

# 27<sup>th</sup> Annual Visitor Studies Association Conference

July 15-19, 2014  
Albuquerque, New Mexico

*Building Capacity for Evaluation: Individuals, Institutions, and  
the Field.*

## Abstracts



# Visitor Studies Association 2014 Conference Abstracts

## Introduction

Welcome to the 2014 Visitor Studies Association Conference Abstracts! This year in Albuquerque we are thinking about, discussing, and diving deep into the theme of *Building Capacity for Evaluation: Individuals, Institutions, and the Field*. Written by the presenters themselves, the following abstracts serve as both an in-depth guide to the different sessions taking place in July as well as a record of what was discussed at this conference. As has been standard practice for the past several years, the abstracts are exclusively available electronically and abstracts from past conferences are available via VSA's website at <http://visitorstudies.org/conference-overview/past-conferences>.

In order to ease navigation in this document, this year the abstracts are organized alphabetically based on their format: individual papers, innovative format sessions, panels, roundtables, and posters. The conference schedule is also included in this document. Thank you, enjoy, and see you in Albuquerque!

Valerie Grabski  
2014 Conference Abstracts Editors  
June 11, 2014

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# CONFERENCE SCHEDULE

## THURSDAY, JULY 17

### Concurrent Sessions 1

[Research Agendas and Field-Wide Capacity Building](#)

*Jamie Bell, Joe Heimlich, and Jessica Luke*

[CASCADING INFLUENCES: Long-Term Impacts of Informal STEM Experiences for Girls](#)

*Dale McCreedy and Lynn Dierking*

[Building Capacity to Support Diversity in Visitor Studies](#)

*Lisa Newton, Patricia Campbell, and Marcie Benne*

[An Open Discussion of Design-Based Research in Visitor Studies](#)

*Scott Pattison, Josh Gutwill, and Joyce Ma*

[Measuring 21<sup>st</sup> Century Skills in Informal Learning Environments](#)

*Amy Grack Nelson and Emily Craig*

Individual Papers: Applying Theory to Practice

[Theory of Intentionality: Supporting Impact-Driven Work](#)

*Randi Korn, Maggie Miller, and Lee Davidson*

[Developmental Evaluation Builds Program Staff Capacity at Urban Advantage Denver](#)

*Maggie Miller*

### Concurrent Sessions 2

[Math Engagement in Exhibits: What are we learning?](#)

*Scott Pattison, Josh Gutwill, Cecilia Garibay, and Andee Rubin*

[Developing the Evaluator Pipeline: A look at teaching visitor studies](#)

*Angelina Ong, Jill Stein, and Elee Wood*

Individual Papers: New Technologies for Evaluation

[Co-Opting an App to Build Evaluation Capacity](#)

*Fran Mast*

[Evaluating Group Interactions with Innovative Technologies: Life on Earth](#)

*James Hammerman*

[Got Choice? A Game-Based Model for Learning Assessments](#)

*Doris Chin, Maria Cutumisu, and Daniel Schwartz*

### **Concurrent Sessions 3**

#### [Research on Organizational Change In and Across Science Museums](#)

*Marjorie Bequette, Marta Beyer, Cecilia Garibay, Steven Guberman, Stephanie Iacovelli, Scott Pattison, and Christine Reich*

#### [Exploring Varieties of Visitor Engagement](#)

*Minda Borun, Ellen Giusti, and Stephen Bitgood*

#### [Evaluation Capacity Building Models for Non-Evaluator Museum Professionals](#)

*Sarah Cohn, Juli Goss, Marley Steele Inama, Nathan Richie, and Anna Lindgren-Streicher*

#### [Thinking Like an Evaluator: Developing tools for educators](#)

*Joe Heimlich and John Baek*

Individual Papers: Understanding Visitor Experience in Art Museums: from the whole visit to gallery design

#### [Old Masters Remastered: Renovations at the Worcester Art Museum](#)

*Amy Cota-McKinley*

Whole Visit Study at the Asian Art Museum

*Steven Yalowitz*

#### [New Media Use in Art Exhibitions: Enriching or annoying?](#)

*Silke Kristin Dutz and Stephan Schwan*

### **FRIDAY, JULY 18**

### **Concurrent Sessions 4**

#### [Explore the BISE Database of Evaluation Reports from \[informal.science.org\]\(http://informal.science.org\)](#)

*Amy Grack Nelson, Kirsten Ellenbogen, Sarah Cohn, Zdana Tranby, Denis Deng, and Gretchen Haupt*

#### [Creating Organization Change through Embedded Evaluation](#)

*Elaine Horr, Rita Deedrick, Joe Heimlich, and Andy Aichele*

#### [Comparing and Contrasting Digital and Paper Modes for Visitor Observation](#)

*Jennifer Borland, Beverly Serrell, Steven Yalowitz, and Camellia Sanford*

#### [Action Research in Zoos and Aquariums: Reflections from multiple perspectives](#)

*Andee Rubin, Lynn Dierking, Jim Kisiel, and Wayne Warrington*

#### [Using an Indoor Positioning System to Automate Visitor Tracking](#)

*Joyce Ma*

#### [Evaluation Toolkits: Passing trend or promising progression?](#)

*Joy Kubarek-Sandor and Ardice Hartry*

### **Concurrent Sessions 5**

#### [Creating Systems that Support Evaluation of Institutional Outcomes](#)

*Claire Thoma, Elee Wood, Erica Orton, and Sheila Brommel*

[Sharing Results Internally: Infusing your discoveries into your institution](#)

*Stephen Ashton*

[Rethinking the Language of Evaluation to Promote Inclusion of Diverse Audiences](#)

*Jill Stein and Shelly Valdez*

Individual Papers: Exploring Projects and Theories in Pursuit of Global Relevancy  
[Museums and Cultural Sustainability: Planning and evaluation](#)

*Theopisti Stylianou-Lambert*

[A Case Study in Globally Relevant Programming and Evaluation Metrics](#)

*Ellen Bechtol*

[Using Evaluation to Develop New Adult Learning Approaches in Museums](#)

*Ruth Cohen and Jennifer Borland*

## **POSTER SESSION**

### **SATURDAY, JULY 19**

#### **Concurrent Sessions 6**

[“Everything Looks Different!”: Embracing complexity in multi-sited projects](#)

*Jill Stein, Shelly Valdez, Dolly Hayde, Cecilia Garibay, and Juli Goss*

[Growing Up Isn't Easy: Developing Systems to Grow Institutional Capacity](#)

*Lindsay Maldonado, Joy Kubarek-Sandor, and Nicole R. Rivera*

[Save the Date: Education & Research are Getting Married!](#)

*Nette Pletcher and Danielle Ross*

Individual Papers: Novel Techniques for Visitor Studies

[Micro-Experiments for Fast, Actionable Data about the Museum Experience](#)

*Erin Gong and Michelle Maghard*

[Perceived Atmosphere: A novel way for characterizing exhibition environments](#)

*Regan Forrest*

[Co-Creation and Evaluation – Measuring the internal impact of public engagement](#)

*Kayte McSweeney*

#### **Concurrent Sessions 7**

[Understanding Institutional Culture: Tools for Cultivating a Welcoming Visitor Environment](#)

*Azuka I. MuMin, Joe Heimlich, and Andrea Motto*

[Strategies for Professionalizing the Field of Visitor Studies](#)

*Larry Bell, Rich Bonney, and Barbara Butler*

[Telling the Visitor Story: Bringing UX design techniques into Evaluation](#)

*Stefanie Mabadi*

[Building Evaluation Capacity in Museums through University Partnerships](#)

*Jim Kisiel, Theano Moussouri, Mary Jane Taylor, and Nick Visscher*

## Abstracts

### INDIVIDUAL PAPERS

#### **A Case Study in Globally Relevant Programming and Evaluation Metrics**

##### **Presenter**

Ellen Bechtol, Lincoln Park Zoo

##### **Purpose**

There is a consensus among researchers that conservation efforts must be global in scope in order to be most effective. However, many conservation education programs continue to be designed for a target single institution or small-scale collaboration. There is a need for globally relevant programming models and learning tools that can be shared across settings and institutions. "Observe to Learn" (OTL) is an iPad/iPhone app designed to help users study animal behavior. OTL was developed by Lincoln Park Zoo and launched in February 2013. We have partnered with seven institutions nationally and abroad to pilot using the app in a variety of programming structures. A comprehensive evaluation plan is in place to collect data on the app's impact from users of all ages at partnering institutions. Preliminary evaluation results suggest that technology can aid in connecting people with wildlife and engaging people in scientific research methods.

##### **Perspectives**

Informal science learning institutions such as zoos and museums have an important role in supporting science literacy. These institutions are instrumental in stimulating interest in and understanding of science concepts, as well as increasing visitor use of scientific tools and language (National Research Council, 2009). Research shows that emphasizing the process of science, as opposed to teaching only the results, increases science literacy (Lewenstein & Bonney, 2004). OTL was created as a tool to engage the public in an authentic science experience. Evaluation data from previous programs at Lincoln Park Zoo indicated an interest among visitors in using technology for animal observations. This trend aligned well with our goal to connect visitors with a research method used by zoo scientists. OTL simultaneously addresses many of the challenges inherent in conducting paper-based ethology studies (pencils break, paper gets wet).

##### **Methods**

Research methods include questionnaires for users of all ages, teachers, and institutional partners, as well as focus groups with the users and institutional partners. Observations of programs that integrate the app are also taking place at Lincoln Park Zoo and at the sites of our institutional partners.

##### **Data & Analysis**

Data collection and analysis is ongoing and will continue through September, 2014. Preliminary results will be presented, along with a look towards avenues of further research.

##### **Results**

Preliminary results suggest that technology can play a role in connecting diverse audiences with wildlife and engaging users in scientific research methods. Study participants indicated that they enjoyed using OTL, and that through using the app, they learned about animal behavior. In addition, participants of all ages correctly identified reasons why scientists use ethograms to study animal

behavior. So far, there is general agreement among institutional partners that the app helped users understand the work of zoos and zoo scientists. They also felt that the app encouraged users spend more time closely observing animal behavior, thus reinforcing a connection with wildlife (animals have behaviors, I have behaviors too).

### **Importance**

This study further explores the use of technology in enhancing public engagement in informal learning environments. OTL has been downloaded thousands times in over sixty-five countries, demonstrating that a simple user interface can be applied in diverse contexts and for multiple audiences. Continued research is needed in order to evaluate how technology can be optimally integrated into informal learning situations, and how technology can facilitate genuine scientific experiences on a large scale.

### **References**

Lewenstein, B. V., & Bonney, R. (2004). Different ways of looking at public understanding of research. In Chittenden, D., Farmelo, G., & Lewenstein, B. (Eds.), *Creating Connections: Museums and the public understanding of current research* (63-72). Walnut Creek, CA: Altamira Press.

National Research Council. (2009). *Learning Science in Informal Environments: People, places, and pursuits. Committee on Learning Science in Informal Environments*. Philip Bell, Bruce Lewenstein, Andrew W. Shouse, and Michael A. Feder, Editors. Board on Science Education, Center for Education. Division of Behavior and Social Sciences and Education. Washington, DC: The National Academies Press.

### **Additional Links**

Observe to Learn – Keeping Tabs on Wildlife with a Mobile Tablet  
<http://www.lpzoo.org/education/initiatives/observe-learn>

## **Co-Creation and Evaluation – Measuring the internal impact of public engagement**

### **Presenter**

Kayte McSweeney, Audience Advocate, Science Museum, London

### **Purpose**

At the Science Museum the response from visitors to co-creation is paramount but much research has also been done looking inward and assessing the impact of this way of working on the institution and its staff.

This session will outline how visitor research can successfully adapt its methodologies to meet the demand for evaluation that's inevitably for visitors but not with them.

Key areas to be focused on will be:

1. What insight and learning about internal staff attitudes, reservations and ambitions for co-creative working practices can be uncovered
2. The impact of the evaluations on planning for more successful and more influential co-creation projects
3. How the evaluation been conducted is feeding into a Model of Participation being prepared at the Science Museum

The goal is for each delegate to be introduced to the ambitions of conducting this research, the challenges that were encountered and the legacy its findings.

### **Perspectives**

In the UK museums are said to have entered the Age of Participation – a time when people expect to be able to actively participate in or directly influence their museum experience. With this shift towards more collaborative relationships with the public the visitor research field has to respond to this change, build on its capacity or face being left out. Visitor Studies can really influence how you measure the success of these types of projects and, through rigorous evaluation practice, determine the internal impact and influence of this way of working.

At the Science Museum, London we have dedicated much research time to assessing the impact and benefits of the approach on the institution and its staff. The Audience Research and Advocacy team have been gathering evidence from a number of exhibition developments that justifies and validates not only the institutional benefits of working in a co-creative manner but on how this step-change in working practice can really change an institutions attitudes to engaging deeper with its public. By indicating what success can look like the team have also been using its role as Advocates to tackle the inevitable challenges and hesitations and help foster a culture of participation.

### **Methods**

The studies presented utilized a mixture of qualitative research methodologies including: in-depth interviews, focus groups and focused observations.

### **Importance**

This session aims to provoke questions and reflection about the ever-expanding role of visitor studies and evaluation in putting your audiences at the heart of exhibition production and innovative interpretation. The findings show that beyond the production of a physical output (an exhibition, event etc) co-creation can have a profound affect on staff and the ways in which they think about how they develop visitor offers.

For VSA members the session will highlight how tried and tested methodologies within the capacity of current visitor research staff can be used to investigate the real institutional impact of new ways of working. It will turn the light inwards on those who create our visitor offers and allow them to reflect and participate on their practice.

## **Co-Opting an App to Build Capacity**

### **Presenter**

Fran Mast, John G. Shedd Aquarium

### **Purpose**

As with any new exhibit or experience, Shedd Aquarium's Audience Research and Evaluation team needed to evaluate and understand the guest experience at the very literal hands on experience, Stingray Touch that debuted in the summer of 2013. Given that the nature of this experience varied dramatically from more traditional gallery-based experiences throughout the aquarium, there was a need to go beyond heavily relied upon methods used in previous research and evaluation work and explore new means of data collection that would yield a comprehensive picture of the guest experience. This presentation is the story of that exploration for new tools and methods set in the context of the Stingray Touch evaluation, the specific criteria of research and evaluation teams that shape that search and the resulting growth in capacity that results from this sort of exploration.

## **Perspectives**

Audience Research and Evaluation at Shedd has worked to build institutional capacity by utilizing a slew of part time staff, interns, and volunteers to assist with research and evaluation projects. While this budding team is capable and eager for experience working in the research and evaluation field, the varying degrees of experience and time commitment require new tools to be intuitive and user-friendly without sacrificing rigor. In addition, an ever-growing project load requires projects move swiftly and efficiently forward. By extension, new tools used in these projects cannot have a long learning curve less the project fall behind tight project timelines. Of equal consideration is cost; as in most institutions, budgeting necessitating that new tools not be unreasonably expensive. Thus the criteria were set in a search for new tools to assist in the evaluation of Shedd's Stingray Touch experience: easy to use, easy to learn, and inexpensive.

## **Methods**

Lincoln Park Zoo released the free Observe to Learn app in spring of 2013 as planning was underway for Shedd's evaluation of Stingray Touch. The AR&E team first explored the app's use out of collegial curiosity rather than the pursuit of new evaluation tools, but exploring the app quickly lead to co-opting innovation. Being for use with all ages, it was intuitive and user-friendly. New-tool criteria seemingly were met: inexpensive and easy to use, but would it yield valuable results? The app facilitates instantaneous sampling observations, with intended targets being animals. Thus AR&E turned to the classic work of Altman (1974) who described instantaneous sampling as providing "the amount or percent of time that individuals devote to various activities." This method could yield the kind of representative results AR&E sought and the app made data collection far more tenable.

## **Data & Analysis**

In addition to the instantaneous sampling results, tried-and-true methods were also added to ensure reliable results: running record observations were added to better record group interactions and intercept interviews were instituted to gain perceptual data from targets. New methods called for new means of analysis. Once data was collected, behavioral breakdown (i.e. the percentages of instances each behavior was noted), interview feedback and running record notes were compiled for each case. The qualitative interview and observation data was then coded using inductive analysis and constant comparison, with data from each case assessed individually and across the different data sources in order to find broad themes about the experience. After this analysis, data was triangulated to create behavioral profiles that aligned across all three sources of data.

## **Results**

Three adult profiles during data analysis. Explorers tended to participate in the touch activity to a high extent, but also participated in leading others in activities and seeking and sharing info. Amusement Chasers fully participated in the touch activity with relatively higher levels of affective enjoyment. However, they did not seek out or share information to make deeper connections. The Observer filled the onlooker role, observing with low interest and participating in the activity to a far lesser extent. Three child profiles also emerged. The Engaged Child participated in the touch activity to a very high extent. They did not seek or share information or connect to stingrays based on previous knowledge. The Participant Child was involved in the touch activity but had a more passive interest in their experience. The Non-Participatory Child was involved in the touch activity to a very low extent compared to other profiles.

## **Importance**

Co-opting any new tool for data collection requires knowing what the research team in the field needs and what you want your results to do. For AR&E accessible, inexpensive, and efficient tools were needed for a team of burgeoning evaluators. But new tools could not sacrifice data being rigorous and comprehensive. Establishing these clear criteria for new tools and methods made the exploration of

new tools simpler; it was easy to disregard cumbersome and expensive tools in favor of those that were accessible, inexpensive, and yielded rigorous data. Even if they were not meant for use in social science research, new tools were added to the methodological arsenal of a growing team. These new tools, often co-opted beyond their intended use, meant that AR&E could expand their capacity to meet the needs of institution with a list of ever-growing evaluation demands.

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## Developmental Evaluation Builds Program Staff Capacity at Urban Advantage Denver

### Presenter

Maggie Miller, Maggie Miller Consulting

### Purpose

The audience will walk away with a basic understanding of the definition of Developmental Evaluation (DE), and how it was applied in evaluating Urban Advantage (UA) Denver. Audience members will hear some contextual information about UA Denver, and about how the original evaluation plan evolved to become more developmental in its approach. The systems and processes which were created to support DE will be described in some detail, in hopes that audience members will be informed and motivated to “try this at home.” Finally, audience members will hear how this evaluation approach affected stakeholders in UA Denver. The big idea of the session is: “while many complex things can be said about DE, and while we only have a few minutes together, Maggie’s experience in applying DE at UA Denver gives participants useful information about processes and systems which support DE, and motivation to try this at home.”

### Perspectives

This session draws on the work of Michael Patton, who developed the idea of Developmental Evaluation (DE). DE is an approach to evaluation that supports and documents program development in real time. It is characterized by deep partnership between the program staff and the evaluator.

I am an Accidental Developmental Evaluator. Urban Advantage Denver’s original evaluation plan included standard front-end, formative, and process evaluation. As UA progressed, I was able to meet regularly with the team. Because they were open to feedback and I am by nature a non-intimidating person, and because everyone was flexible, we began to collaboratively look at data and adjust elements of the evaluation plan; and the team made significant programmatic changes as well. At one point, a colleague commented on my “DE approach.” I looked it up and found that, indeed, I seemed to be doing something that looked a lot like DE. After this point, I became more intentional about my approach, aiming to learn more about it through readings, discussions, and workshops.

While DE is not the right approach for every situation, it can be a good fit with informal education, with its emphasis on free choice, discovery, and engaged learning.

### Importance

Developmental Evaluation (DE) provides a platform for individuals and institutions to build capacity for evaluation. Because there is so much emphasis on using data in real-time to develop a program, it promotes evaluative thinking. Because the evaluator role focuses on facilitating use of data, rather than serving as an outside expert who hands down judgment on a program, reflection and learning are key aspects of DE. Engaging in evaluative thinking, reflection, and learning help individuals develop their evaluation capacity, which in turn can affect the evaluation culture in the institution.

The implications for future directions for practice will be clear from this presentation: practitioners should know what DE is and consider it as an option when planning evaluation, and they should build in time and money to do it when appropriate. VSA members will get a glimmer of what DE is all about and leave with resources to learn more. **References**

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Patton, M. Q. (Instructor). (April 16, 2014). *eStudy041: Beginning Developmental Evaluation* [Webinar]. Washington, D.C.: American Evaluation Association.

