. First, although natural history museums are sometimes cast as irrelevant nineteenth-century institutions, they are, in fact, more relevant now than at any time in history. Our planet is experiencing rapid change in its climate, biodiversity, and ecosystems, and we, as a species, are responsible for much of it. There is a growing sense that the future depends in large part on our ability to understand change and, specifically, our role in adapting to or mitigating change. Natural history museum collections offer many stories from the history of the earth. We staff members are now realizing that our scientists and our visitors can learn about change from the collections in ways that were not envisioned even 20 years ago. Many at the conference argued that natural history museums should rise to this challenge and become leaders in issues of change and sustainability. We wondered how our museums might make the transition from being the trusted resource for those who want to learn about the history of life on earth, to being a place that promotes debate and discussion about questions of immediate societal interest. How can we best use the evidence of the history of life on earth to make predictions about the present and future of life on earth, especially when this new public stance sometimes offends those who disagree with the evidence we present? In this way, we grappled with how to move forward, considering the resources we have in abundance, the history of how we have traditionally used them, and the urgency of meeting the public as equal participants in the future of the earth we live on.

Second, we were inspired by the many examples of museums creating visitor-centered experiences. It is probably fair to say that natural history museums have been slower than many other kinds of museums in recognizing the power of interactive, self-directed experiences for visitors. Traditionally, natural history museums have had lots of objects to look at, some signage here and there, and perhaps the occasional educator-led tour through a hall. The conference explored the idea that creating a place people choose to visit (and usually must pay to do so) obliges deeper recognition of the interests, emotions, values, and resources that audiences bring to the experience. We felt that our goal should be to create experiences that support all visitors in better understanding evidence about continual changes in nature—preferably by illuminating the role of humans in creating and responding to those changes as scientists and as citizens. In order for these issues to be relevant, we need to explore ways to facilitate deeper learning about the science of our collections, but we also need to cultivate personal and emotional connections to nature and a sense of wonder at its complexity and beauty. There is plenty of raw material in our collections, but new forms of interaction and design must be imagined in order to unlock the potential.

We returned to Pittsburgh from the Smithsonian conference, inspired, energized, informed, and connected to colleagues around the world who, like us, were beginning to seriously rethink how a natural history museum might look and act in the twenty-first century. Our own approach to this challenge has revolved around

the idea of putting learning at the center of the museum's daily life. Through a partnership with the University of Pittsburgh, we are two years into the launch of a set of linked and ongoing learning initiatives across the museum. We have learning researchers (housed at both the museum and university) working on a daily basis with educators, exhibit designers, and curators to explore new ways to activate our collections and scientific expertise in ways that connect with diverse audiences around issues related to observing and understanding nature and changes in the natural world. We will devote special attention to climate change and energy development topics that are of both national and regional importance.

Our work is meant to facilitate an institutional culture of learning and constant improvement leading to enhanced audience experience and staff performance by integrating research and evaluation—evidence-based learning and decision-making—into all aspects of the institution's operations. We think of ourselves as a research and development lab for creative new approaches that are tested with rigorous empirical methods and iteratively developed to reflect cutting-edge knowledge of how people learn in museums. In addition to our improvement work within the museum, we also have a mission to generate new knowledge and disseminate the museum's research internationally.

Along the way, we are incorporating community-centered practices that provide a mechanism for soliciting a two-way discussion with surrounding cultural groups about how their interests, values, and needs might intersect with the museum's content commitments and collections. The learning group is working to change the way the museum sees its education mission. Rather than regarding our role as imparting important and necessary scientific knowledge, we are thinking about it as a method for initiating dialogues about areas of science that are woven into daily life and that have consequences for the future. The goal of this work is to maximize our potential as conveners and supporters of community conversations around difficult topics that have been addressed in distinct but intersecting ways by scientists and society more broadly. The museum—by becoming both a dependable site for this interaction across differences, as well as an institution that supports dialogue, rather than simply a reliable source for packaged knowledge—is ready to broadcast its continuing relevance as a preserver of the past but also a steward of the future.

We next describe four strands of this work, which we are currently pursuing with funding from local foundations, the W.T. Grant Foundation, the National Science Foundation, and NASA. Each strand connects learning research we conduct with the design of new experiences that push the boundaries of how our museum operates.

1. *Connecting to nature*. Our emphasis here is one of observation and understanding of change over time. We are redesigning floor experiences around objects from the museum collection in ways that promote sustained inquiry. For example, in *Exploration Basecamp*, the public can choose from hundreds of collections boxes of skulls, fur, feathers, insects, plants, shells, and so on. Brightly painted boxes are carried to benches, the floor, and beanbags, and are opened with friends and family, with all the contents available for exploration. Areas for sketching, measuring, and viewing objects through microscopes are also available. This is a space where people demonstrate their interests and connections to nature because of the open format and personal choice about what part of the collection to explore. We have been building on this successful introductory experience by creating process tools that help people identify

scientifically important features of the collections and that encourage them to take new skills to other areas of the museum and life. Understanding how to create these kinds of experiences is essential if we want to support the visitor's ability to consider and assess scientific evidence and information essential to forming arguments that persuade others. We need to support learners of all ages, with a variety of backgrounds, and to identify the resources that are most useful to different audiences as they construct their understanding of our changing world. Through this process, the resources offered may expand from our touchable collections to behind-the-scenes collections experiences, interactions with researchers, and current science update stations.