### **Additional Links**

Maggie Miller Consulting

<http://www.maggiemiller.org>

eStudy – AEA Webinars

[http://comm.eval.org/coffee\\_break\\_webinars/estudy/](http://comm.eval.org/coffee_break_webinars/estudy/)

Urban Advantage Denver

<http://www.urbanadvantagedenver.org>

## **Evaluating Group Interactions with Innovative Technologies: Life on Earth**

### **Presenter**

James K.L. Hammerman, Director, STEM Education Evaluation Center (SEEC) at TERC, Cambridge, MA

### **Purpose**

This paper describes how an interactive observation protocol tool, and novel analytic methods contributed to the rigorous evaluation of group interactions at an interactive touch-table exhibit on evolution and common ancestry. The paper uses the example of the evaluation of the Life on Earth exhibit to explore methods for characterizing interactions among fluid groups at exhibits, and for conducting rigorous analyses using network analysis and hierarchical modeling techniques. Design and analysis issues such as tool design, reliability, and synchronization will be discussed.

### **Perspectives**

In natural history or science museums, learning is driven by the free choices of learners. These learners often visit in family or other social groups, and the de facto “group” around an exhibit may shift and change over time. Interactive museum exhibits succeed, in part, when they capture visitor interest and attention for long enough to allow exploration and engagement with the substantive content or activity. Thus, measures of visitor “dwell time” are a key component of exhibit evaluation, as are other measures of extent and depth of engagement (Humphrey, Gutwill, & The Exploratorium APE Team, 2005; Yalowitz & Bronnenkant, 2009). While most exhibit activities allow a single visitor to interact with them, and some may be restricted to one-at-a-time interactions, some exhibits are specifically designed to promote shared play and social interactions, and for these, descriptions of these interactions may be key to understanding their effectiveness and impact. Evaluation of Life on Earth focused on 1) describing how visitors engage with the touch-table exhibit and with one another;

and 2) how engagement was associated with understanding of key concepts of evolution and common descent.

## **Methods**

We conducted videotaped and naturalistic observations of nearly 500 visitors interacting with the exhibit at the California Academy of Sciences during fall, 2012. In both conditions, visitors had free access to the exhibit, though consent was obtained for video observations and surveys. Observation data were collected using an interactive database tool designed with Filemaker and running on iPads with the freely distributed Filemaker Go app (Filemaker Inc., 2013a, 2013b). The tool enabled us to quickly record arrival and departure times for each visitor, as well as behaviors for the group during timed 20 second intervals. Use of technology eased data collection and meant evaluator attention was freed to focus on the interpretive task of coding social interactions and talk among visitors. Visitors were asked to complete surveys as they left the exhibit.

## **Data & Analysis**

Data included:

- Observations of visitors, including their time at the table, verbal and physical interactions, as well as gender and age category;
- Table log data of activities done with the software; and
- Survey data from a subset of visitors about their experiences at the exhibit (interest, enjoyment, learning), their understanding of common ancestry and evolution, and some demographic questions.

Because experience at the exhibit was shared by the group who happened to overlap at the table, analyses that treated visitors as independent would be biased (Raudenbush & Bryk, 2002). Therefore we used network analysis tools to determine each visitor's primary "group," then used these groups in hierarchical regression models to differentiate individual and group characteristics that contributed to dwell time and learning outcomes.

## **Results**

Findings show dwell time increased with larger shared groups, but decreased when there were also "strangers" at the exhibit; and increased dwell time was associated with increased learning, after controlling for level of education. Methodologically, we explored several techniques for maintaining rigor amidst realistic variability and "messiness" in the museum context. For example, we worked to create inter-rater reliability statistics that would account for boundary overlaps with timed observation intervals. And we explored methods for characterizing primary group membership through network analyses when visitors often overlap different amounts with different people. These, along with hierarchical analytic techniques, were necessary to appropriately model the relationship between group interactions and exhibit engagement and learning.

## **Importance**

By exploring methodological issues related to using technology tools for observing and analyzing the impact of group interactions at a multi-touch touchable exhibit, this paper helps to build capacity for evaluating the role of group interactions and shared experience at a variety of exhibits beyond the case of Life on Earth. The findings that larger groups contribute to engagement (and thus learning), but primarily when others in a group are "known," suggests the need for further research into specifics of how characteristics of groups affect visitor experience.

## **References**

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Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical Linear Models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage.

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### **Additional Links**

Life on Earth Project

<https://lifeonearth.seas.harvard.edu/>

STEM Education Evaluation Center (SEEC) at TERC

<http://evaluation.terc.edu>

Life on Earth evaluation reports

<https://external-wiki.terc.edu/display/evaluation/Sample+Evaluation+Projects#SampleEvaluationProjects-LifeonEarth>

## **Got Choice? A Game-Based Model for Learning Assessments**

### **Presenters**

Doris B. Chin, Maria Cutumisu, and Daniel L. Schwartz  
Stanford Graduate School of Education

### **Purpose**

In partnership with both formal and informal learning institutions, we have been building a suite of online games, called choicelets, to serve as interactive assessments of “21st century” learning skills, e.g. critical thinking and intelligent persistence. The games take a process-based view of learning and focus on students’ choices as they attempt to solve challenges. The system provides students with various learning resources and then tracks whether, what, how, and when they choose to learn. We describe two of our games targeting different design- and science-focused learning skills: seeking feedback and data visualization. We also present early experimental results from controlled studies with children playing the choicelets, and consider possible future applications for game-based assessments.

## Perspectives

In the world of free-choice learning, designers of experiences aim to put individuals on a trajectory of continued, lifelong learning that includes fostering interests, developing skills, and changing attitudes and behaviors. However, a challenge exists in measuring these outcomes. “Test-taking” does not fit the free-choice structure of informal activities, and observational or survey methods frequently have difficulty tracking effects that last beyond the observed learning experience.

Game-based technologies are fun and a possible bridge to assess learning processes that are active across formal and informal settings. We call the games we are developing “choicelets” to highlight the importance of the choices that children make as they learn. The focus is not on assessing children themselves, but rather on determining if a learning experience has a measurable effect in changing how children solve future challenges. Choicelets, then, can be tools for formative assessment, and provide “actionable information” to educational practitioners and designers.

## Methods

Two games were designed in consultation with partner institutions interested in particular programs and learning processes. The Posterlet game focuses on two important steps in the design cycle: seeking feedback and revising. Children are tasked with designing three posters for their school’s Fall Festival. They must test each poster with a focus group, choosing either equally informative positive or negative feedback from each character. Students then choose to either revise or submit their poster (Figure 1).

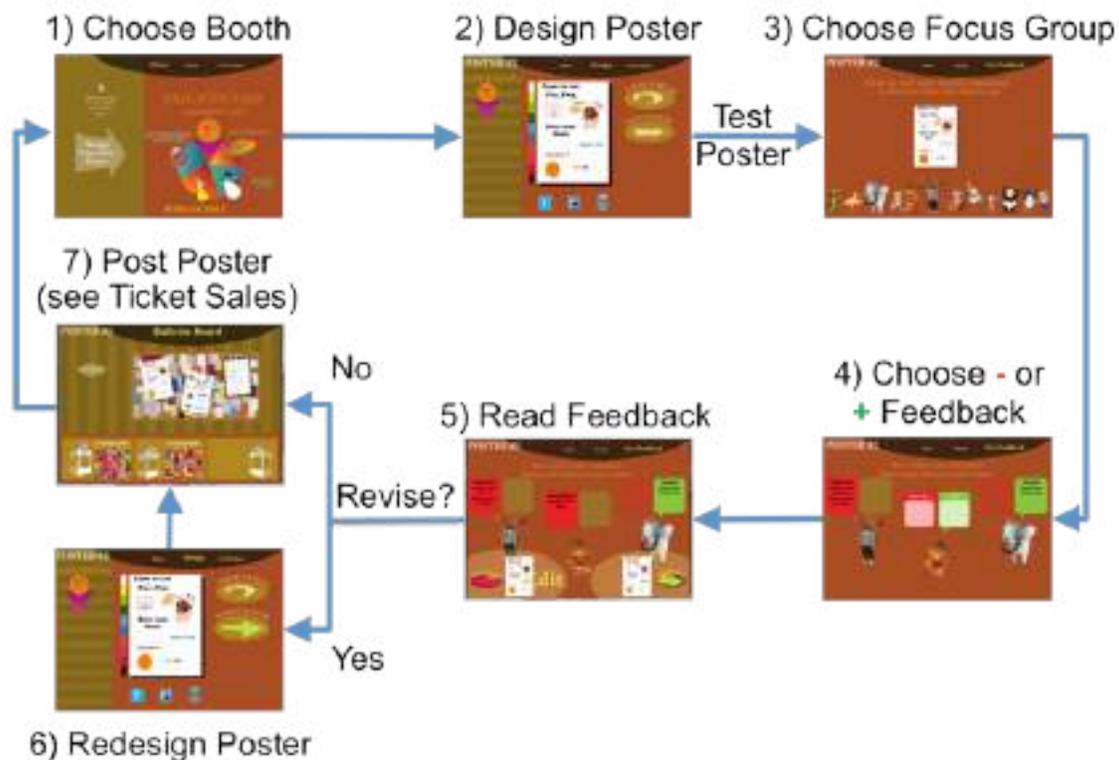
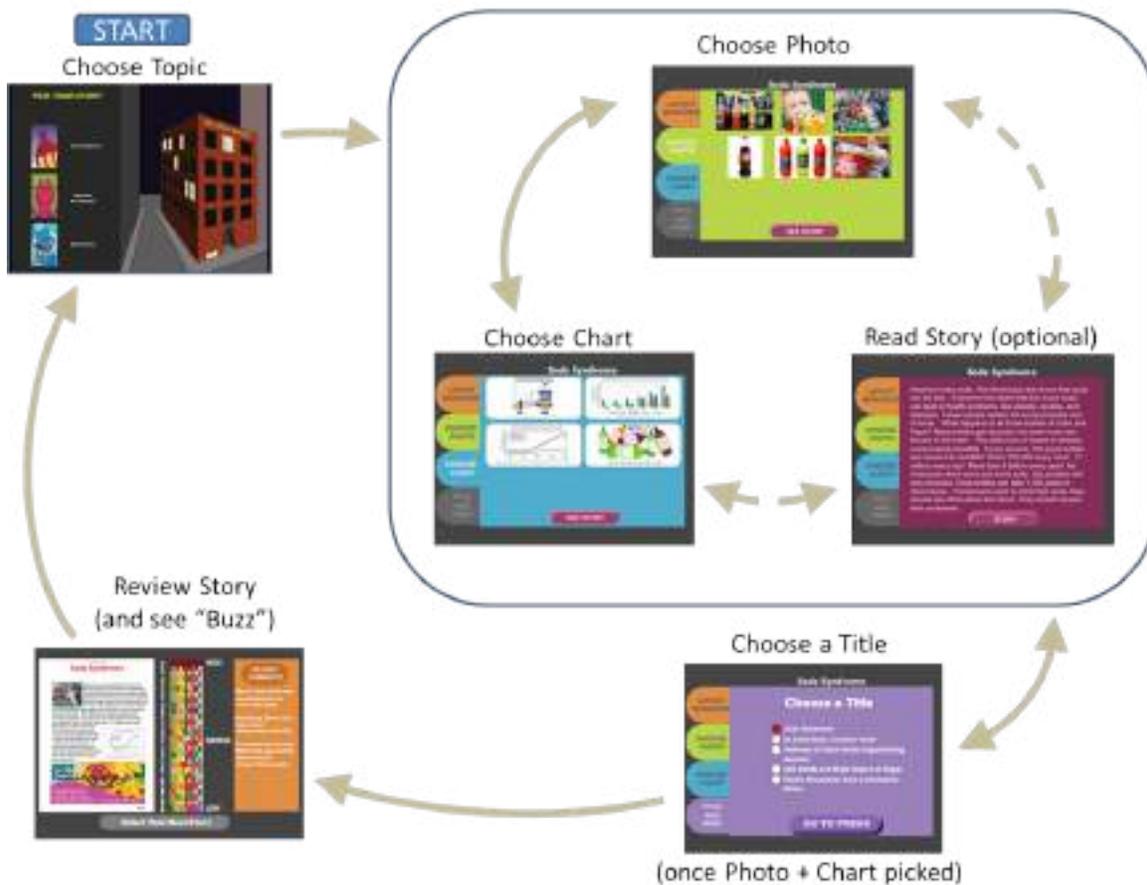


Figure 1. Flowchart of Posterlet Game Mechanics

Figure 1. Flowchart of Posterlet Game Mechanics

The Vizlet game was designed to assess the learning outcomes of a pilot curriculum focused on data visualization. “Storytelling with data” was the premise, teaching high school students how scientists communicate with data. Students are tasked with picking the correct graphics for three different stories. The system logs all the players’ choices as they go through the stories and provides them with feedback on the appropriateness of their choices for each story (Figure 2).



**Figure 2. Flowchart of Vizlet Game Mechanics**

*Figure 2. Flowchart of Vizlet Game Mechanics*

### Data & Analysis

Posterlet was pilot tested with 6-9th graders at two design-based schools (N=473) in two different major urban centers. Choice data included number of negative feedbacks & decisions to revise. Learning measures included quality of posters (game-based), post-game quiz scores, as well as standardized achievement data compiled from the schools.

Vizlet was tested with 10th graders from a public high school and included students who had (N=49) and had not (N=44) undergone the data visualization lessons. The hope was that “data viz” students would show different behavior patterns in the game (e.g. choose to look more often or longer at graphics). Choice data included views and time spent on the different stories and graphics. Learning measures included graphics appropriateness (game-based) and post-game quiz scores (targeting both story content and graphic design principles). Regression analyses examined correlations between in-game choices and both in-game and out-game learning measures.

## Results

Posterlet: Both choosing negative feedback and revising correlate significantly with in-game learning measures of Poster Quality and Post-game quiz scores ( $p$ 's < .001). It is important to note that these results do not mean that students who prefer positive feedback did not learn from that feedback. They just learned less than their counterparts who sought more negative feedback. Interestingly, Negative Feedback also correlated with standardized achievement scores in both reading and math ( $r$ 's  $\approx$  .4,  $p$ 's < .001).

Vizlet: Data visualization students exhibited different play patterns than control students, choosing to spend more time on the graphics and less on reading the stories ( $p$  < .05). The post-game quiz scores indicated that though control students scored better on factual content questions, the data visualization students exhibited a better grasp of each story's "main message", as measured by their explanations of which graphics were most appropriate and why ( $p$  < .05).

## Importance

We are developing a novel, fun method of assessment to capture children's learning behaviors. We have found good evidence to establish internal validity of the assessments: differences in students' game play choices, did, indeed, predict differences in their learning outcomes, measured both within the games and out. We also found evidence for external validity of the assessment: students' choices within the games appear to be related to differences in their outside learning experiences.

An important direction for future work with choicelets is to ask the questions: for what types of experiences can we use this assessment model? Can we use the game-based assessments to look at shorter, less structured learning experiences? And what ways can the data be useful? Can we provide formative feedback to educators to help them improve programs or identify children who could benefit from instructor or facilitator intervention?

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### **Additional Links**

AAA Lab at Stanford University

<http://aaalab.stanford.edu>

## **Micro-Experiments for Fast, Actionable Data about the Museum Experience**

### **Presenters**

Erin Gong, Independent evaluation consultant

Michelle Maghari, Crocker Art Museum, Visitor Services Manager

### **Purpose**

This presentation explores options for light-weight experiments. Experiments are powerful because they set up comparisons. Many evaluations ask “Does this work?”, but experiments can ask “Does this work better than that?” However, experiments are often costly in terms of budget, timeline, and participant pool. Because of this, experiments have been widely underused in museum evaluation.

We spent the last 6 months jumping head first into micro-experiments at the Crocker Art Museum in Sacramento, CA. Our goal was fast and simple data collection to drive actionable insights. In this session, we combine the theoretical discussion of micro-experimentation (setting up a hypothesis, creating clean experimental designs) with practical principles for application (which experiments yielded interesting results, what data collection methods were effective). We anticipate a thoughtful discussion about what worked well, what challenges we faced, and directions for the future.

### **Perspectives**

Many businesses that collect data about their customers have also started running experiments on their customers. Web developers call this A/B testing – a randomized experiment testing a control (A) and treatment (B) in an online setting. Web developers constantly A/B test because it leads to direct gains in the outcomes they care about (increased click-through or conversion rates).

In this way, experiments are becoming a core component of how a business continuously learns, develops products, and rapidly iterates. We want to open the conversation on how to set up micro-experiments in a museum setting. We see two key questions that must be addressed for micro-experimentation. First, what aspects of the physical museum environment can we change in an experimental way? (e.g., a museum can change the location of signs. Exhibits can be moved from one location to another. Staff can make certain suggestions to visitors as they enter.) Second, how can we quickly and easily collect data to measure the anticipated outcome of a change? It may be a matter of tracking traffic patterns, asking a single exit question, or monitoring the presence or absence of a specific behavior.

### **Importance**

Micro-experiments can be a great addition to the typical evaluation toolkit. For an institution, micro-experiments lead directly to data that informs decision-making. In setting up an experiment, you must address what specific intervention is being tested, and what it is being compared to. The resulting data should tell you which option is better, on a given outcome measure. This can lead directly to an informed a decision about that intervention: do it, or don't do it.

For an individual evaluator, the practice of micro-experiments is demanding. It is a great way to hone many evaluation skills – from setting up a hypothesis, to determining sample size and sampling method, to conducting fast and accurate data analysis. Quick iterations of micro-experiments let you learn as you go, increasing your own evaluation capacity.

### **References**

Ries, E. (2011). *The Lean Startup: How constant innovation creates radically successful businesses*. Penguin Books.

## **New Media Use in Art Exhibitions: Enriching or annoying?**

### **Presenters**

Silke Dutz, Knowledge Media Research Center (KMRC), Tuebingen, Germany  
Stephan Schwan, Knowledge Media Research Center (KMRC), Tuebingen, Germany

### **Purpose**

The reasonable use of new technology in museums – touchscreens, multi-touch tables, portable multimedia guides – can have a huge benefit for a pleasant, fun and rewarding museum experience. But until now, there's hardly been any research that investigates systematically and empirically the effects of new media use in exhibitions – do they have benefits over traditional information formats like wall texts or audio guides? If so, how can positive effects be measured and evaluated?

Our main research therefore focuses on the following question: What effects does the type of information presentation (a wall text next to a painting, an audio guide or a portable multimedia guide) have on visitors' behavior in an exhibition, on cognitive aspects (knowledge acquisition, memory capacity) and on aesthetic judgment?

### **Perspectives**

The backstory of our research is the great “media debate” between Richard Clark and Robert Kozma that started in the early nineties.

The controversy whether media were mere vehicles that deliver information in a neutral manner (Clark), or whether different media might lead to different visitor behavior, perception and cognition (Kozma), is one interesting aspect that we wanted to investigate. Therefore, we appointed different

features to different types of media: 1) Amount of information; 2) Push vs. pull; 3) Simultaneous perception; 4) Comprehensibility of complex information.

Another aspect focuses on aesthetic appreciation of artworks. Leder et al. (2004) presented an information-processing stage model of aesthetic processing, with two types of output: aesthetic emotion and aesthetic judgments. Russell (2003) made a distinction between a paintings' perceived meaningfulness and its pleasingness.

In the KMRC, the project "EyeVisit" combines psychological research methods with technological expertise in order to develop a new intuitive and personalized visitor information system with interactive displays for museums. Its centerpiece is a large, collaboratively usable multitouch table, complemented by portable mobile devices. This project serves as a problem based and sustainable application of knowledge and technology at the interface of innovative media technology and psychological analyses of museum settings.

## **Methods**

In a laboratory art exhibition showing 30 paintings from European artists, a study was conducted with 160 participants, who were divided into four groups – three groups received additional information either through wall texts ("Interpretive Label"), an audio guide or a tablet. As a control group, the fourth group ("Basic Label") received no additional information, only a label with the name and title.

During the first part, the participants could stay in the exhibition for as long as they wanted. They were not told that they were being tested afterwards. The second part consisted of an online questionnaire, including 120 multiple choice questions – four questions for each painting: two about visual details; two about the text. Afterwards, they had to rate on a 7-point scale, first, how pleasant and beautiful they considered each painting (aesthetic enjoyment/pleasingness) and second, how excited they felt to think about each painting (aesthetic appreciation/meaningfulness).

## **Data & Analysis**

The collected data consisted of various items. First, the participants had to indicate which paintings they had examined closer. In the Audioguide and the Tablet group, we also had the LOG files to verify which audio file they'd listened to and which text file they'd activated respectively. Second, we had the results of the 120 questions in the multiple choice test. Thirdly, we collected the aesthetic measurements for a) pleasingness and b) meaningfulness. Furthermore, we collected age, gender, field of study, interest in art, number of museum visits, interest in new technologies. Additionally, we noted the dwell time in the exhibition.

Data were analyzed using SPSS. ANOVAs were performed as appropriate for the level of data and the number of groups being compared. Following convention, an alpha level of 0.05 was adopted as indicating statistical significance. For ANOVAs, Turkey-HSD tests were used to make post hoc comparisons among groups.

## **Results**

We are currently still analyzing the data. We focused on the following aspects: do the participants in the four groups: 1.) Basic Label (BL); 2.) Interpretive Label (IL); 3.) Multimediaguide (MG); 4.) Audioguide (AG) show differences in a.) visitor behavior (dwell time in exhibition, number of explored paintings); b) capacity of memory for either pictorial details or text information; c) aesthetic evaluation. Dwell time was highest for group AG, moderate for IL and MG, and lowest for group BL. Number of explored paintings differed between the groups. Memory for text information was higher in group IL, MG and AG, compared to group BL. Memory for pictorial details was significantly higher in group AG,

compared to group IL and MG, and lowest for group BL. Aesthetic evaluation showed no differences in Pleasingness, but significantly higher scores in Meaningfulness in group IL, MG and AG compared to group BL.

### **Importance**

So far, there's hardly been any research that investigates systematically and empirically the effects of different media types in an exhibition on visitor behavior, memory capacity and aesthetic evaluation. With our laboratory art exhibition, we have the possibility to investigate this under controlled conditions. An interesting aspect is certainly whether empirical findings from a laboratory can be transferred into the real museum setting and if they can be used for the evaluation of visitor studies in the future.

Our findings might help in the decision-making of curators and exhibition designers, if the administrative and technical expense of putting new media into an art museum is worth it. We can answer in the affirmative.

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Kozma, R. B. (1994). Will media influence learning: Reframing the debate. *Educational Technology Research and Development*, 42, 7-19.

Leder, H., Belke, B., Oeberst, A., & Augustin, D. (2004). A model of aesthetic appreciation and aesthetic judgments. *British Journal of Psychology*, 95, 489-508

Russell, P. A. (2003). Effort after meaning and the hedonic value of paintings. *British Journal of Psychology*, 94, 99–110.

### **Additional Links**

Knowledge Media Research Center, Tuebingen, Germany

<http://www.iwm-kmrc.de/www/en/index.html>

Project EyeVisit

<http://www.iwm-kmrc.de/www/en/projekte/projekt.html?dispname=EyeVisit+-+Intuitive+und+personalisierte+Besucherinformation+im+Museum+mit+interaktiven+Displays+%3A+Kontextualisiert+%E2%80%93+Multimedial+%E2%80%93+Kollaborativ&name=Eyevisit>

## **Old Masters to Remastered: Renovations at the Worcester Art Museum**

### **Presenter**

Amy L. Cota-McKinley, Ph.D., Worcester State University

### **Purpose**

With the desire to improve traditional linear art displays, the Worcester Art Museum (WAM) pursued an alternative design approach to encourage visitor interaction. Summative evaluations were conducted in the Old Masters Gallery and the reinstallation titled “Remastered” to determine the effectiveness of the reinstallation. The goal of “Remastered” is to balance traditional museum opportunities for quiet contemplation with new interactive approaches focused on reshaping the visitor experience. The new design incorporates the installation of paintings hung medallion-style, which are mounted in clusters and tipped forward into the space to facilitate connections between paintings. To

encourage visitor interaction, traditional labeling was replaced with iPad technology, laminated gallery guides and books. Seating was also reconfigured. Tracking maps and visitor interviews addressed the following questions: 1.) how visitors were utilizing the space, 2.) what was the level of engagement within the gallery and 3.) how visitors responded to the design changes.

### **Perspectives**

The Worcester Art Museum and Worcester State University were looking for new ways to facilitate relationships between institutions. As a part of this endeavor, I was asked to evaluate changes that were going to occur in the Old Masters Gallery. The proposed changes were guided by the new director's vision.

### **Methods**

Ninety-four visitors were tracked in the Old Masters Gallery and 101 visitors were tracked in "Remastered." The exhibit element viewed, total number of stops, and total time spent in the gallery was recorded. Participants were then approached and asked if they were willing to participate in a short survey. The questions in the Old Masters Gallery addressed visitor interest, level of cognitive engagement with the paintings (from various perspectives and connections between paintings), mentally elaborating on label information, whether the visitor engaged in conversation with others on the content, and interest in utilizing iPads for additional information. The interview questions for "Remastered" included visitor interest, whether visitors noticed the altered gallery presentation, and the effectiveness of the interactive tools (iPad, gallery guide, laminated labels in wall pocket, and books).

### **Results**

Visitors viewed significantly more exhibit elements in "Remastered,"  $t(193) = -3.43$ ,  $p = .001$ ,  $r^2 = 5.75\%$ ; however, the overall total viewing time decreased an average of eight seconds. While gallery success rate increased from 38.95% to 44.13%, Remastered failed to meet gallery success criteria defined by a simple majority of exhibit elements viewed. The altered gallery elements included in "Remastered" were not well received. The majority of visitors did not use the iPads or the laminated wall pocket labels. The book carts and informative binders were utilized by less than 9% of visitors. Fifty-seven percent of visitors rated the interactive tools as ineffective at increasing their understanding of the art and the majority of those interviewed expressed a return to traditional wall labels. The iPad comments reinforce this sentiment.

### **Importance**

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## **Perceived Atmosphere: A novel way for characterizing exhibition environments**

### **Presenter**

Regan Forrest, University of Queensland, Australia

### **Purpose**

The physical context of the museum has long been recognized as an important facet of the visitor experience (Falk & Dierking, 2000). Recent qualitative studies (Packer, 2014; Roppola, 2012; Schorch, 2013) have underscored the fact that visitors take notice of and are influenced by the exhibition environment. However, a key limitation in advancing research in this area has been a paucity of methods for quantifying and analysing visitor perceptions of the exhibition environment beyond simple measures of satisfaction.

Perceived Atmosphere is an instrument designed to address this gap, allowing the relationship between environment and experience to be studied in greater depth. So far it has been used to characterize different exhibition environments in a natural/cultural history museum, and to relate aspects of perceived atmosphere to visitors' affective, cognitive and behavioral responses. The next step is to extend Perceived Atmosphere's use to different museums and exhibition settings. The instrument will be made available to other researchers for this purpose.

### **Perspectives**

The development of the Perceived Atmosphere instrument was informed by environmental psychology, in particular environmental cognition, theories of spatial perception and the research field known as atmospherics. Atmospherics is the study of how retail environments and other service settings influence customer attitudes and behavior. As I have recently argued (Forrest, 2013), methods and approaches that have been developed in the retail sector are often suitable for applying to informal learning settings. Perceived Atmosphere is an adaptation and extension of a method developed in a retail context (Vogels, 2008).

In relating perceived atmosphere to visitor experience, visitors' subjective assessments of their own experience were foregrounded. Furthermore, the study attempted to take a holistic, 'content neutral' approach to studying the visitor experience. Accordingly, measures of visitors' affective and cognitive engagement were based on visitors' own perceptions of their experiences, rather than on assimilation of specific content or interpretive messages.

### **Methods**

In the retail study described above, a vocabulary of environmental descriptors was developed and subsequently used to characterize different types of store environments. Likert-scale ratings were subjected to factor analysis to identify underlying constructs of perceived atmosphere, and the emergent constructs were shown to be capable of distinguishing between retail environments in meaningful ways.

Taking this general approach and drawing upon environmental psychology, color theory, and visitors' own descriptions of exhibition environments, the Perceived Atmosphere instrument was piloted across three exhibition spaces in two Australian museums. After initial analysis provided proof of principle, the instrument was subsequently refined to 30 semantic differentials presented as 7-point scales. It was then used in a study conducted with 602 visitors across four exhibition spaces at the South Australian Museum, one of Australia's major natural history and anthropology museums.

### **Data and Analysis**

Perceived Atmosphere was included in a self-complete questionnaire along with self-report items for

cognitive engagement and affective response, the visitor experience checklist developed by Packer et al (Packer, Ballantyne, & Bond, 2013), plus a limited number of demographic and visit history questions as control variables.

Results from the 30 semantic differential scales comprising Perceived Atmosphere were entered into a factor analysis (principal axis factoring) with Varimax rotation. The resulting four-factor solution was interpreted as: *Vibrancy*, *Spatiality*, *Order* and *Modernity*. Summated scales (based on 22 of the 30 items) created to represent these four factors were related to measures of affective and cognitive responses through correlation and multiple regression analyses. These analyses identified which dimensions of Perceived Atmosphere were the most important predictors of different facets of the visitor experience.

In addition, a small number of participants (n=60) were tracked prior to completing the questionnaire, allowing some preliminary analysis of the relationship between Perceived Atmosphere and visitor behavior.

## Results

Perceived Atmosphere does not generally vary by visitor gender, age, visit history or visit purpose. However, different exhibitions can be characterized based on their perceived atmosphere profiles. There were statistically significant differences between galleries on three of the four perceived atmosphere dimensions (there were no significant differences in Order); these differences are interpretable in light of each gallery's physical characteristics. Furthermore, results are consistent with an ecological theories of environmental perception, in which the affordances of a space are as important as physical properties. This is particularly pertinent to perceptions of Spatiality – the presence of long vistas appears to be a stronger predictor of Spatiality than a gallery's physical size. Of the Perceived Atmosphere dimensions, Vibrancy is the strongest predictor of affective, cognitive and behavioral engagement. Spatiality is a predictor of a sense of relaxation in the exhibition environment. There is a negative correlation between Order and 'Cognitive Overload'.

## Importance

The perceived atmosphere instrument represents a novel and easy-to-administer research tool for studying the relationship between the exhibition environment and the visitor experience. It offers a means for studying how different exhibition environments are perceived by visitors, and what likely implications this has for visitor experience. Possible future research directions include:

- Further research into how specific design features influence perceptions of Vibrancy, Spatiality, Order and Modernity
- Use of Perceived Atmosphere to evaluate different configurations of temporary exhibitions
- Using perceived atmosphere across a whole museum to understand the overall balance of exhibition environments
- Consideration of Perceived Atmosphere parameters during the planning stage of exhibitions, particularly through mapping an environment's prospective Vibrancy and Spatiality properties to ensure a balance of experiences across a museum.

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## **Theory of Intentionality: Supporting Impact-Driven Work**

### **Presenters**

Randi Korn, Randi Korn & Associates, Inc.  
Maggie Miller, Urban Advantage  
Lee Davidson, Victoria University of Wellington

### **Purpose**

The Cycle of Intentional Practice is a construct designed to help museums effectively make a difference in people's lives by clarifying their purpose and realigning all practices and resources to achieve that purpose. The Cycle of Intentional Practice helps museums know themselves, who their audiences are, and how they want to serve those audiences. The Cycle of Intentional Practice requires that museums carefully craft an impact statement that reflects and describes the essence of how the museum would like to make a difference in people's lives. The process includes articulating staff passions, identifying the museum's distinct qualities as a cultural institution, and envisioning impact on a finite number of audiences. Staff members' deepest passions meld together their hopes and expectations, and along with an understanding of their audiences' needs, become the focus of the museum's work. The impact "statement" lives in the center of the Cycle of Intentional Practice.

### **Perspectives**

The Cycle of Intentional Practice is an ideal work cycle for museum practitioners. It represents a work cycle for all museum staff--from the director to floor staff--and it assumes that there will be cross institutional collaboration around a core concept that I refer to as impact. I take the position that museums need to be mission AND impact driven, and that to be only mission driven misses the primary purpose of museums--to make a difference in the quality of people's lives. Mission describes what a museum does, while impact describes the result of that work on a population. Other words or phrases may be used to represent a similar concept, for example, public value is often used to describe public impact.

To live the Cycle requires significant individual and organizational behavior change; yet when all staff work together to achieve their desired results, all will know the ways in which they have grown and changed, and what they have learned so they can improve their work moving forward.

## Importance

More and more museums are being asked to demonstrate their impact with evidence. Evaluation of individual museum programs and exhibitions is the traditional mode of evaluation in museums, and while important, a piecemeal approach to evaluation does not take a holistic approach to evaluation. The Cycle of Intentional Practice raises the vantage point from evaluating an individual program to evaluating the entire museum's work on the public. Intentional practice requires leadership, vision, collaboration, a common understanding of intended impact, and a desire to continually collect evaluative data to demonstrate results and support individual and organizational learning and change.

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## Using Evaluation to Develop New Adult Learning Approaches in Museums

### Presenters

Ruth Cohen  
Senior Director, Education Strategic Initiatives  
Director, Center for Lifelong Learning  
American Museum of Natural History

Jennifer Borland  
Senior Evaluator, Rockman, Et Al

### Purpose

This presentation will focus on museums as wellsprings for lifelong learning in the new knowledge age. In pursuing expanded programming in this area, the American Museum of Natural History (AMNH) is seeking to understand how it—and the field—can offer visitors a deeper, longer-term experience of learning, beyond the usual “visit,” and what assets in particular contribute to motivation by adults to view and utilize museums to pursue lifelong learning in new modes of engagement. This presentation (co-led by staff from AMNH and the evaluation firm Rockman Et Al) will ask: What are the characteristics of adults who seek to engage with these types of adult learning programs? What do participants come to understand as a museum’s unique value proposition for lifelong learning? How can adult learning programs move participants along a continuum from lower levels to higher levels of knowledge, engagement and self-identification as life-long learners?



*Roderick Mickens, American Museum of Natural History*

Adult learners engaged in a course at the American Museum of Natural History.

## **Perspectives**

Ruth Cohen is the first director of the AMNH Center for Lifelong Learning, established in 2009. The Center's goal is to advance forms of lifelong learning for the spectrum of learners potentially drawn to the Museum. The Center emphasizes AMNH's role as an informal science learning institution that possesses the potential to change the perception of science as "for experts only," engage non-scientists in science content, and provide a trajectory toward levels of science mastery for those that desire. The Center therefore relies on the critical role of sophisticated evaluation to establish the necessary feedback to pilot, prototype and develop the most effective programs for lifelong learning, aligned toward these objectives.

Jennifer Borland is a Senior Evaluator with Rockman Et Al, an evaluation firm specializing in evaluating programs in museums and other informal learning environments. Jennifer has led evaluations of adult learning courses at the American Museum of Natural History and is currently evaluating the museum's new adult learning course on climate change. Jennifer will approach the topic from a research perspective that is both specific—as it pertains to the work she is doing at AMNH—and general, as it pertains to adult learning in broader ways.

## **Methods**

A mix of qualitative and quantitative methods have been used to study adult learning preferences and outcomes of adult learning programs at the American Museum of Natural History. In the spring of 2012, 460 AMNH members and course participants completed an online survey. Later that same year, participants in an AMNH course on neuroscience were invited to participate in focus groups wherein they provided feedback on that course specifically as well as adult learning in a more general sense. Participants in this course were also surveyed, and each class session was observed by a member of the Rockman Et Al research team. Proposed research methods for the newest climate science course include pre- and post-course participant surveys, session observations, participant focus groups, and pre- and post-course conversations with participants that are recorded and will be blindly scored by experts.

## **Data & Analysis**

AMNH member and general course participant survey data were analyzed using basic descriptive statistics and response summaries. Open-ended questions were coded and analyzed using qualitative data analysis techniques. Likewise, data gathered from neuroscience course participants were also analyzed using a mix of quantitative and qualitative data analysis techniques—the later of which were used to identify trends and themes that ultimately helped to clarify quantitative findings from analysis of participant surveys. Climate science course data will be analyzed using rigorous qualitative and quantitative analysis methods as well.

## **Results**

Adult learners appreciate learning opportunities that are rigorous but not overwhelming. They take courses to satisfy their curiosity, or because they enjoy learning for the sake of learning, however, some seek out specific learning opportunities because they are personally or professionally relevant. Adult learners are attracted to current topics and appreciate opportunities to satisfy their curiosity, expand their scientific understanding, and gain the ability to be conversant on timely scientific topics. Participating in courses gives them "conversational currency" when interacting with peers, and also provides a sense of satisfaction in having a deeper understanding about topics that they read or hear about in the media. Adult learners express an appreciation for the role that the museum can play in providing high-quality learning experiences, especially in so far as the museum can facilitate instruction that involves opportunities for participants to interact with real scientists who are experts in their fields.

## Importance

This session contributes to the landscape of evaluation in visitor studies because it addresses the broader issues of establishing different levels of engagement to a deeper, longer-term experience of learning, beyond the usual “visit.” The session organizers hope to gain additional input from VSA participants to understand what the field as a whole might need to evaluate in order to effectively reposition lifelong learning in museums as urgent, contemporary, and uniquely personal experiences.

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## Additional Links

American Museum of Natural History, Adult Course  
<http://www.amnh.org/learn-teach/adults/adult-courses>

Rockman, Et Al  
<http://www.rockman.com>

## INNOVATIVE FORMAT

### Rethinking the Language of Evaluation to Promote Inclusion of Diverse Audiences

#### Presenters

Jill Stein, M.A., Lifelong Learning Group  
Shelly Valdez, PhD., Native Pathways

#### Purpose

Language plays an essential role in the work we do as evaluators – from our communication with partners, clients, public audiences, communities, and other key stakeholders, to defining outcomes and impacts, developing evaluation tools and instruments, analysing and interpreting evaluative feedback, and reporting back to funders and stakeholders. This session explores the “language of evaluation” that informs our practices and how language can foster – or hinder – the relationships we build with communities, partners, and other stakeholders, and even how our use of language can impact the validity of our findings. The session facilitators will share examples and lessons learned from their collaborative evaluation of projects. One primary outcome of this work has been a deepened awareness of different language paradigms and how reflecting on our use of language in evaluation is essential in building authentic relationships and creating pathways for sharing authentic voice.

#### Perspectives

Through our collaborative evaluation work on multiple projects, including Cosmic Serpent (NSF-DRL-0714631), Native Universe (NSF-DRL 1114467), and Navajo Sky (NASA-ROSES), the facilitators of this session have deepened our awareness of the different “languages” that we bring to evaluation and collaboration. In order to build partnerships based on trust and mutual understanding, it is important to spend time exploring the implications of the language we use, and what different terms mean to different partners or communities. For example, the language used in evaluation comes largely from social science research; yet academic language can be alienating and off-putting to the communities we are trying to include in evaluation -- particularly in Native communities, where historical trauma around research, evaluation, and assessment is still deeply felt. Within the visitor studies field, we take certain terminology and language for granted – such as outcomes, measurements, instruments, description of sample, methods – and do not often stop to reflect on the meanings these terms may have to the audiences or communities we are working with, or with partners bringing diverse perspectives on the evaluation process.

#### Importance

This session addresses the conference theme of building capacity in the field, with particular focus on the question, “In what areas do we need to increase capacity in order to respond to changes in society, culture, and informal learning?” Activities and discussion will focus on identifying the “language of evaluation” and to what extent this may or may not resonate with the audiences whose stories we are helping to share. As museums, libraries, and other informal learning organizations seek to broaden their reach and relevance to increasingly diverse audiences, it is essential that our work as evaluators can reflect the perspectives and voice of diverse communities in an authentic way. Building awareness and reflective practice around the language we use is an essential part of creating capacity in this area, and we hope this session will help further the conversation around cultural responsiveness in evaluation

## **Additional Links**

Cosmic Serpent

<http://cosmicserpent.org/about-us.html>

The Cosmic Serpent Story: Summative Evaluation for Final Report

[http://informalscience.org/evaluation/ic-000-000-003-452/The\\_Cosmic\\_Serpent\\_Story\\_Summative\\_Evaluation\\_for\\_Final\\_Report](http://informalscience.org/evaluation/ic-000-000-003-452/The_Cosmic_Serpent_Story_Summative_Evaluation_for_Final_Report)

Native Universe

<http://indigenousedu.org/native-universe/>

## **Save the Date: Education & Research are Getting Married!**

### **Presenters**

Nette Pletcher, Association of Zoos & Aquariums

Danielle Ross, Columbus Zoo & Aquarium

### **Purpose**

Research questions:

- What role do Zoos/Aquariums play in an individual's lifelong learning experience?
- How do Zoos/Aquariums compare with other informal learning institutions?
- How do Zoos/Aquariums shape social action and social activism?
- What role do Zoos/Aquariums play regarding social services?
- What are the unique characteristics of learning in Zoos/Aquariums?
- How can we support a Zoo/Aquarium profession?
- How do we assess, disseminate and apply existing knowledge?