2. *Engaging people of all ages in complex and current scientific debates of regional consequence*. To highlight current science and our institutional commitment to science research, we are developing experiences that bring current science topics to the public in a variety of formats. Here we are paying attention to the museum's and to the public's role in learning, through direct presentations of research and institutional knowledge and other participatory formats of engagement that highlight public perspectives and interests. For general public audiences, we have been conducting a series of studies about the presentation of museum science through the format of Gigapixel technology (see Louw and Crowley 2013). We have developed three case studies of public understanding, engagement, and participation in research—creating and studying new institution-specific scientific stories for the galleries, and the public response. In addition to digital representations of this scientific work, we are also looking to develop programs that bring scientists and collections to the public in new ways, and mechanisms for engaging in direct dialogue around issues of social relevance.

In addition to this exhibition-focused research, we are also expanding our teen programs. The model of volunteers teaching from a cart on the weekend is changing to one of teens contributing to the development of new visitor experiences on topics of critical importance (energy development, biodiversity, and cultural awareness) alongside exhibition developers, scientific section staff, and the visitor experience staff. With this initiative we are aiming both to broaden our audience by building community relationships, and to learn about how this youth audience can inform our presentation of evidence for change in natural systems.

3. *Partnerships and our Learning Ecology*. Ultimately, we realize that while the work we do internally is foundational, transformative work requires a broader platform. Because this is more than an institutional strategy—because there is urgency for society to engage in a rapidly changing world—we are also concerned about maximizing our role as members of a broad range of institutions interested in science learning. We want to identify unique capacities we contribute to a learning ecology and how our resources might best be combined with the resources of a zoo, botanical garden, university, or park, so that the learning, resources, and ideas are readily accessible to the broadest public. We are looking at the ways in which science learning institutions can leverage their resources for a bigger impact. We begin this work in 2013 with a newly funded Climate Change Education Partnership project. At the center of this proposal is a vibrant urban learning network that includes a variety of organizations with learning, advocacy, and service roles. This group is figuring out strategies to promote public thought and action focused on urban impacts of climate change.

4. *Iterative professional development.* An important part of the success of this type of

programming is the development of staff who are able to facilitate and support visitor inquiry. We want to understand how this change impacts visitors, museum educators, and the institution's own perception of its internal resources and external role in a regional learning ecology.

For instance, we want to understand how people respond to existing exhibition and program contexts at the museum and then to see the ways that these contexts might provide launching points for discussion, debate, and public response. An example of this is a new field trip program we are developing with Pittsburgh Public Schools and four local informal science institutions. In this program we have taken a traditional docent tour, added a climate change theme, and (through a series of iterative changes) created a learner-centered exploration via dioramas that support consideration of climate change impacts on various biomes. Evaluation of the learner experience, and research on the process of change for the facilitators, are built into the project. We have found that this method supports staff members in adjusting their own facilitation strategies and program design to better meet the needs and interests of an audience. Our learning from this project has led to skilled builder classes that allow school groups to learn a scientific process skill and then apply that skill in the museum's galleries, as students uncover evidence of scientific import with support from museum staff and their own friends and teachers. In the coming years this process is being incorporated into general public programs professional development.

For each strand there is a layer of professional development that is central to the success of the program. Ultimately we are interested in understanding how this work impacts us institutionally and as professionals, as well as how the public interaction influences the way we approach or work (both scientific and educational), and the way it transforms our public and self-perception in terms of our relevance and value to the community.

A unique aspect of the Smithsonian conference was its integration of scientists, educators, researchers, and evaluators. Each museum had to send a mix of staff in order to attend. For most of the attendees, it was a rare chance to be exposed to each other's professional communities. For the educators in particular it generated an excitement about the possibilities of engaging the scientific staff in our institutions more directly in educational projects. The conference's field-building efforts will need to be nurtured, shared, and supported in an ongoing way for change to be felt in more than a few key leadership institutions. The conference provided an international platform for bringing these conversations field-wide—connecting them in fact beyond the world of natural history museums to include zoos, aquariums, nature centers, and botanical gardens and arboretums. That larger peer group is incentive in itself to generate support, acknowledgement, and accountability to peers.

We had been working on our own learning research initiative for about year before the conference. We found that we were not alone in taking on the question of how to change an institutional identity and way of working, motivated by difficult economic times, urgent scientific issues, and pressing educational needs. Our hope is that an expansion of natural history learning will emerge from the conference, providing an ongoing collaborative structure to share questions, findings and strategies, and to usher in a new age of natural history education. Through combined initiatives, the field can emphasize the value of our institutions as places where scientists and the public actively teach each other in order to solve urgent questions about sustaining life on earth. END

ACKNOWLEDGMENTS

Thanks to Karen Knutson, Bill Watson, and anu jain for their helpful comments on drafts.

REFERENCE

Louw, M., and K. Crowley. 2013. New ways of looking and learning in natural history museums: The use of gigapixel imaging to bring science and publics together. *Curator: The Museum Journal* 52(1): 87–104.