### **Perspectives**

AZA's Conservation Education Committee is interested in exploring these seven questions under the Visitor Studies strategic initiative. The questions originate from a 2009 white paper titled "The AZA's Framework for Zoo and Aquarium Social Science Research," which was based on earlier research published as "Why Zoos and Aquariums Matter." The framework organized research needs in zoo/aquarium education and provided a structure for individual institution and multi-institutional studies to be interpreted in the larger picture of what we know about zoos and aquariums, their visitors and their community relationships. The key, overarching questions were meant to guide the field further. Within each question are a great many opportunities for descriptive, phenomenological, structural, and predictive research. It was the hope of the CEC that this framework would help individuals, institutions, and the larger zoo and aquarium community to coalesce and continue to build our work on what we know, and what we could know to help us serve our visitors and communities better. As such, the CEC's Visitor Studies initiative has conducted a survey of all AZA-accredited institutions to determine which areas of research are already being addressed and which should be prioritized for immediate study.

### **Importance**

AZA's Conservation Education Committee envisions a robust future for research in zoo/aquarium education. There will necessarily be a variety of approaches - evaluative, applied, and basic--conducted through a mixture of levels. This effort recognizes the substantive need for an aggressive research agenda to be implemented. Ultimately, what we learn will help zoos and aquariums meet our conservation mission. Thus, the CEC strongly encourages all research to be shared, both

academically and practically. It will ultimately be important that any research findings fitting into the above framework should be digestible and usable by those doing education in our institutions, and those who are responsible for the direction and management of our institutions and our future.

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Atkins, A., Pletcher, N., Searles, V., Sloan, P., & Boyle, P. (2009). The AZA's Framework for Zoo and Aquarium Social Science Research – An Institute for Learning Innovation Independent Research Report produced in association with The Ohio State University Extension.

### **Additional Links**

AZA Conservation Education Committee

<https://www.aza.org/conservation-education-committee/>

## **Sharing Results Internally: Infusing Your Discoveries Into Your Institution**

### **Presenter**

Stephen Ashton, Ph.D., Director of Audience Research and Development, Thanksgiving Point Institute

### **Purpose**

We often discover great findings from our research and evaluation studies, but how often do our findings get shared within our own institutions? This session will not only look at how information can be shared internally, but session attendees will participate in a mock community of practice “share out” session, as communities of practice represent a meaningful way for sharing and gaining new knowledge. In this share out session we will model how a real evaluation study could effectively be shared out.

Additionally, session attendees will discuss other effective or ineffective ways they have shared their results internally within their own organizations.

We will also discuss how to make the findings relevant for those without a research or evaluation background.

### **Perspectives**

At Thanksgiving Point we have created an internal community of practice, made up of a diverse set of employees from all across the Thanksgiving Point venues and departments. We have used this community of practice as a means for sharing out information, including results from evaluation studies. We have found this to be an effective way to share out our findings internally and to discuss the implications for our organization.

According to Wenger, McDermott, and Snyder (2002), communities of practice (CoPs) are “groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis” (p 4).

Communities of practice represent just one way to share out findings internally. Session attendees will discuss other ways to disseminate information internally.

### **Importance**

If our institutions are going to stay relevant in an increasingly competitive world then we are going to need to be continually learning and improving. Obviously it is important to share out what we are learning, and the impact we are making, with outside groups. However, just as important is the need to

share out internally what we are learning. This helps staff members to be more fully invested and better educated. This leads to better experiences for guests. In a way, effective internal dissemination can lead employees to become ambassadors for the institution.

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### Additional Links

Thanksgiving Point Institute  
<http://thanksgivingpoint.org/>

## Telling the Visitor Story: Bringing UX design techniques into Evaluation

### Presenters

Stefanie Mabadi, Evaluator, Perot Museum of Nature and Science

### Purpose

Attendees will be introduced to an affinity diagram, a tool from the User Experience (UX) Research field to analyze and disseminate qualitative data obtained from interviews. Building and sharing affinity diagram reveals the stories of a targeted population of visitors. It describes underlying motivations, intentions of visitors and connections between behaviors which can be hidden in other evaluation efforts. The affinity diagram can present summative data on visitor experiences, as well as actionable data – meant to spur ideation, brainstorming for the next exhibit or experience, or solutions for ongoing exhibits or experiences. Attendees will interact with an affinity diagram produced at the evaluation dept at the Perot Museum of Nature and Science. We will discuss instances where this tool may be used, and how to consider when to use it, as well as some pointers on how to think about building an affinity diagram.

### Perspectives

The affinity diagram helps us understand visitor stories from their perspective. Building this model helps us avoid assuming we know all the aspects of their experience and leaves open the opportunity for us to learn something new. This method was first used at the Perot Museum of Nature and Science to understand the range of experiences within an exhibit designed in-house, called Recycle Reef. Our purpose was to understand which aspects of the experience were the most compelling. In addition to answering the research questions, the affinity diagram tool helped staff members typically quite disconnected from the visitor experience understand the struggles and delights of visitors within the scope of the research (i.e., around a specific exhibit). Because the tool is storytelling in nature, it

has wide and actionable implications, and is an easy and interesting tool to share – as its meaning and how to use the data are implicit.

### **Importance**

The affinity diagram is an additional tool for evaluators to consider when trying to investigate and reveal the scope of connected experiences of a targeted population. It is a powerful tool to disseminate data internally, brainstorm new experiences for your visitors, and can be used to demonstrate of the value of evaluation in a public, interesting, utilitarian format.

## **Thinking Like an Evaluator: Developing tools for educators**

### **Presenters**

Joe E. Heimlich, Ohio State University Extension  
John Baek, NOAA

### **Purpose**

The purpose of this session is to think aloud together about our practice; the discussion(s) will be captured in order to help non-evaluators required to do evaluation to approach the work with the benefit of the best thinking of the pros. Through dialogue, we hope to see convergence around the thinking underneath the evaluation questions that are formed, the logic models that are created, and the methods that are selected. In looking at all the resources available for conducting evaluations (and many very excellent resources exist), it became clear that what doesn't exist for non-evaluators is the very different way the evaluators' approach and think about programs. This session is a step in the development of resources to facilitate evaluation by agency educators by expediting them through the deeper thinking processes evaluators use, and then lead them to the existing resources on the "how-to-do" evaluation.

### **Perspectives**

NOAA and other agencies often require, and always desire, evaluations by their education programs in the field. Yet, the educators involved rarely have training in evaluation, and especially rarely have training or operational models for implementing evaluation in informal settings. Because many of these agency programs are conducted with minimal funding, hiring evaluators for ongoing efforts, and even for one-shot program evaluations is cost prohibitive.

There are many existing "how to" guides for evaluation, yet the evidence suggests these field-based educators rarely have the time or understanding to read through these guides. NOAA itself has such guides including a guide for evaluation created in 2005 based on evaluation training for the Coastal Services. The U.S. Fish & Wildlife Service, USDA, The National Park Service and many other agencies have developed these resources, yet many educators in these agencies still do not formally evaluate.

NOAA proposed the development of a series of fact sheets designed not as instructions in how to do, but rather in how to think about evaluation for specific types of programmatic activities and then connecting the users to existing resources (such as through MEERA; [informal.science.org](http://informal.science.org); ATIS/PEARS and others).

### **Methods**

This session is about collaborating with VSA members. NOAA and The Ohio State University are leading the development of resource materials for NOAA educators with the perspective these materials could be used across other informal learning programs. After many discussions, examinations of existing resources, and critical reflection, the idea emerged that perhaps what would

be most valuable for the educators would be to “get inside the mind” of an evaluator specifically around how an evaluator would approach a program such as a field trip, or a workshop, or a lecture series. The idea expanded to think about both formal and informal programs for each “type.”

The goal for this session is to do that. Can we collectively think through how we approach a particular program? How do we organize thoughts? Once we’ve shaped the questions, what are the methods that seem to work best for particular types of educational programs?

### **Data & Analysis**

This session will be a different type of roundtable. It will be a discussion about philosophy, approach, and our practice as evaluators. The discussions will be crafted to get at the shared approaches we use for thinking through the evaluation for different educational contexts and programming. And we will look at where our thinking leads us as we apply methods to answer the questions for these different programs. People can move in and out of the table, or can choose to stay with this discussion the entire session in order to contribute fully to the dialogue, the process, and the resulting products. And there will be flip charts, post-its, and lots of color coding and we hope a lot of energy in the dialogues.

### **Results**

In this session, participants in the roundtable will be able to engage in the process of critically reflecting on our practice and seeing what may be the common processes we each use in coming to the evaluation questions we ask, the routes we take to determine the methods we select, and the ways in which we use data to make meaning.

Equally important will be hearing how we are each different in these same ways. These discussions will be the basis for then building the fact sheets for formal and informal educational programs of different types. As part of the discussions, any VSA members interested in continuing in the collaboration will be invited to participate in the writing of fact sheets (blind, peer-review publications through Ohio State University Extension).

### **Importance**

Educators in agencies and informal settings are expert in education, not evaluation. Guiding these educators to resources on “how to” conduct an evaluation is possible, but rarely leads to real change. This project hopes to help the educators “think like an evaluator” by benefiting from the collected knowledge and experience of VSA members. This is a working session to ground-truth the work of, and obtain insights from the field for an unfunded initiative led by NOAA with OSU Extension to develop resources for field-based educators. This session will be highly engaging and hopefully revealing for all of us as we critically think through how we approach our work in varied settings. In addition, the collective work will be used in the development of resources for agency (and other) educators to use. Participants can continue with the project through writing peer-reviewed fact sheets. VSA will be acknowledged on all publications.

## **Understanding Institutional Culture: Tools for Cultivating a Welcoming Visitor Environment**

### **Presenters**

Azuka I. MuMin, COSI  
Joe Heimlich, OSU Extension @ COSI  
Andrea Motto, Yale

### **Purpose**

This interactive workshop will engage in reflection, discussion, and analysis to challenge our institutional habits and learn from each other to support the diverse needs of staff and visitors. As a field, we recognize that society, and our museum visitors, are becoming more diverse. Change in the thinking, approach and delivery of experiences by the institutional team members is necessary. Change through dialogue can help to overcome misperceptions; support training to eradicate ignorance, and facilitate the exposure required to remedy stereotypes that keep us from creating the welcoming and inclusive environments that diverse audiences expect and need from sustainable 21st century museums.

### **Perspectives**

In a 2013 field-wide survey distributed to ASTC member institutions, the opt-in participants were asked to respond to staff satisfaction around current diversity practices. Although the overall response to this question was low, dissatisfaction expressed a vague awareness that institutions could be doing more or better work (in prep, Youngs, Heimlich, & Huerta-Migus). These findings may point to ambiguities that mask institutional biases and assumptions that leave staff feeling unprepared and unsupported in taking more concrete steps toward creating welcoming and engaging environments for diverse audiences. In many instances, museum team members are unsuccessfully seeking the institutional support for diversity, through training, dialogue and strategic priorities to integrate within their roles and responsibilities. The required dialogue can begin with internal conversations and self-reflection on one's own experiences with inclusion and through this session, panelists will expose their personal positioning on a variety of diversity issues including race, gender, sexual orientation, and socio-economic status to outline a few of the common issues facing museum environments today. Diversity and inclusion is an advantage for creating greater relevancy for our visitors. A first step is preparing our internal teams mentally and professionally to advance the diversity initiatives supported by their institution's cultural environment.

### **Importance**

The lack of an integrative framework derived through discussions around institutional variables that affect engagement and inclusion of diverse audiences means few consistent guidelines exist for implementing diversity programs. Little attention has focused on structural responses to efforts to promote a climate more supportive of diversity. Museums and science centers need to explore and evaluate the everyday workplace processes that occur in response to diversity initiatives. This understanding is particularly crucial for public institutions whose major endeavor is the delivery of services to a larger system. Museums must engage more underserved and under-represented audiences and better informed organizational practices and service delivery will influence the confluence of the internal cultural environment and diversity issues, which ultimately affect and impact the visitor experience.

## PANELS

### **Action Research in Zoos and Aquariums: Reflections from multiple perspectives**

#### **Panelists**

Andee Rubin, TERC  
Lynn Dierking, Oregon State University  
Jim Kisiel, California State University  
Amy Niedbalski, Saint Louis Zoo  
Wayne Warrington, Phoenix Zoo

#### **Purpose**

The Zoo and Aquarium Action Research Collaborative (ZAARC) is an NSF-funded project that provided an opportunity for staff at six zoos and aquariums to conduct action research projects relevant to their site with mentoring from informal science education researchers. The goal of ZAARC has been to identify the benefits and challenges of this model of “mentored action research” as professional development for informal educators and to study how its implementation impacts both individuals and institutions. In the ZAARC model, teams of participants designed and carried out research projects that emerged from both their individual interests and their institutional goals. Simultaneously, ZAARC staff collected data to determine the effect of this professional development on participants’ knowledge of action research, perspective on visitor engagement, and self-image as educators. This panel discussion will examine program outcomes and institutional capacity-building from the perspectives of both mentors and informal educators.

#### **Panelists’ Perspectives**

The session will include an introduction to the ZAARC project, followed by reflections on the benefits and challenges of doing action research in informal settings from two mentors and two participants. Rubin, the project PI, will describe the rationale for using action research as professional development in informal educational institutions and explain how the project was structured to allow participants flexibility in their choice of action research question while fostering a community of practice across institutions.

Dierking and Kisiel will reflect on their roles as mentors, considering how they balanced the need to provide resources and advice on participants’ action research projects with a desire to leave control and decision-making in the hands of zoo and aquarium staff, who had an intimate knowledge of their own institutional and personal contexts.

Niedbalski will describe her role as a member of the Saint Louis Zoo team from the vantage point of an in-house researcher/evaluator collaborating with two educators who used the project to address institutional challenges.

Warrington will speak from his perspective as the volunteer manager at the Phoenix Zoo about the relationship of his work on ZAARC to his practice, considering how the reflective possibilities the project provided enhanced his work.

#### **Importance**

The ZAARC project explored an action-research-based professional development model for informal educators. Central elements of the model included: 1) use of action research methodology (Kelly, 2009; Reason & Bradbury, 2006; Gordon, 2008) to support practitioners’ increased attention to and reflection on their own practice; 2) considerable autonomy for participants in choosing action research questions relevant to their own practice; 3) intensive collaboration between site-based teams and

mentors who were active researchers in the free-choice education field; and 4) community-building events and activities that encouraged cross-site communication and collaboration. The discussion portion of the session will consider the impact of these design choices on the process and results of ZAARC. We will also discuss the distinct conditions that an informal educational setting (in contrast to a classroom) imposes on action research, and the impact of institutional factors on the work of ZAARC participants.

### **References**

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Kelly, L. D. (2009). Action research as professional development for zoo educators. *Visitor Studies* 12(1), 30-46.

Reason, P. & Bradbury, H. (Eds.). (2006). *Handbook of action research*. London, England: Sage Publications.

## **Building Capacity to Support Diversity in Visitor Studies**

### **Panelists**

Lisa Newton, Lawrence Hall of Science  
Patricia Campbell, Campbell-Kibler Associates, Inc.  
Marcie Benne, Oregon Museum of Science and Industry

### **Purpose**

Research and evaluation are tools that can help museums and other community or educational organizations learn more about and meaningfully engage their audiences and surrounding communities. This gives rise to the question: What knowledge, techniques, and supports do visitor studies professionals need in order to engage diverse groups of people in ways that lead to informed and inclusive program decision-making? Here, diversity refers not only to race and ethnicity, but also to a range of additional factors and experiences that shape individual and shared identities. This session will offer an overview of cultural competencies in visitor studies, resources and strategies from BeyondRigor.org for improving educational evaluation with diverse audiences, and an introduction to a new group for VSA members to support continued discussion and capacity building around cultural competencies. Session attendees will discuss priorities for building capacity for diversity in visitor studies.

### **Panelists' Perspectives**

A recent Master's Project (Newton, 2013) investigated culturally mindful and responsive evaluation to help characterize the landscape of museum evaluation and visitor studies with diverse audiences. Key perspectives identified through literature include multicultural validity (Kirkhart, 1995; 2010), cultural competence in evaluation (AEA, 2011), and culturally responsive evaluation (Hood et al., 2005; Frierson et al., 2010). Additional insights from evaluator interviews inform findings and recommendations for building capacity.

According to Drs. Eric Jolly and Pat Campbell, developers of BeyondRigor.org, rigorous designs and methods are not enough to understand what programs work for whom in what context. If research and evaluation don't take into account the needs, issues, and goals of different subgroups, the results are incomplete and often inaccurate. BeyondRigor.org provides strategies that help take evaluation

practice beyond rigorous designs and methods to support better educational evaluation with diverse audiences.

VSA conference sessions demonstrate recent efforts to create dialogue within the field on this topic (Stein et al., 2012; Huerta Migus et al., 2013, etc.). A new group for VSA members, called Bridging Communities, developed out of recommendations from the 2013 conference session on developing pathways for diverse talent in visitor studies (Benne et al., 2013).

### Importance

According to the report *Demographic Transformation and the Future of Museums* (Farrell & Medvedeva, 2010), the preferred future for the museum field “is one in which our users reflect our communities” and our resources “benefit all segments of society” (p. 5). To facilitate engaging the diverse communities of our society and serving them effectively, best practices in visitor studies should take context and culture into account. While many have taken strides to build this capacity, fleshing out this additional lens on competencies for visitor studies professionals and providing additional opportunities for professional development will build capacity for visitor studies to bridge communities and foster more inclusive and effective institutions and programs.

### References

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- Benne, M., Huerta Migus, L., Bequette, M., Valdez, S., & Aichele, A. (2013, July). *Developing pathways for diverse talent in visitor studies*. Presentation at the Annual Visitor Studies Association Conference. Milwaukee, WI.
- Farrell, B., & Medvedeva, M. (2010). *Demographic transformation and the future of museums*. Washington, DC: AAM Press. Retrieved from <http://culturalpolicy.uchicago.edu/publications/Demographic-Transformation.pdf>
- Frierson, H. T., Hood, S., Hughes, G. B., & Thomas, V. G. (2010). Chapter 7: A guide to conducting culturally responsive evaluations. In Joy Frechtling (Ed.), *The 2010 user-friendly handbook for project evaluation* (Revision to NSF Publication No. 02-057) (pp. 75-96). Arlington, VA: National Science Foundation. Retrieved from <http://www.westat.com/pdf/projects/2010ufhb.pdf>
- Hood, S., Hopson, R. K., & Frierson, H.T. (2005). *The role of culture and cultural context in evaluation: A mandate for inclusion, the discovery of truth and understanding*. Charlotte, NC: Information Age Publishing.
- Huerta Migus, L., Garibay, C., Yalowitz, S., Watson, B., & Martin, J. (2013, July) *Does reaching out to underserved audiences alienate core visitor groups?* Presentation at the Annual Visitor Studies Association Conference. Milwaukee, WI.
- Kirkhart, K. E. (1995). Seeking multicultural validity: A postcard from the road. *American Journal of Evaluation*, 16(1), 1-12.
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Newton, L. R. (2013). *Putting evaluation in perspective: Culturally mindful and responsive evaluation in museums*. Unpublished Master's Project. John F. Kennedy University, Museum Studies. Berkeley, CA.

Stein, J., Garibay, C., Heimlich, J., Reich, C., & Valdez, S. (2012, July). *Forum: Applications of AEA's cultural relevance in evaluation statement to VSA*. Presentation at the Annual Visitor Studies Association Conference. Raleigh, NC.

### **Additional Links**

Campbell, P. B. & Jolly, E. J. *Beyond Rigor: Improving Evaluations with Diverse Populations*. <http://beyondrigor.org/index.html>

## **Building Evaluation Capacity in Museums through University Partnerships**

### **Panelists**

Jim Kisiel, California State University Long Beach  
Theano Moussouri, University College London  
Mary Jane Taylor, University of the Arts, Philadelphia  
Nick Visscher, University of Washington

### **Purpose**

The purpose of this panel discussion is provide museum and university professionals alike with varying examples of how graduate programs have collaborated with museums to engage students in real-world exhibition development and evaluation experiences. These experiences create mutually beneficial relationships between university programs, graduate students and museums. This discussion addresses the underlying goals, constraints and shared challenges of these types of relationships.

### **Panelists' Perspectives**

Graduate programs across many disciplines, including museum studies, public history, and education, often incorporate project-based work into their courses, creating unique opportunities for students to apply the ideas and theory from the classroom to real-world situation. This session looks specifically at collaborations involving evaluation in museums and other informal learning institutions. Whether they involve exhibit design, program development or evaluation studies, these project-based experiences raise important questions. Most importantly, how can these university courses balance student learning with the needs, expectations, and obligations of partnering museums?

During this discussion, instructors and museum professionals from four University programs (University of the Arts, University of Washington, California State University Long Beach, and University College London) will discuss different approaches to establishing and maintaining these collaborative learning partnerships. The panelists will each outline their rationale and intended learning outcomes, as well as provide a brief background about their programs (and students.) Important similarities and differences among the course assignments will be discussed as well, Presenters will consider the impacts each program has for students and for the partnering organizations, and whether the student practicums can function as capacity building exercises for partnering museums.

At the conclusion of the session, the panelists will ask audience members to reflect upon and discuss such practical questions as:

- Are these course assignments ‘too academic’?
- Are they rigorous enough?
- How might course assignments be improved?
- How might evaluators who are not university faculty become engaged in these practicum experiences?

Each university program/course discussed offers a different level of depth in developing student evaluation skills and understanding, but the programs share similar obstacles. Conducting evaluation projects from start to finish within the confines of one or two academic semesters often constrains the time devoted to other elements of the course(s). Selecting and working with partner sites can be time-consuming and potentially political in nature. Staff at small museums that most need assistance with evaluation efforts can lack the time and experience needed to frame a strong study and provide feedback or coaching to student teams. Larger organizations who are often more familiar with evaluation protocols (and possibly better equipped to mentor students) often expect evaluation that is more sophisticated than what students can accomplish. The panelists want to engage VSA attendees in a discussion about how these types of difficulties might be mitigated, and hope to use the conference audience as a *de facto* advisory board.

### **Importance**

This session hopes to build on the VSA conference theme, “Building Evaluation Capacity: Individuals, Institutions and the Field” by exploring ways to expand the benefits and deepen the impacts of university-museum evaluation partnerships.

## **CASCADING INFLUENCES: Long-Term Impacts of Informal STEM Experiences for Girls**

### **Panelists**

Dale McCreedy, Franklin Institute Science Museum  
Lynn D. Dierking, Oregon State University

### **Purpose**

The purpose of this National Science Foundation-funded study was to investigate whether girls-only, informal out-of-school-time (OST) STEM experiences have long-term (5-25+ years) influence on young women’s lives, both in relationship to STEM, but also generally. We documented their perceptions of the program experience in one of six informal programs, and the ways in which participation influenced choices in education, careers, leisure pursuits and ways of thinking about what science is and who does it.

The overarching research question was, “What possible influences do informal science experiences play in girls’ interest, engagement, and participation in science communities, hobbies, and careers over the long term?” There were three sub-questions: (1) Does participation in such experiences facilitate and lead to additional engagement? (2) What role if any do significant adults and peers play? (3) How do girls describe their relationship to science and their sense of themselves (identities) as science-interested learners and advocates?

### **Perspectives**

We used a sociocultural lens to frame and guide the design and implementation of the study, specifically communities of practice (CoP), considering the varied CoPs of the six programs from which we recruited women to participate in the study. In this framework, three elements distinguish a community that fosters engagement and the potential for continued participation:

- Domain of knowledge (in this case, the missions and goals of the organizations leading the programs)
- Network of people engaged in implementing the program (i.e., girl and adult participants, as well as professional and amateur scientists serving as mentors), which provides opportunities for personal connections and interactions created and facilitated within a rich and supportive social context;
- Shared activities and practices afforded by the social context (e.g., hands-on science activities, kits, museum experiences, and authentic contexts in which to engage in and enhance specific STEM practices and skills and life skills).

## Methods

There were three investigations:

- **Investigation 1 – Personal Meaning Mapping (PMM)/In-Depth interviews.** To ground the study in women’s own language and perspectives, we used Personal Meaning Mapping (PMM), an approach specifically designed for use in informal education settings (Falk, Moussouri and Coulson, 1998). We explored ways in which young women discussed their program in order to better understand what outcomes might be possible and to inform the development of Investigation 2’s web-based questionnaire.
- **Investigation 2 – Web-Based questionnaire.** Research participants included 174 young women, recruited from six informal OST programs committed to supporting girls in science.
- **Investigation 3 – Life story development; review and vetting of findings.** Eight women allowed us to deeply explore their personal perceptions of the influence of informal STEM program experiences in their lives. They participated in different programs, yet their experiences and the impacts they perceived were remarkably similar to and consistent with one another.

## Data & Analysis

Quantitative data were analyzed using SPSS and focused on these research hypotheses: (1) Women have positive memories of their experiences in STEM programs, even years later; (2) Free-choice/informal STEM programs contribute to women’s STEM learning, including: a) Science memories; b) Attitudes towards and perceptions of science; c) Awareness and understanding of science and science careers; d) Future engagement in science communities; and e) Science identity; and, (3) Informal STEM/free-choice programs contribute to the shaping of women’s personal identity and social capital, including: a) Personal agency; b) Personal identity; and, c) Social capital, networks, and skills. We developed coding rubrics for the qualitative data, identifying key open-ended questions for coding, and then determining which of the hypotheses each question tapped. Thus, open-ended questions were coded for more than one hypothesis or from more than one content perspective. Inter-rater reliability was more than 0.68 for all open-ended questions.

## Results

- **Participants formed long-lasting memories that remained constant regardless of the length of time that had passed since participation.** Memories were equally detailed whether five years or 15, and included specific skills and practices they had used in programs, and the people they had met: mentors, program leaders and peers.
- **Experiences influenced and contributed to women’s attitudes toward and understanding of STEM, shaping future education, careers, leisure pursuits, and ways of thinking about what science is and who does it.** For example, women discussed how

participation enhanced their awareness and understanding of science and introduced them to a variety of science and science-related careers.

- **Participation helped to shape women's personal identities and life trajectories.** Women perceived that participation in informal STEM programs positively influenced a) personal identity and agency, b) social capital, networks, and skills (leadership and other life skills), and c) commitment to civic engagement.

### **Importance**

Over the past decades, hundreds of STEM programs for poor girls, many of color, have been funded, undertaken, and evaluated. Short-term evidence shows that effective informal STEM programs offer meaningful experiences for girls and women to engage with STEM in everyday contexts, building capacity and confidence in science (Afterschool Alliance, 2011; Modi, Schoenberg & Salmond, 2012). However, little research has been conducted to determine whether OST programs like these fulfill their long-term potential of significantly contributing to women's continued engagement and persistence in science. Findings from this exploratory study both provide insights into the power of informal OST social contexts and the contributions they make in supporting STEM learning, science rich lives, and girls' identity development, as well as raise policy implications about what counts and is taught as STEM in K-12 and the important but often undervalued role of OST experiences in sparking creativity, interest and persistence in STEM.

### **References**

Afterschool Alliance. (2011). *STEM learning in afterschool: An analysis of impact and outcomes*. Washington, DC: Afterschool Alliance.

Falk, J.H., Moussouri, T., & Coulson, D. (1998). The effect of visitors' agendas on museum learning. *Curator*, 41(4), 107-120.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York: Cambridge University Press.

Modi, K., Schoenberg, J., & Salmond, K. (2012). *Generation STEM: What girls say about science, technology, engineering, and math*. A Report from the Girl Scout Research Institute. New York, NY: Girl Scouts of the USA

## **Comparing and Contrasting Digital and Paper-based Modes of Visitor Observation**

### **Panelists**

Beverly Serrell, Serrell & Associates  
Steve Yalowitz, Audience Viewpoints  
Camellia Sanford, Rockman Et Al  
Jennifer Borland, Rockman Et Al

### **Purpose**

Digital technologies have facilitated new modes of data collection via handheld devices that enable wireless collection and transmission of data. Subsequently, in recent years, use of digital technologies has become more widespread within the field of visitor studies. As these technologies have become more commonplace in researchers' arsenal of tools, it is reasonable for the visitor studies field to take a moment to reflect on what we've learned thus far about the relative strengths and challenges of digital methods of data-collection in comparison to the paper-based modes that were the

predecessors and the methodological ancestors of processes and procedures for collecting visitor data using digital devices. This session seeks to explore the comparative benefits and challenges of digital data collection and more traditional paper-based modes of data collection through a variety of case studies.

### **Panelists' Perspectives**

**Beverly Serrell:** Beverly has been tracking and timing visitors in museum exhibitions for more than 30 years. She has continued to use the paper-based methods that she pioneered, but in recent years, has also sought to incorporate digital data collection tools in studies for the Natural History Museum of Utah and Sciencenter (in Ithica, NY).

**Steve Yalowitz:** Steve is a long-time practitioner within the visitor studies field. Steve and his company, Audience Viewpoints, recently conducted a major study for the Asian Art Museum in San Francisco that incorporated use of digital data collection tools to facilitate observations and interviews.

**Camellia Sanford:** Camellia's work has included a mix of paper-based timing and tracking studies as well as those that have incorporated digital data collection tools to facilitate the process, including studies for the American Museum of Natural History and Connor Prairie Interactive History Park.

**Jennifer Borland (facilitator/discussant):** Throughout her 15-year evaluation career, Jennifer has sought to find new and appropriate uses for digital technologies. Jennifer will serve as discussant for the group and will seek to organize conversation around a series of themes – and will call upon each member of the panel to cite specific examples from their own experiences.

### **Importance**

The discussion themes for the panel will include an examination of the relative learning curves, accuracy, and costs of digital vs. paper-based data collection methods, relative differences in data output and subsequent options for analysis, and the resulting strengths and limitations of both modes of data collection. The panel will examine contexts in which each mode of data collection would be advantageous and we will discuss strategies for selecting the best mode of data collection in a variety of different scenarios. By calling upon examples from personal experiences, this panel hopes to foster open and honest discussion about conditions where each type of data collection may be best-suited and seeks to establish a platform from which the field of visitor studies can continue to evolve its data collection practices while staying true to the sound methodological base on which they have been built.

### **References**

Serrell, B. (1998) *Paying Attention: Visitors and Museum Exhibitions*. American Association of Museums.

Yalowitz, S. S., & Bronnenkant, K. (2009). Timing and tracking: Unlocking visitor behavior. *Visitor Studies*, 12(1), 47-64.

Doering, Z. D., & Pekarik, A. J. (1997). Why time is not quality. *Curator: The Museum Journal*, 40(4), 249-252.

## **Additional Links**

Examples of Beverly's Recent Work:

Report on evaluation of "Ocean Bound" Exhibit at Sciencenter

[http://informalscience.org/images/evaluation/OCEANBOUND\\_SummativeReport2012.pdf](http://informalscience.org/images/evaluation/OCEANBOUND_SummativeReport2012.pdf)

Report whole-museum stay-time study for the Natural History Museum of Utah

<http://www.serrellassociates.org/pdf/4-NHMU%20Stay-Time%20Study%20Report%20FINAL%206.29.12%20copy.pdf>

Examples of Camellia's Recent Work:

Summary of 1863 Civil War Journey Report for the Connor Prairie Interactive History Park

<http://rockman.com/projects/projectDetail.php?id=290>

Examples of Steven's Recent Work:

Asian Art Museum – Whole Visit Study is included within this set of project summaries

<http://www.audienceviewpoints.com/projects2/>

## **Creating Organizational Change through Embedded Evaluation**

### **Panelists**

Andy Aichele, Director of Human Capital Development: COSI

Rita Deedrick, Director of the Center for Research and Evaluation: COSI

Joe E. Heimlich, Ph. D., OSU Extension @ COSI

E. Elaine T. Horr, Ph. D., Center for Research and Evaluation Associate: COSI

### **Purpose**

Science centers and other informal learning environments have long implemented evaluation as an important tool in developing and measuring impacts of exhibits and experiences within their institutions. How can evaluation be used to affect change in an institution beyond a single exhibit or experience? How can organization-wide change occur without a large evaluation staff? This session begins with an exploration of COSI's use of embedded evaluation to build the institution's capacity – not for evaluation skills per se – but for evaluative thinking and organizational change. This session will present "embedded evaluation" from three perspectives: exhibition development and project management; culture shift and organizational development; and evaluation capacity. The session will then engage the audience in discussion of how they might envision the role of embedded evaluation in capacity building in their organizations.

### **Panelists' Perspectives**

Andy Aichele, COSI's Director of Human Capital Development, will moderate the panel discussion and facilitate the dialogue with the audience at the end of the session. Panelists for this session are E. Elaine T. Horr, Center for Research and Evaluation Associate at COSI, presenting how the embedded evaluator role led to project management and culture change at COSI; Joe E. Heimlich, OSU Extension@COSI, explaining the culture shift and organizational development that can result when evaluation becomes expected practice; and Rita Deedrick, Director of COSI's Center for Research and Evaluation, exploring the process of building evaluation capacity within an organization.

### **Importance**

Many organizations may have either a very small number of staff dedicated to evaluative work or even no staff to take on evaluation projects. In these cases, training non-evaluative staff to carry on basic evaluative work can help build the capacity within the organization for evaluation skills. However, staff are sometimes resistant to embracing evaluation as a useful tool due to not understanding why, when,

and how evaluation can be utilized in various projects. COSI found that having an evaluator embedded as an integral part of the team during a 29-month long exhibition development project resulted in the evaluator becoming part of the system rather than just the evaluator assigned to the project. For some members of the project team an attitude shift regarding the role of evaluation in a project occurred, resulting in building capacity for evaluation, experiencing cultural shift, and ultimately organizational change.

## **Creating Systems that Support Evaluation of Institutional Outcomes**

### **Panelists**

Claire Thoma, The Children's Museum of Indianapolis

Elee Wood, Indianapolis University-Purdue University Indianapolis and The Children's Museum of Indianapolis

Sheila Brommel, Minnesota Historical Society

Erica Orton, Minnesota Historical Society

### **Purpose**

Interest in undertaking evaluation continues to grow, but museums and informal learning institutions often struggle to figure out where to start. Between the daunting task of identifying goals and outcomes for every exhibit and program and the challenge of relating findings from one evaluation to a new project, the will to evaluate can be defeated. The Minnesota Historical Society and the Children's Museum of Indianapolis have found success in overcoming many of these obstacles and through the adoption and use of goals and outcomes at the institutional level.

Panelists will describe how the identification of institutional outcomes has catalyzed the creation of systems that support evaluation—including coordinating program and exhibit development, generating staff buy-in, building evaluation tools, and reporting findings. Panelists will present examples that highlight both successes and challenges and will invite participants to discuss whether these or similar models could be useful for their own institutions or clients.

### **Panelists' Perspectives**

Sheila Brommel and Erica Orton will describe the process of creating institutional logic models at the Minnesota Historical Society, some examples of ways they have supported evaluation efforts, and their use to program staff. Three years ago, the Minnesota Historical Society, which manages 26 different historic sites and museums, created an institutional logic model to define and guide the work of the entire institution and then developed over 140 complementary logic models for each division, department, program and project at a more specific level.

The organization's logic model has recently been helpful in standardizing a school field trip survey for use across 15 different sites. While the large team of program managers could agree on four skills of 21st century learners as desired outcomes (communication, creativity, collaboration and critical thinking), it was much more difficult to reach consensus on other outcomes when designing the survey instrument. The evaluation team struggled to accommodate the specific survey questions of all 15 sites, but ultimately was able to re-focus on the institutional and program outcomes identified in the logic models to help guide the development of survey questions. This example illustrates how the use of logic models has led to consensus and the ability to standardize the evaluation of one program across multiple sites. The logic model framework has provided a common language that all staff can understand and adopt.

Claire Thoma and Elee Wood will describe the framework the Children's Museum has adopted, the systems developed to support its widespread implementation, and the ways in which those systems have also contributed to institutionalizing the evaluation process. About 10 years ago, the Children's Museum of Indianapolis adopted "Family Learning" as the educational framework to support all visitor experiences. Over several years, researchers within the organization developed appropriate definitions of family learning and identified behaviors indicative of family learning. Once in place, planning for these behaviors was incorporated into the Exhibit Development process as a standard section of the logic model developed for each exhibit component.

In more recent years, the logic model, including planning for family learning, has been successfully expanded into all Interpretation programming, from scripted museum theatre performances to informal conversations with visitors. Planning for specific family learning behaviors has allowed staff in the Interpretation department to evaluate the success of their interactions with visitors in common terms across galleries. For example, a large-scale evaluation started in the summer of 2011 revealed the areas in which gallery hosts were excelling and the areas in which there was room for improvement. Managers subsequently developed a series of all-staff trainings targeted at increasing staff knowledge of particular interpretation strategies. The findings of the following summer's evaluation showed remarkable increases in the frequencies with which the targeted family learning behaviors were observed.

Currently work at The Children's Museum focuses on extending the family learning model to the Collections Department. Staff members are developing an instrument to rate the family learning potential of artifacts, which will help inform many decisions about collection care and artifact display. One limitation of focusing on visible evidence of family learning is that it does not capture content-specific learning in a given exhibit or program, but it does provide a basis upon which exhibits or programs can be compared regardless of their topic. This has proved helpful in generating staff buy-in for evaluation by more clearly identifying successful methods and strategies that can be applied to future projects.

### **Discussion questions**

"What do attendees find appealing or problematic about these institutional models?"

"What might institutional outcomes look like at your museum or for your clients?"

### **Importance**

More museums and informal learning organizations are seeking to institutionalize evaluation and measure their mission impact, and the adoption of institutional outcomes can support both efforts. Although the development of institutional outcomes and the transition to their consistent use is a lengthy process, the effort offers long-term benefits to organizations.

Both the Children's Museum of Indianapolis and the Minnesota Historical Society have found that institutional outcomes have catalyzed the development of systems that support both the process of experience development and the process of evaluation. Benefits have included the standardization of evaluation terms, expectations, and processes for all staff (not just those responsible for evaluation), and the identification of common data that can be collected across departments, projects, and sites over time.

## **Additional Links**

[Minnesota Historical Society Mission and Vision](http://www.mnhs.org/about/mission)

<http://www.mnhs.org/about/mission>

[Minnesota Historical Society Evaluation Capacity Building Documentation and Resources](https://www.wilder.org/redirects/MinnesotaHistoricalSocietyEvaluationCapacityBuilding.html)

<https://www.wilder.org/redirects/MinnesotaHistoricalSocietyEvaluationCapacityBuilding.html>

[The Children's Museum of Indianapolis Mission and Vision](http://www.childrensmuseum.org/about/mission)

<http://www.childrensmuseum.org/about/mission>

Article describing some of the research on and application of the family learning framework

[Wolf, B. & Wood, E., \(2012\). Integrating scaffolding experiences for the youngest visitors in museums](#)

[Journal of Museum Education. 37\(1\), 29-38](#)

[http://museumeducation.info/wp-content/uploads/2011/07/Integr\\_scaffold\\_experiences.pdf](http://museumeducation.info/wp-content/uploads/2011/07/Integr_scaffold_experiences.pdf)

## **Developing the Evaluator Pipeline: A look at teaching visitor studies**

### **Panelists**

Angelina Ong, Principal, Spotlight Impact, LLC

Jill Stein, Senior Research Associate, Lifelong Learning Group

Elee Wood, Director of Museum Studies, Associate Professor and Public Scholar, IU School of Liberal Arts

### **Purpose**

The pathways that lead VSA members to their work is not always straightforward. Many learned to conduct evaluation through practice rather than taking academic courses. Others were trained as academic researchers who found their way into museum work, while some continue to work in academic settings preparing new professionals. As the field evolves and more “evaluator” and “audience research” positions become permanent fixtures in informal learning settings, there is a growing need to develop skilled visitor studies professionals. Unfortunately, there are few opportunities to cultivate these types of professionals within the industry. In an effort to ‘fill the gap,’ dozens of university Museum Studies and Museum Education programs have expanded over the past decade to include courses aimed at teaching the fundamentals of audience research and creating opportunities for practice. This session takes a closer look at how students are being prepared; compares teaching strategies; and discusses applied training programs.

### **Panelists' Perspectives**

Over 100 universities across the United States offer Museum Studies or Museum Education programs, yet fewer than half offer courses or concentrations in audience research and evaluation. However, unlike traditional museum disciplines (e.g. collections management, curatorial, exhibit design) there are few standards by which to craft a visitor studies curriculum. Universities often design courses based on faculty strengths, academic focus, and geographic resources. In 2008, VSA introduced evaluator competencies, but these were geared toward ongoing professional development. While it is a notable trend that many VSA members are teaching courses in visitor studies and audience research, this may not be a guarantee that there is consistency on how they choose to teach their classes, the skills they choose to emphasize, and the applied opportunities they offer.

Three panelists representing different museum studies programs across the country will provide information from a field-wide survey of programs, including: 1) An overview of programs that feature visitor studies and evaluation as courses or concentrations. 2) A survey of the key concepts, readings, and practices of visitor studies/audience research courses. 3) A discussion of preparation and applied training opportunities and the implications of the training on knowledge and skill development.

### **Importance**

The variability in entry-level professional training has a direct impact on the capacity of individuals, organizations and the field as a whole. As employers and managers, understanding the diversity of existing visitor studies training can assist us in making informed hiring decisions as well as helping us define appropriate career opportunities and pathways for our staff. As practitioners and peers, a better understanding of the competencies of those we work with enables us to support and cultivate a robust field. As a professional association it gives us the opportunity to shape what we believe to be important foundational skills and knowledge for new and emerging professionals in visitor studies and audience research.

## **Evaluation Capacity Building Models for Non-Evaluator Museum Professionals**

### **Panelists**

Sarah Cohn, Science Museum of Minnesota  
Juli Goss, Museum of Science  
Marley Steele Inama, Denver Zoo  
Nathan Richie, Golden History Museums  
Anna Lindgren-Streicher,

### **Purpose**

An increasing number of evaluators are training or mentoring practitioners in evaluating their own programs or practices. This session will highlight four diverse evaluation capacity building (ECB) efforts in national and regional networks, divisions within an institution, and a single project across multiple institutions. Each panelist will present on a project and discuss:

- The goals and purpose of their ECB efforts
- How partners were recruited or selected
- The professional development approach
- Ongoing mentoring and support
- Evaluation of the ECB efforts
- Reflections on challenges that emerged throughout the process

Following the brief presentations, ample time for small group discussion will allow participants to switch tables and engage in deeper discussion about more than one project as well as share their own experiences.

### **Panelists' Perspectives**

Sarah Cohn will share the team-based inquiry (TBI) process, developed by the Nanoscale Informal Science Education Network. TBI is designed to help professionals use data to improve their products and practices, foster effective teams and learning organizations, and build capacity to conduct front-end and formative evaluation.

Juli Goss will discuss the work of evaluators at the Museum of Science who have used TBI with educators to investigate educational programs. Each team develops their own questions, collects data, and reflects as a group with the support of a professional evaluator.

Marley Steele Inama and Nathan Richie will discuss the Denver Area Evaluation Network (DEN), which began with local museum professionals who were interested in evaluation, although most had little to no experience. The group has since conducted pan-institutional studies and has established itself as 15 diverse and committed cultural through a variety of ECB activities.

Anna Lindgren-Streicher will share how the National Living Lab project has trained educators at multiple national institutions to conduct formative evaluation of their efforts for one specific national project. Evaluators developed instruments and training materials for educators at multiple museums, conducted on-site training, and guided the data analysis process.

### **Importance**

More evaluators are training or mentoring practitioners in evaluating their own programs or practices, and such efforts have attracted the attention of federal funding agencies, as shown by the IMLS grant received by DEN. It is critical that as these efforts expand, successes and lessons learned in evaluation capacity building in museums and cultural institutions are shared. This session will share knowledge gained from four diverse evaluation capacity building projects. Tools and training approaches developed will also be shared.

In addition to presenting on their own projects, panelists will facilitate small-group discussion amongst attendees to learn more about the projects presented, as well as share their own experiences with or questions about leading ECB projects.

### **Additional Links**

NISE Network Team-Based Inquiry guide

[http://nisenet.org/catalog/tools\\_guides/team-based\\_inquiry\\_guide](http://nisenet.org/catalog/tools_guides/team-based_inquiry_guide)

National Living Laboratory project

<http://livinglab.org/>

## **“Everything Looks Different!”: Embracing complexity in multi-sited projects**

### **Panelists**

Jill Stein, Lifelong Learning Group (discussing Native Universe)

Dr. Shelly Valdez, Native Pathways (discussing Native Universe)

Dolly Hayde, Lifelong Learning Group (discussing Worldviews Network)

Dr. Cecilia Garibay, Garibay Group (discussing Girls RISEnet)

Juli Goss, Museum of Science (discussing NISE Net)

### **Purpose**

Through conversations with other visitor studies professionals, participants in this session will learn and discuss practical strategies for working across locations. Our goal for this session is to combine the range of a panel with the informal knowledge-sharing of a roundtable discussion. Each presenter will help define the boundaries of “multi-sitedness” and frame key issues of complexity with a project example. Participants will then break into discussion groups informed by audience interests and spend thirty minutes in facilitated discussion with presenters and each other. The session will close with a debriefing conversation in which small groups report back and voice any emergent questions. As we

work to articulate this area of focus in more detail, our collective questions include the following:

- What areas of complexity are particular to multi-sited projects?
- To what degree and in what ways are strategies for dealing with complexity affected by the number of project sites?

### **Panelists' Perspectives**

This session grew out of a need to study connected programs while honoring the differences of partner organizations. Presenters will demonstrate how issues of complexity have emerged across sites (e.g., in evaluating a program's implementation across multiple museums or measuring impact on professionals who participate in varying roles). This exploratory conversation is intended to articulate and clarify some of the emerging needs associated with this work.

Stein and Valdez will discuss insights gained through using their collaborative evaluation process and questions of how multiple worldviews help us rethink the purpose, approaches, and goals of evaluation.

Hayde will discuss strategies for analyzing divergent yet connected data across a network, focusing on the particularity of nine institutions' individual contributions to a whole.

Garibay will describe the process of evaluating a unified model of training, institutional partnership, and financial support across many regionally distributed organizations.

Goss will share efforts used to strategically sample and capture the wide range of professional experiences across a very large network of practitioners.

An emphasis on discussion will allow participants to elicit detail about projects as needed, but will also maximize the opportunity for visitor studies professionals to learn from both presenters' and attendees' experiences with multi-sited projects.

### **Importance**

As institutions and organizations join forces to promote broad initiatives across multiple contexts and audiences, the issue of how to conduct research and evaluation for large-scale projects has emerged as an increasingly critical area of inquiry for visitor studies professionals. In contrast to smaller studies that can usually assume a relatively consistent institutional context, multi-sited projects present unique insights and challenges for researchers, particularly when activities and resources change as they extend across and between partner spaces. Our experiences with multi-sited studies suggest that realistic answers to complexity depend on systematic yet flexible strategies throughout all stages of project work. Meanwhile, multi-sited projects create new opportunities for us to reflect on our practices and rethink evaluation approaches and strategies within these complex and diverse environments. This conversation is intended to support professional capacity by promoting knowledge-sharing about informal learning environments (Competency B) and research and evaluation practice (Competency C).

## **Additional Links**

Native Universe

<http://indigenousedu.org/native-universe/>

Worldviews Network

<http://worldviews.net/>

Girls RISEnet

<http://www.girlsrisenet.org/>

NISE Net

<http://www.nisenet.org/>

## **Explore the BISE Database of Evaluation Reports from [informalscience.org](http://informalscience.org)**

### **Panelists**

Amy Grack Nelson, Science Museum of Minnesota

Sarah Cohn, Science Museum of Minnesota

Zdanna Tranby, Science Museum of Minnesota

### **Purpose**

The Building Informal Science Education (BISE) project spent the last three years coding all of the evaluation reports on [informalscience.org](http://informalscience.org). During this session, we'll describe how we created our coding framework and some of the ways people have used our database. The bulk of the session will be dedicated to familiarizing people with the freely available resources from our project. The resources include: 1) a coding framework for informal education evaluation reports; 2) an NVivo database with over 500 reports that are coded based on our framework; 3) a spreadsheet which includes some of the information in the NVivo database to provide an additional way to search the coded reports; 4) a zip file with all the reports included in the database; and 5) an Endnote file with citation information for all of the reports. Attendees are encouraged to bring a laptop with NVivo installed (free trials are available online).

### **Panelists' Perspectives**

Within the field of evaluation, there are a limited number of places where evaluators can share their reports. We are fortunate that one such resource exists in the informal learning community – [informalscience.org](http://informalscience.org). [Informalscience.org](http://informalscience.org) provides evaluators access to a rich collection of reports they can use to inform their practice and learn about a wide variety of methods and measures used in evaluating informal education projects. In 2010, the National Science Foundation funded the BISE project to investigate how the rich collection of evaluation reports on [informalscience.org](http://informalscience.org) can be used to advance understanding of evaluation of informal science education projects. BISE is a collaborative effort between the University of Pittsburgh Center for Learning in Out of School Environments, the Science Museum of Minnesota, and the Visitor Studies Association. The project produced an extensive coding framework for analyzing the reports and commissioned five authors to produce synthesis papers, which exemplify what can be learned from such a rich resource.

### **Importance**

In the field of informal education, evaluation represents a sizable investment of time, money, and intellectual energy. But despite these hundreds of studies, we often hear the complaint that we don't know much about informal learning. What could we learn about the field of informal education if we turned back to a large collection of evaluation reports and conducted a secondary analysis of how evaluators have studied the field, what they have found, and what they recommend for future work? These are critical questions that Visitor Studies professionals can address through access to the BISE

resources. In addition to answering questions about informal learning, the BISE resources will be highly valuable to evaluators who want to learn more about evaluation practices in the field and find examples to inform the design of their own evaluation studies.

### **Additional Links**

Check out the monthly Building Informal Science Education blog posts  
<http://informalscience.org/perspectives/blog/category/32>

## **Exploring Varieties of Visitor Engagement**

### **Panelists**

Minda Borun, Director of Research and Evaluation, The Franklin Institute Science Museum,  
Address: 222 N. 20th Street, Phila. PA 19103  
Phone: 215.448.1103 Fax: 215.448.1188  
Email: mborun@fi.edu

Ellen Giusti, Evaluation Consultant  
Address: 1125 Park Ave., NY, NY 10128  
Phone: 212.876.1425 Fax: 212: 427.7142  
Email: egiusti@nyc.rr.com

Stephen Bitgood, Professor Emeritus  
Address: PO Box 556, Cropwell, AL 35054.  
Phone: 256.591.1325  
Email: steveb@jsu.edu

### **Purpose**

After nearly 90 years of Visitor Studies, fundamental information has yet to be uncovered about how audiences engage with our exhibits and programs. To some extent, we have fallen into a groove of repeatedly asking similar questions about dwell time, content learning, and affective impact as we vary the exhibit or program. But there are new questions to ask and new approaches to answering them.

Capturing attention is relatively easy; engaging or holding visitors' attention is more difficult. Failure to engage is not solely due to visitors' choice of content and pre-visit agenda or "identity." The museum experience can alter this agenda. This session explores factors that influence visitor engagement from psychological considerations, to longitudinal effects, to patterns of group composition. Panelists will introduce approaches to the study of visitor engagement based on data from their research.

### **Panelists' Perspectives**

Bitgood will offer a conceptual framework for understanding three stages of an attention continuum: capture, focus, engage. Each stage entails a unique combination of response measures and variables that influence these responses. While there are many ways to facilitate engagement, this presentation will examine research projects in which visitor engagement was prompted by exhibit design techniques.

Giusti will discuss the long-term impact of a weekly science program at the American Museum of Natural History on children and parents who participated for several years. Results of this 15-year retrospective study suggest that the program influenced memories of museum experiences, structure and goals of family visits, as well as family participation in other activities. The program fostered an enduring connection with the Museum among participating families.

Borun explores a new way of tracking and timing visitors in exhibition galleries. Until now, we have focused on easily observed single visitors or dyads. But, our audience visits the museum in family and school groups. How much time do groups remain intact and how much do they disperse? How do demographic factors affect these patterns? Borun will report on a four-observer study in which multiple subgroups were tracked simultaneously with synchronized stop.

### **Importance**

Before museum-based learning or inquiry is possible, visitors' attention must be deeply engaged. Panelists will summarize their research. They will then invite audience members to share stories of their own experiments with novel ways to engage visitors. Without engagement our efforts at creating extraordinary exhibitions and programs are in vain. This session will help exhibition developers, educators, designers, and administrators understand how to communicate with museum visitors.

### **References**

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- Yalowitz, S. and Bronnenkant, K. (2009). "Tracking and Timing: Unlocking Visitor Behavior." *Visitor Studies* 12(1), 47-64.

## **Growing Up Isn't Easy: Developing Systems to Grow Institutional Capacity**

### **Panelists**

Lindsay Maldonado, John G. Shedd Aquarium  
Joy Kubarek-Sandor, John G. Shedd Aquarium  
Nicole R. Rivera, North Central College

### **Purpose**

This session will explore three approaches for building capacity to do institution-wide research and evaluation at Shedd: 1) partnerships with universities and local research networks 2) volunteer recruitment and training 3) implementation of empowerment evaluation for internal education staff. These approaches are developing into an institution-wide model for building research and evaluation capacity, and can be used together or individually in other organizations. A representative from North Central College will discuss the benefits of partnering with Shedd to create opportunities for students and the informal learning environment as a learning laboratory. Finally, this session will discuss the feasibility of such a model across institutions, ways to further engage partners in building institutional capacity, and how to best integrate evaluation into the program development process while empowering staff.

### **Panelists' Perspectives**

Thanks to the efforts of many within VSA and other similar organizations, we, as a research and evaluation community, recognize the importance of understanding the guest experience and documenting effective strategies for doing so. Whether establishing a new program or, as in the case of Shedd Aquarium, looking to expand the reach of a well-established program, resources are always limited. Building institutional capacity became an important goal at Shedd as we strived to increase our understanding of our diverse audiences and the equally diverse experiences they have with us. The associated challenge was finding ways to grow research and evaluation within Shedd but also maintaining the quality of our work. In order to do so we used three approaches for building capacity to do institution-wide research and evaluation at Shedd: 1) partnerships 2) volunteer recruitment and standardized training protocols and 3) implementation of empowerment evaluation for internal education staff. These approaches are developing into an institution-wide model for building research and evaluation capacity, and can be used together or individually in other organizations. From the college perspective, we will discuss partnerships that afford students important opportunities to learn about research and evaluation practices through volunteering, internships, and developed research studies.

### **Importance**

With growing interest in understanding our audiences, institutions like Shedd have had to increase their internal capacity to conduct evaluation work. However, increased need does not mean increased resources, which means institutions must formulate creative solutions to the increased demand for evaluation while also maintaining high quality work. This topic links to the conference theme by presenting Shedd's model for building institutional evaluation capacity by taking advantage of an existing volunteer program, leveraging internal resources, and developing external partnerships with local universities. Higher education partnerships extend capacity building beyond the walls of the institution and help foster student development. Additionally, external research networks like the Chicago Cultural Organizations Research Network establish the notion that academics and internal researchers could partner to achieve mutually beneficial goals. These approaches can be utilized by other institutions together or individually to meet growing demands for understanding audiences that visit and participate in programs.

## References

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Fetterman, D. M. (2001). *Foundations of empowerment evaluation*. Thousand Oaks, CA: Sage.

## Additional Links

Shedd Aquarium  
[www.sheddaquarium.org](http://www.sheddaquarium.org)

North Central College  
<https://northcentralcollege.edu/>

## Math Engagement in Exhibits: What are we learning?

### Panelists

Scott Pattison, Oregon Museum of Science and Industry  
Josh Gutwill, Exploratorium  
Cecilia Garibay, Garibay Group  
Andee Rubin, TERC

### Purpose

This session will explore findings from two recent, NSF-funded math exhibition projects—Geometry Playground and Access Algebra—that are helping us understand what math engagement looks like in designed informal learning environments, salient characteristics of mathematical conversations that foster mathematical reasoning, and strategies for assessing math engagement. Drawing from evaluation and research studies of these two exhibitions, presenters will: a) examine the ways and extent to which these exhibits fostered mathematical reasoning; b) describe exhibit design strategies to engage visitors in mathematical reasoning and link these strategies to study results; and c) discuss the evaluation and research strategies used to measure math engagement. These presentations will serve as a launching point for a group discussion of the field's understanding of mathematical reasoning in museums, promising approaches for measurement and evaluation, and next steps for exhibit and program development and research.

### Panelists' Perspectives

During the session, Pattison will introduce the topic and frame the key issues, including what we know about fostering and measuring math engagement in designed informal environments. Gutwill and Garibay will then present results from two projects, Geometry Playground and Access Algebra. Finally, Rubin will provide commentary to initiate a group discussion around the topics outlined above.

The Geometry Playground project (<http://www.exploratorium.edu/geometryplayground/>), led by the Exploratorium, sought to help visitors practice spatial reasoning skills, including “understanding, manipulating, reorganizing, or interpreting relationships visually” (Tarte, 1990). Research and evaluation studies explored visitors' mathematical engagement at the exhibits and compared spatial reasoning at immersive and tabletop exhibits. Similarly, the Access Algebra project (<http://www.designzoneexhibit.org/>), led by the Oregon Museum of Science and Industry (OMSI), focused on developing and testing effective strategies for informal family math learning in exhibitions. The project produced Design Zone, a 6,000-square-foot traveling exhibition, designed to engage visitors in algebraic reasoning, a type of mathematical inquiry (NCTM, 2008). Summative evaluation and video studies investigated visitors' engagement with algebraic reasoning, while a follow-up NSF-

funded research study is currently exploring how museum education staff can support math discourse at interactive exhibits.

### **Importance**

Most of what is generally recognized as “mathematical reasoning” takes place in school and a large literature exists on mathematics education in the classroom (NRC, 2005). There is also a small, but growing body of work describing the mathematical thinking that takes place in everyday settings, including homes, stores, employment, and sports (e.g., Goldman & Booker, 2009; Nasir, 2000; Nunes, Schliemann, & Carraher, 1993; Taylor, 2009). There have been only a few studies, however, of mathematical reasoning in non-school settings, such as museum exhibitions. Sharing elements of classroom and everyday contexts, exhibitions have the potential to support rich mathematical learning that builds on individuals’ prior knowledge and experiences. To capitalize on this potential, more work is needed to understand what types of mathematical reasoning are possible in museums, how this reasoning can be measured, and how exhibits can best support mathematical engagement.

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- Taylor, E. (2009). The purchasing practice of low-income students: Relationship to mathematical development. *The Journal of the Learning Sciences*, 18(3), 370–415.

## **Research Agendas and Field-Wide Capacity Building**

### **Panelists**

Jamie Bell, Center for the Advancement of Informal Science Education (CAISE)  
Joe Heimlich, OSU Extension (OSUExtension@COSI)  
Jessica Luke, Museology Graduate Program, University of Washington

### **Purpose**

A growing number of research agendas are under development across informal learning sectors. Why are these research agendas being created, for whom, and what role can they play in building field-wide capacity for research and evaluation? Panelists will explore these issues within the context of three specific research agenda efforts being developed by the Center for the Advancement of Informal

Science Education (CAISE), the Association of Zoos and Aquariums (AZA), and the Association of Children's Museums (ACM).

### **Panelists' Perspectives**

A growing number of research agendas are under development across informal learning sectors. For the most part, these projects seek to identify and prioritize sector-wide research questions that will inform and strengthen practice, decision-making, and knowledge generation within the sector.

This session explores the issues of capacity building in the context of three case studies. Jamie Bell will present CAISE's Practice-and-Research "Roadmap" process. Joe Heimlich will present AZA's Framework for a Research Agenda and initial studies to inventory the field. Jessica Luke will present ACM's "Building a Practicing Research Network in the Children's Museum Field." Participants will then join one of three small groups, facilitated by presenters, to engage in dialogue about issues of capacity building across these research agenda projects. Discussion questions will include but not be limited to: In what ways do these research agendas potentially build field-wide capacity for research and evaluation? For whom do they/should they build capacity? In what ways might these research agendas limit the capacity for research and evaluation? What infrastructure/resources should accompany these research agendas in order to successfully build capacity? Who is best positioned to create and maintain such infrastructure?

### **Importance**

The process of creating research agendas is necessarily complex. Many of the projects described above have struggled with important issues such as how to navigate competing priorities when determining research questions, what the "grain size" of the questions should be, who should be involved in determining the questions, how the resulting research agenda should be disseminated, and how the agenda is ultimately "populated" moving forward to inform the field. Key to many of these issues is the theme of capacity-building, and the role that these research agendas can play in enhancing research and evaluation practice across the field. This discussion will work to cross-map issues and ideas such that they might inform research agenda efforts moving forward; notes from the session will be shared with participants.

## **Research on Organizational Change In and Across Science Museums**

### **Panelists**

Marjorie Bequette, Science Museum of Minnesota  
Marta Beyer, Museum of Science, Boston  
Cecilia Garibay, The Garibay Group, Chicago, IL  
Steven Guberman, Science Museum of Minnesota  
Stephanie Iacovelli, Museum of Science, Boston  
Scott Pattison, Oregon Museum of Science and Industry  
Christine Reich, Museum of Science, Boston

### **Purpose**

There are several trains of thought on the possibility for and nature of change in museums but few empirical studies of the specific contexts and practices that facilitate or derail change. So, what constitutes change in our field? What circumstances can lead to meaningful change in individual organizations and across the field in general? In this session, we will offer three theoretical perspectives on organizational change in and across museums and present case studies of the circumstances that facilitated or deterred change in a variety of informal science education

organizations. The session will integrate participant questions and experience with putting change into practice and encourage reflection on future directions for innovation and change in museums.

### **Panelists' Perspectives**

Christine Reich will present a study that examined how three science museums learned to be more inclusive of people with disabilities. Change toward inclusion was not a one-time endeavor or the purview of a particular individual, but an on-going process embedded within many areas of the organizations. She presents specific actions that science museums can take to facilitate inclusion. Steven Guberman, Marta Beyer, and Stephanie Iacovelli are investigating how affiliation with the NISE Network—a national community of researchers and educators dedicated to fostering public understanding of nanoscale science—leads to changes in museums' practices. Case studies of six science museums reveal the conditions that facilitate or impede the influence of new practices within the network's partner organizations. Marjorie Bequette and Scott Pattison will focus on change across institutions that make up the NISE Network. They will present findings from a study of how practices to build evaluation capacity have been introduced and fostered throughout the network, and on the conditions that foster or impede that process. Cecilia Garibay, the discussant, will begin the session by introducing key concepts and questions. Following the presentations, she will offer remarks about the studies and lead a question-and-answer session with the audience.

### **Importance**

Building museums' capacity for evaluation will require changes at many levels, from the development of practitioners' research skills to institutional and field-wide commitment to using evaluation to improve practice. But museums, as institutions founded for purposes of collecting and preserving, are not known as being responsive to change. In fact, change in museums has been described as a traumatic event that cuts at the very fabric of who these institutions perceive themselves to be. However, as radical shifts in media, information sharing, recreational trends, and demographics threaten traditional museum models, talk of innovation and institutional change has become ubiquitous in museums and other cultural institutions. This session presents findings from three research projects examining organizational change in science museums.

## **Strategies for Professionalizing the Field of Visitor Studies**

### **Panelists**

Larry Bell, Museum of Science, Boston  
Rich Bonney, Cornell Laboratory of Ornithology  
Barbara Butler, Retired, National Science Foundation

### **Purpose**

This session will focus on various means to professionalize the visitor studies field. Although the work of informal learning evaluators is not wholly comparable to that of those in fully professionalized fields such as medicine, law, architecture, and accounting, the visitor studies field embodies several elements of a profession. It has a professional organization (VSA), a professional journal, and an annual conference aimed at fostering a sense of community and providing opportunities for members of the field to learn from each other, and a robust continuing education component. What it does not have is a recognized professional credential. The outcomes of this session will be 2-fold. Participants will be able to form an opinion about VSA professionalization and VSA will be able to evaluate the current level of interest in some type of professional credential.

## **Panelists' Perspectives**

Over the last decade VSA has carried out activities to identify elements of a professional field: the cognitive base, ethical guidelines, and a registry system that would identify and recognize qualified professionals. The intellectual value and practical worth of visitor studies could be advanced if VSA members would collectively move toward adopting a credential. Not only would evaluators have more direction in planning their careers and be formally recognized, but those using the services of evaluators would have criteria and information beyond word of mouth in selecting an evaluator.

There are a variety of ways to confirm the professional knowledge, skills, and behaviors of professionals. Fields that are regulated by *licenses* include medical personnel, lawyers, teachers, engineers, social workers, architects, certain tradesmen, and service industry workers. Licensing may include a written examination and/or several years of field experience. Certificates are often issued by a professional organization or an educational institution to recognize the successful completion of a particular course of study and attainment of a level of proficiency. A registry is a list of persons who have demonstrated a minimum level of skills, training, or experience as recognized by the registering organization.

## **Methods**

Five components of a registry system were developed during the NSF planning grant and subsequent supplement. They included a *guide to the administration and management of a registry system*, a *self-study guide for visitor studies professionals*, an *outline of evaluator competencies*, a *register application form*, and a *guide for reviewers of applications*. Also included was a professional code of ethics. This work was carried out from 2004 - 2008 during which meetings of an eight-person project team developed the above-mentioned materials and prepared a set of financial models to support the program. Six VSA members volunteered to complete sample registry application forms and a 3-person review panel read the applications and tested the review protocols. The results were presented to the VSA Board in 2008. All the materials were set aside for future consideration, except for the Evaluator Competencies for *Professional Development*, which were posted on the VSA website.

## **Importance**

VSA has not implemented the proposed registry of evaluators or any means of formally acknowledging or identifying persons who call themselves or can be considered professionals in the field. We believe that it is possible and desirable to change that, and that the VSA is the formal organization best situated to effect the change. We further believe that it is time to revisit this approach to building capacity for the field, and we would like to review the competencies relevant to visitor studies work and advocate for the creation of an agreed-upon written body of professional standards and a process of formal credentialing within the VSA. As there already exists an array of written materials within the VSA archives on this topic, an initiative of this sort can proceed with the advantage of a substantial body of work already available.

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## ROUNDTABLES

### Evaluation Toolkits: Passing trend or promising progression?

#### Presenters

Joy Kubarek-Sandor, The Shedd Aquarium  
Ardice Hartry, The Lawrence Hall of Science, UC Berkeley

#### Purpose

Although it is widely recognized, particularly by evaluators themselves, that evaluation can help improve programs, not all programs have the capacity to fund high-quality evaluations. This roundtable discussion will ask how toolkits, like the ones being created independently by both presenters, can benefit members of VSA. We will explore questions such as: How can evaluators create and use toolkits to maximize effectiveness to move people, organizations, and professions forward? For those already using toolkits for evaluation capacity building, this provides an opportunity to share, compare, and bounce ideas off one another. For those new to evaluation toolkits, discussion may serve as a springboard to a new approach or collaboration. For researchers and evaluators skeptical of toolkits, honest discussion and feedback allows roundtable participants to understand challenges and alternatives.

#### Perspectives

In the evaluation profession and culture, words trend as often as celebrities. One buzz-worthy term of late is “evaluation toolkit.” Evaluation toolkits pertain to all 2014 VSA questions for the field: a new method to increase capacity; a path to build institutional culture of evaluation; a support for evaluation at every stage of development. Both presenters are currently involved with the creation of toolkits for evaluations. Over the past 18 months, Shedd Aquarium has created, piloted, and refined an evaluation toolkit. The aquarium has a history of dedicating time and resources to evaluation, yet given internal and external demands for evidence of learning, existing evaluation staff and resources could not cover all learning evaluation needs. Therefore, the evaluation toolkit, combined with an empowerment evaluation approach, was created and utilized to close the gap between evaluation best practices and realities of informal programming. Similarly, the Lawrence Hall of Science has recently received a grant from NSF to develop a toolkit that can be used in the evaluation of science learning experiences in a variety of settings, including museum, zoos, and aquaria. Both toolkits promise to benefit the field of evaluation and look to VSA members for comment and support.

#### Importance

Both presenters are developing instruments and toolkits that can benefit a number of potential audiences. Professionally-trained evaluators would have access to high-quality and validated instruments, allowing them to spend less time on instrument development and more time on collecting context-specific data and providing feedback to their clients. The toolkits will expand the capacity of small-scale organizations to collect, analyze, and interpret data, which, in turn, will enable them to improve their programs on an ongoing basis. It will also provide a way for non-evaluators to engage in the process of evaluation, building their own capacity. This means that under-resourced informal programs that offer science learning experiences –programs most likely to be attended by groups under-represented in science fields – will have access to a evaluation tools without requiring the investment in expensive technology or highly-trained personnel. Such toolkits can equal the playing field in evaluation and program improvement.

## Measuring 21st Century Skills in Informal Learning Environments

### Presenters

Amy Grack Nelson, Science Museum of Minnesota  
Emily Craig, Randi Korn & Associates

### Purpose

What are 21st century skills and how do I measure them? This question is becoming more and more common among evaluators in the Visitor Studies field. Much has been written about 21st century skills and their importance, but there are few tools and little guidance for measuring the skills. With the lack of guidance and measures, there is a need for professionals to discuss their experiences measuring the skills. This roundtable will provide evaluators an opportunity to do just that. In addition, evaluators who have not yet been asked to measure these skills will gain insight into how they might do so. The roundtable will begin with an overview from two evaluators working to find ways to measure 21st century skills in informal learning institutions. The roundtable will then provide a forum for evaluators to discuss strategies they've used, instruments they've found, and challenges they've encountered in measuring these skills.

### Perspectives

Amy Grack Nelson will share the beginnings of the NSF-funded project Collaboration in the 21st Century (C2C): Measuring Essential Skills for the STEM Workforce. Presently, evaluators that want to measure teamwork and collaboration skills in STEM out-of-school time programs have to develop their own instruments, modify existing instruments, or use ones that lack validity evidence for the population and/or context being studied. The C2C project is addressing this need by developing and validating instruments to measure these skills in a wide range of middle and high school STEM out-of-school time programs.

Emily Craig will share an impact framework Randi Korn & Associates developed to measure 21st Century Skills in the NSF-funded exhibition *Places of Invention*, from the Lemelson Center for the Study of Invention and Innovation at the Smithsonian's National Museum of American History. The impact framework has served as a guide throughout front-end and formative evaluation to recognize visitors' awareness of, attitude toward, and practice of 21st Century skills. Additionally, the impact framework will be used to create a scoring rubric to measure the impact of the exhibition on visitors' ability to draw connections between the skills used by inventors and the skills they use in their own lives.

### Importance

Although there is an increasing interest in developing 21st century skills through educational experiences, there is little guidance on how to measure these skills and few instruments exist to aid evaluators and researchers. Some publications have provided lists and reviews of available instruments specifically designed to measure one or a group of 21st century skills (National Research Council, 2011; The Forum for Youth Investment & National Collaboration for Youth Research Group, 2012; Wilson-Ahlstrom, Yohalem, DuBois, & Ji, 2011). However the range of instruments is lacking and there is a call both nationally and internationally to address this lack of measures (Griffin, McGaw, & Care, 2012; National Research Council, 2011, 2012; Partnership for 21st Century Skills, 2007). The lack of measures is even more pronounced for evaluations of informal learning experiences, making the roundtable conversation both timely and important.

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## Museums and Cultural Sustainability: Planning and evaluation

### Presenter

Theopisti Stylianou-Lambert, Cyprus University of Technology

### Purpose

This presentation identifies an area in which our field can grow by: (1) exploring the relationship between cultural sustainability, museums and evaluation and (2) offering a theoretical model for the sustainable development of museums. The presentation discusses how museums can respond to the evolving concepts of “sustainable development” (SD) and “cultural sustainability.” It argues that culture should be considered as an equal pillar of sustainable development along with the environment, the society and the economy, and as such, taken into consideration when designing any strategic plans or evaluating museums. Within a discussion of how museums can contribute to SD, a theoretical model for sustainable museums is offered for consideration. This theoretical model attempts to increase stakeholder understanding by placing museums at the heart of cultural sustainability.

### Perspectives

While there are recently a number of articles and conventions dealing with culture and SD, there is not much literature dealing specifically with museums and cultural sustainability, apart from perhaps some recommendations or best-practices for museums mainly generated from museum associations, organizations or scholars interested in ‘greening’ initiatives (e.g., Canadian Museums Association *n.d.*, Davies and Wilkinson 2008, Graham-Taylor 2003, Lord *n.d.*, Madan 2011).

In order to visualize the role of culture in SD when it comes to museums a proposed theoretical model is constructed which is based on the broad discussions of culture as a fourth pillar of SD, the recommendations of museum associations and the most recent debates regarding multiculturalism, inclusion and community participation. The construction of this theoretical model is informed by the discussions taking place during the European COST program “Investigating Cultural Sustainability” (2011-2014, [www.culturalsustainability.eu](http://www.culturalsustainability.eu)).

## **Importance**

The main contribution of this presentation is that it attempts to create a clear link between museums and cultural sustainability. The theoretical model helps museum professionals and evaluators understand and exploit those elements that will guarantee and reinforce cultural sustainability. After all, cultural sustainability is closer to the essence of museums and one of the best arguments that museums matter.

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## **Additional Links**

European COST program "Investigating Cultural Sustainability", 2011-2014  
<http://www.culturalsustainability.eu/>

## **An Open Discussion of Design-Based Research in Visitor Studies**

### **Presenters**

Scott Pattison, OMSI

Josh Gutwill, Exploratorium

Joyce Ma, Exploratorium

### **Purpose**

The visitor studies field has always drawn from other disciplines to develop tools and methodologies for understanding the complexities of informal learning experiences. Over the last 20 years, design-based research (DBR) has emerged as an important and influential research approach in the field of education, especially classroom studies (Kelly *et al.*, 2008). Museum and informal learning researchers, however, are just beginning to explore its utility for our own field. Many questions remain about the extent to which DBR is suited to informal learning research and visitor studies and the skills, knowledge, and capacity necessary for our field to engage authentically in this research approach. In this round table discussion, presenters and participants will share their experiences and discuss the opportunities and challenges associated with conducting DBR in museums and other informal learning environments.

## **Perspectives**

Design-based research (Brown, 1992; Cobb *et al.*, 2003; Collins *et al.*, 2004; Sandoval, 2013) is a broad research methodology loosely characterized by iterative cycles of research and design, investigations in authentic learning environments, the development and testing of theories and conjectures, and collaboration with practitioners (Cobb *et al.*, 2003; Collins *et al.*, 2004; Kelly *et al.*, 2008). Originally developed to study classroom learning (Brown, 1992), DBR emerged as a reaction to laboratory and experimental studies that, as DBR pioneers argued, strips the research of the complexity that is so central to education and may produce results that have little utility for practice. In contrast to these approaches, DBR explicitly acknowledges the complexities of learning and learning environments and uses a design-oriented approach to accomplish the dual goals of creating more effective educational tools and experiences and advancing theoretical models of education and learning (Cobb & Gravemeijer, 2008).

## **Importance**

DBR offers a potentially promising approach for visitor studies professionals to develop useful theories and educational strategies grounded in the realities of practice, connect researchers and educators in the joint enterprise of understanding and supporting learning, and broaden our field's capacities to conduct rigorous research using a variety of methodologies. During this round table session, presenters and participants will explore a variety of questions around DBR, including:

- What experiences have we had as a field using DBR to understand visitor learning and advance theory and practice?
- What do we believe is the utility of using DBR in visitor studies?
- How is DBR similar to and different from formative evaluation and other approaches common to visitor studies?
- What are the implications of the unique characteristics of museums and other informal learning environments for conducting DBR?
- What are practical tools and strategies for visitor studies professionals wishing to use DBR?

## **Using an Indoor Positioning System to Automate Visitor Tracking**

### **Presenter**

Joyce Ma, Exploratorium

### **Purpose**

Recent technological advances promise to increase the precision of indoor positioning systems (IPS) to allow us to better track objects and people inside buildings. For visitor studies, such systems have the potential to transform how we study visitors' museum experiences by automating the collection of timing and tracking data on a scale rarely attempted because of the large time and resource commitment required with current methods (Serrell & Adams, 1998 and Yalowitz & Bronnenkant, 2009). This roundtable presentation provides an opportunity to discuss the potential and pitfalls of using an indoor positioning system to automate the collection of timing and tracking data. Two case studies of IPS use will help illustrate and spark conversation about how this emerging technology may be used in visitor research and evaluation.

### **Perspectives**

To explore the challenges and promises of indoor positioning systems, the Exploratorium, in partnership with Qualcomm, is developing a prototype IPS that uses the museum's existing Wi-Fi infrastructure to track Wi-Fi enabled devices inside its museum walls. Through two use scenarios, we are exploring how this prototype system can be used to collect timing and tracking data for visitor

research. In the first case, we are attempting to use the prototype IPS to collect whole-visit tracking information with gallery-level resolution. In the second scenario, we are looking at how the system can capture movement within one gallery. This roundtable presentation describes the lessons learned to date in building, installing and tuning the system, in asking for visitor consent, and in processing and making sense of the data collected.

### **Importance**

In the 2013 Museum Edition of the NMC Horizon Report (Johnson, Adams Becker, & Freeman, 2013), the New Media Consortium identified indoor positioning as an emerging technology poised to change museums within two to three years' time. Although the discussion in the museum field has so far focused on its applications to programmatic offerings, IPS technology also has the potential to revolutionize visitor research and evaluation. This roundtable presentation begins the conversation about the appropriate use of indoor positioning systems with the visitors studies community by identifying how to leverage an IPS to collect and process timing and tracking data to better understand the visitor experience inside a museum's walls.

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## POSTERS

### **Full Spectrum Science: Successful Strategies in Engaging Latina Girls in STEM Programing**

#### **Presenter**

Ivel Gontan, Oregon Museum of Science and Industry  
*2014 April Award Recipient*

#### **Purpose**

This poster session showcases my masters project, which explores characteristics of science, technology, engineering, and math (STEM) programs demonstrated to be effective at targeting Latina girls. For this project, I wanted to find out what programatic considerations and organizational structures could support successful programs for underrepresented girl audiences. I was particularly interested in focusing my findings on STEM because women, especially Latina women, are severely underrepresented in the STEM workforce. My findings suggest that successful organizations incorporate certain signature elements such as hiring bi-lingual/ bi-cultural staff, and conducting evaluations led to offering programs that were more relevant to underrepresented audiences. Successful programatic considerations included making role models available to girls, taking girls on site visits to technological institutions, and involving family members in programs.

#### **Perspectives**

The impetus for this masters project was born from a confluence of circumstances that were reflective of both personal realizations and modern day societal leanings. In 2010 the American Association of University Women (AAUW) issued a report titled "Why So Few? Women in Science, Technology, Engineering, and Mathematics", this report shed light on the fact that women were significantly underrepresented in these fields and also gave recommendations moving forward. There are many reports like this, put out by the National Science Foundation (NSF), the Congressional Commission on the Advancement of Women and Minorities in Science, and similar institutions. All highlighting the systematic shafting our nations minority girls, and offering potential solutions. Personally, I was grappling with what it meant to be a Latina woman interested in promoting positive change; what does a modern day revolutionary look like? The answer came to me through an understanding and genuine belief that museums could be at the forefront of challenging societal inequity and promoting healthy happy generations of budding scientists of all classes and creeds. My question was the following, how can museums go about this? The answer I think is, by subtly shifting their own cultural and institutional belief systems and acting in ways that reflect a true commitment to diversity and equality. Science centers and museums are in a unique places in terms of how they can attract and sustain relationships with their surrounding communities. There is fertile ground to plant the seeds that will grow into enduring and fruitful connections with underrepresented audiences, but more research has to be done. This masters project attempts to provide a few steps that museums can start taking in the direction of progress.

#### **Methods**

I employed three methodologies for this masters project, a literature review, a case study, and interviews with professionals. My literature review covered three themes that allowed me to paint a broad picture of systematic issues that prevent girls from being interested in STEM, and how science centers and museums can play a positive role in making STEM content more accessible to underrepresented audiences. Interviews with professionals in the field, from a wider variety of

institutions including aquariums and science museums, gave me a real time snapshot of what these programs look like on the ground and insight on what challenges and success they had overcome. Finally a case study on a successful organization allowed me to see what strategies had been proven to be effective in reaching underrepresented girls.

### **Importance**

It is important to research and shed more light in the ways we understand what and how science centers or museums can improve their efficacy in reaching underrepresented audiences for a number of reasons; equity, social justice, and the advantages of fostering diverse perspectives, to name a few. My poster session is particularly relevant to the theme of this year's VSA conference because my findings highlighted the need for institutions to build internal capacity that supports minorities in museums, both as visitors and as staff. The only way to move towards a future of inclusivity is to recognize the scope and breadth of the inequality that afflicts us, and to make strides towards promoting change.

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## **Application of John Falk's Museum Visitor Identities at Thanksgiving Point**

### **Presenters**

Stephen Ashton, Ph.D.  
Director of Audience Research and Development  
Thanksgiving Point Institute

### **Purpose**

In 2009, John Falk's book, *Identity and the Museum Visitor Experience*, was published. In his book he identified six different museum visitor identities, which are explorer, facilitating parent, facilitating socializer, experience seeker, professional/hobbyist, and recharger.

Thanksgiving Point has been conducting research that applies Falk's work with museum visitor identities. For over two years, in exit surveys and other event-specific surveys, guests have been self-identifying themselves as one or more of the visitor identities. The research shows how different types of venues and events attract different types of guests. This has been helpful for Thanksgiving Point as we have sought to better meet the needs of the guests. Others could benefit from understanding the types of visitors that attend their institutions as well. Understanding the guests helps stakeholders to make more informed decisions.

### **Perspectives**

Thanksgiving Point is in a uniquely beneficial position to conduct this research because it is a multi-venue informal learning complex. More specifically, Thanksgiving Point Institute is an expansive farm, garden, and museum complex that draws upon the natural world to cultivate transformative family learning. Thanksgiving Point is home to the Museum of Ancient Life, one of the world's largest dinosaur museums; the Museum of Natural Curiosity, a hands-on children's / family museum; Farm Country, a hands-on working farm; and Gardens, a 55-acre estate garden. Exit surveys have been conducted in each of these areas to discover how the museum visitor identities differ between venue and events. The research has shown how there are distinct differences between the venues. This is important as institutions and evaluators seek to know more about their guests so they can help their guests have the most meaningful experiences possible.

### **Methods**

The primary methodology to conduct this research has been through exit surveys. During each month evaluators invite venue guests to participate in our exit survey. If the guests agree, we take down their email address and then send them the survey. The end of the survey has a question that invites them to indicate what their motivation was for attending the venue. In response to that question, the guests are self-identifying themselves as explorers, facilitating parents, facilitating socializers, experience seekers, professionals/hobbyists, rechargers, or a combination of the identities.

### **Data & Analysis**

We have included the question about visitor identities in our exit surveys for about two years. In that time we have collected over 1,200 responses.

### **Results**

The study has shown that the types of visitors greatly depends on the venue and the events taking place. For example, roughly 50% of Garden attendees identify themselves as rechargers, while only about 5% do in the Museum of Ancient Life. But, again looking at the Gardens, when Thanksgiving Point has its annual Tulip Festival, there is a smaller percentage of guests identifying themselves as rechargers and higher percentage in each of the other areas. These types of results can greatly inform decisions as institutions seek to build capacity.

### **Importance**

This research helps to validate the finding made by Falk. The better we understand our visitors the better we are able to meet their needs. This research has helped Thanksgiving Point gain a better understanding about its guests, and it has shown Thanksgiving Point that different types of guests will attend the different venues throughout the property. This research will be important for other institutions as they consider who is visiting them, and it will also help them see how events and different venue experiences can lead to different audience groups.

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### **Additional Links**

Thanksgiving Point Institute  
<http://thanksgivingpoint.org/>

## **Building Capacity through Academic Partnerships**

### **Presenter**

Amelia Robinson, Senior Audience Researcher, Science Museum, London

### **Purpose**

This session will highlight the way in which partnerships between museums and universities can help increase capacity and the robustness of research on visitors' behaviours and learning.

It will discuss two projects at the Science Museum, London, which involve collaboration with academic partners. These examples give an insight into the opportunity for museums to broaden the depth, frequency and scope of visitor research by conducting more in depth, longitudinal studies.

### **Importance**

In a time when resources are stretched conducting research and evaluation can be challenge. This poster explores the benefits for the Science Museum in London in forming academic partnerships to increase institutional capacity in research and evaluation. Traditionally, the audience research team at the Science Museum carry out the, front-end, formative and summative evaluation of projects and galleries based on shorter length research. With the availability of more staff, a dedicated team of research from the universities, and different analytical approaches, the aforementioned give the freedom to undertake much larger, longitudinal studies of projects and participants to create larger, robust data sets.

## **Building Capacity through Interdisciplinary Cooperation: Experimental Research on Reception Practice**

### **Presenter**

Dr. Annette Loeseke, Independent scholar and museum consultant, Berlin, Germany

### **Purpose**

Suggesting to examine reception as process proceeding dynamically the poster argues that exhibition format and design should better respond to actual reception practice. Reception should be understood and analyzed as process evolving through different phases and modes, such as focus and attention, reflection, imagination, interactive participation, then re-focus attention again, etc.

Instead of primarily focusing on content, exhibitions should also include dramaturgical elements supporting visitors in structuring their reception process.

Current visitor-centered research categories, however, do not seem fully appropriate for analyzing the actual process-related reception experience.

Creativity in building new exhibition designs and formats, and experimental research are needed in order to develop new, process-centered reception categories that allow to research different phases and modes of reception and identify specific exhibition design elements that affect different stages of reception.

### **Perspectives**

In order to evaluate the impact of different exhibition designs on the process-related dimensions of reception, experimental research should systematically test different exhibition designs and spatial layouts that respond to different stages and modes of reception.

An experimental research methodology implies a constructivist approach to product development (exhibitions, programming etc.), requiring a closer interdisciplinary cooperation between evaluators, curators, exhibition designers, etc.

Expanding their expertise beyond evaluation, empirical researchers should enhance their supporting of curators and programmers, and clearly demonstrate how empirical data might actually inform and support product development. Evaluators should cooperate more closely with curators, education experts, exhibition designers, and fully engage in transforming data and empirical findings into strategies to develop and diversify products that respond to actual process-related reception experience.

### **Methods**

The poster refers to observations and hypotheses of several qualitative empirical visitor and reception studies recently carried out at The British Museum, Shanghai Museum, the Rijksmuseum Amsterdam and the Asian Art Museum, National Museums in Berlin.

Empirical methods included structured face-to-face interviews with visitors, and tracking studies following visitors on their path through the exhibition in order to identify movement patterns as well as hot spots and dead spots of the exhibition space (visualized through 'heat maps').

### **Results**

Findings of both interviews and tracking studies indicated the need for examining reception as dynamic process and practice including non-cognitive dimensions of reception. Findings indicated that reception should be analyzed as influenced by external, environmental factors but also as inner process evolving dynamically through different phases and modes of reception.

### **Importance**

Evaluators should interdisciplinarily connect and more closely cooperate with related disciplines such as art history, archaeology, curating, and museum studies.

In order to build capacity and anchor empirical research and evaluation in the overall museum managing process, empirical researchers should particularly address central challenges which museums currently face and which essentially refer to changing reception practices:

- pluralistic audiences and a diverse range of narratives, narrative formats and reception practices, addressed as well as generated by contemporary media (movies, tv, online formats),
- a globalizing world and culturally diverse and intercultural audiences with (potentially) diverse narrative and reception practices,
- and the impact of digital technologies on reception process and practice.

As reception is a dynamic process including non-cognitive dimensions, we need to take formatting and dramaturgical elements (instead of content only) as a starting point for developing products that meet today's pluralistic audiences' reception practices, experiences, motivations and interests.

## **Camera Traps and Teens – an Introduction to Partners in Fieldwork**

### **Presenter**

Ellen Bechtol, Lincoln Park Zoo

### **Purpose**

Despite some improvement, the scientific workforce still does not reflect the cultural diversity of America (National Science Board, 2012). There is evidence that exposure to science experiences can encourage youth to seek out science careers (Cosmos Corporation, 1998; Tai, Liu, Maltese, & Fan, 2006; Fadigan & Hammrich, 2005). The "Partners in Fieldwork" (PIF) program provides the opportunity for urban underserved Chicago-area high school students to join Lincoln Park Zoo's Urban Wildlife Institute (UWI) as "student field researchers." Throughout the school year, students and teachers learn field research methods and collect useful wildlife monitoring data for UWI. PIF is designed to include students in the entire research process including data entry, analysis, and dissemination of results. This poster will provide an overview of successes, challenges, and preliminary evaluation results from the program's pilot year.

### **Perspective**

PIF is based on the concept of Public Participation of Scientific Research (PPSR), what is sometimes referred to as citizen science. PPSR projects emphasize public engagement in and understanding of the process of science, not simply the scientific discoveries or outcomes of research (Lewenstein & Bonney, 2004). PIF builds on a literature of successful formats of PPSR projects with additional elements that draw upon the zoo's unique resources and expertise. PIF also addresses two previously identified opportunities for PPSR projects by (1) exploring the role teachers and schools in PPSR projects (Mueller, Tippins, & Bryan, 2012) and (2) testing collaborative and co-created approaches (Bonney et al., 2009).

### **Importance**

Although there are a number of institutions working in PPSR, zoos have limited published work in this area, and much of the previous research has focused on work with the general public. The methodological challenges intrinsic in extending PPSR programs to public schools may contribute to the dearth of published work with this particular audience. We anticipate PIF will provide insight into how PPSR models can impact youth and be part of a next-practice movement in this field.

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### **Additional Links**

Partners in Fieldwork – Urban Wildlife Research at Local High Schools

<http://www.lpzoo.org/education/initiatives/partners-fieldwork>

## **CASNET: Exploring Evaluation Capacity-Building within a Complex Adaptive System**

### **Presenters**

Scott Pattison, Oregon Museum of Science and Industry

Marjorie Bequette, Science Museum of Minnesota

Chris Cardiel, Oregon Museum of Science and Industry

Sarah Cohn, Science Museum of Minnesota

Amy Grack Nelson, Science Museum of Minnesota

Stephanie Iacovelli, Museum of Science, Boston

Molly Illes, University of Minnesota

Jean King, University of Minnesota

Liz Kunz Kollmann, Museum of Science, Boston

Frances Lawrenz, University of Minnesota

Al Onkka, Science Museum of Minnesota

Christine Reich, Museum of Science Boston

Lauren Causey, Science Museum of Minnesota

Anne Sinkey, Oregon Museum of Science and Industry

### **Purpose**

How and why does evaluation capacity spread (or fail to spread) across interconnected organizations and institutions? Team members on the NSF PRIME-funded Complex Adaptive Systems as a Model for Network Evaluations (CASNET) project will discuss the work being done to help answer this increasingly vital question. CASNET's work is intended to yield new insights on (1) the implications of complexity theory for designing evaluation systems that promote widespread and systemic use of evaluation within a network, and (2) complex system conditions that foster or impede evaluation capacity building within a network. During this poster session, CASNET team members will be on

hand to discuss the preliminary findings based on work coalescing a large body of quantitative and qualitative data into a rich, meaningful, and actionable story regarding evaluation capacity-building within a complex adaptive system.

### **Perspectives**

The complex dynamics present within networks make them in many ways incompatible with traditional models for evaluation. Patterns and changes emerge in sometimes unpredictable ways through the interactions of one part of the system with another, making it difficult to attribute any one action as the cause of a particular effect (Eoyang & Berkas, 1998; Hargreaves, 2010). Similarly, due to a frequently decentralized decision-making structure, everyone in a network is often a potential decision-maker, with no one individual or group considered the ultimate evaluation user. This makes it difficult for an evaluator to study all aspects of the network. Given the limitations of current evaluation methods for studying complex adaptive systems and the increased presence of networks in a variety of fields, there is a critical need to develop new approaches for evaluating them. While only one network (the Nanoscale Informal Science Education Network) is being studied through the CASNET project, the emphasis on the underlying theoretical frameworks of complexity theory (Aula, 1999; Davis & Sumara, 2005; Horn, 2008; Lemke & Sabelli, 2008) and evaluation capacity building (King & Volkov, 2005; Preskill & Boyle, 2008) extends the application of the findings to a range of network types.

### **Methods**

The CASNET project employs a multiple case study approach (Stake, 2006) to explore and understand the evaluation system of a single overarching case, the Nanoscale Informal Science Education Network (NISE Net). In alignment with this methodological approach, individuals belonging to two “tiers” of network involvement were selected for study as sub-cases. Within the more-involved tier sub-case, an additional level of sub-cases was compiled on the basis of membership in distinct working groups. By studying multiple groups as smaller cases within the larger case of NISE Net, we explore how the conditions that foster or impede ECB within NISE Net may vary based on the multiple conditions present, in hopes that such variations may yield important insights for other networks. Data was collected for each case by interviewing NISE Net members, reviewing Network documents, observing Network meetings, and drawing on data from an annual Network survey.

### **Data & Analysis**

Data analysis is facilitated through the use of NVivo software and guided by complexity theory and ECB. The analysis process follows Stake’s (2006) protocol for multiple case study analysis. This form of analysis emphasizes a “case-quintain dialectic” (p. 46), whereby assertions are generated by looking closely at the findings from each individual case with regards to the meaning of the entire group of cases (what Stake calls the “quintain”) and looking at the findings from the whole group of cases with regards to the meaning for each individual case. True to the philosophy of case study research that emphasizes the importance of context, Stake’s protocol for multiple case study analysis is designed to illuminate how a certain phenomenon (in this case, evaluation capacity building within a network) is the same and different across different contexts (with comparisons looking across teams/working groups and also across tiers).

### **Results**

Data collection and analyses are ongoing for the project. Preliminary results from the more-involved tier sub-case suggest that the NISE Net is a complex adaptive system. The spread of evaluation capacity in the Network is 'complexly' related to the efforts to build it with a collaborative consensus building operation. Evaluation is understood and practiced in a variety of ways throughout the Network, but the general attitude toward evaluation is positive and individuals see the Network’s Team Based Inquiry approach to evaluation as a practical vehicle for improvement.

## Importance

As our world grows ever more interconnected, networks of all kinds have gained increased prominence; complex professional and social networks have proven effective in quickly promoting the widespread use and generation of ideas (Barabasi, 2002), while also fostering innovation (Nambisan & Sawhney, 2011). Despite their growing presence, however, relatively little is known about the myriad complexities and processes, which underlie networks as they relate to the day-to-day experiences of individual members. What can a focused exploration of a specific network tell us about the ways in which knowledge and learning are transmitted throughout such complex systems? How might this understanding be used to maximize the efficacy of capacity-building initiatives for the individuals working within such systems? During this poster session, the CASNET project team will share current findings related to these questions, as well as the promising implications of this project for the evaluation capacity of the field.

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## **Conversations with Elementary Age Children about History and STEM**

### **Presenters**

Amanda Svantesson-DeGidio, Science Museum of Minnesota  
Al Onkka, Science Museum of Minnesota

### **Purpose**

Interviews, focus groups or think alouds require individuals to reflect on their perceptions and describe the context of their opinion. These different methodologies all provide a platform for qualitative research that awards rich and diverse data. However, elementary school age children often lack the cognitive capabilities to reflect or sometimes even to articulate their own perceptions. Data collected by evaluators from the Science Museum of Minnesota during a formative evaluation of the Create.Connect exhibit showcases a unique method of "family interviewing", where family groups were asked a series of questions, some for the adult and some for the child. Using the family interview method, children were better able to reflect and articulate their knowledge with the help of their parents and/or siblings.

### **Perspectives**

Presenters will frame this poster within five sections to highlight the family interviewing method: Problem, Method, Benefits, Concerns, Tips

Al Onkka will focus on the problem and method while Amanda Svantesson-DeGidio will focus on the benefits, concerns and tips.

### **Methods**

The family interviews were audio recorded (and later transcribed), in order to capture the richness of responses for further analysis. Evaluators asked some questions directed at an adult museum visitor, and some questions directed at the child visitor after un-cued observations of the family group in the exhibit.

### **Data & Analysis**

Responses for family interviews were coded in various ways to accommodate multiple-speaker responses. Questions directed at adults and children were coded separately. Although 91 interviews were conducted, responses, rather than respondents, were coded. Thus, each interview often had responses from multiple children or adults. Responses were analyzed using emergent qualitative coding.

### **Results**

The method of family interviewing provided richer and more accurate data by including responses from multiple family members, rather than just the target child/adult.

### **Importance**

Sharing findings from the Create.Connect evaluation will foster discussion within the evaluation field about qualitative methodology, interview instruments and implementation, as well as the broader question of measuring STEM learning in informal settings.

## **Designing a Tablet Support Tool for Interpreters**

### **Presenter**

Brian Slattery: Graduate Research Assistant  
Learning Sciences Research Institute (LSRI)  
University of Illinois at Chicago (UIC)

### **Purpose**

Our investigation centers on interpreters' use of a tablet support tool (TST) for collaborative meaning-making and inquiry with visitors at the Brookfield Zoo in Chicago. Interpreters can use the TST to support peripheral visitors at interactive exhibits that would normally only support few simultaneous visitors' engagement. Through the use of images, text, and dynamic data representations, our TST supports interpreters in starting conversations with visitors, eliciting background knowledge, and guiding discussions towards exhibit learning goals. This supports a more dialogic and interactive approach, in contrast to more didactic interpretation such as a pre-arranged talk. Furthermore, our team has followed a user-centered design approach that involves interpreters using and reflecting on multiple iterations of the TST, both with the public and in design sessions. This has allowed us to explore the role that the TST can play for interpreter training, professional development, and evaluation, beyond its use as a facilitation tool.

### **Perspectives**

Interpreters at Brookfield Zoo are trained to engage in dialogic facilitation, which consists of interpreters initiating and supporting back-and-forth conversations with visitors that are based in visitors' prior experiences, personal interests, and individual viewpoints (Knapp, 2007; Ham, 1992). There is a potential that technological supports can be designed to foster this approach (Falk & Dierking, 2008; Heath et al, 2005; Yoon et al, 2013), although few researchers and evaluators have investigated interpreters' use of these tools. However, if designed with interpreters' needs in mind, these tools can help interpreters with core aspects of dialogic facilitation, such as representing exhibit content to make it more accessible for collaborative meaning-making (Crowley & Jacobs, 2002; Jaipal, 2010). Also, these tools have the potential to mediate (Wertsch & Rupert, 1993) new facilitative practices that would not have been available without the tool (Slattery et al, 2014; Jimenez Pazmino et al, 2013). This includes "scaling up" facilitation to display additional information to visitors at the periphery (such as parents or adolescents who are watching another visitor's interaction), as a way to expand the scope of visitor engagement and discussion.

### **Methods**

Over the past two years, our research has followed a user-centered design approach. We have created a series of TST designs that were then altered based on feedback from a core group of teen and adult interpreters. Initially, interpreters used and evaluated TST design iterations in controlled environments off of the zoo "floor", with small groups of visitors. This was complemented by an action research approach that involved the primary designer of the TST spending time "embedded" as an interpreter, to ground the researchers' initial understanding with more situated knowledge of interpreters' facilitation. These experiences led to a series of larger-scale studies where interpreters used the TST with the normal visitor population at an interactive exhibit, as well as collaborative design sessions including both interpreters and researchers. This allowed the interpreters to evaluate the TST in a more naturalistic context.

### **Data & Analysis**

Throughout the studies and design sessions outlined above, the research team gathered data from multiple sources: individual and group interviews with interpreters, field observations of interactions with the TST, log data of the TST software's state over time, audio recordings of interpreter/visitor

conversations around the TST, and video recordings situating TST usage in the overall exhibit. The researchers used qualitative data analysis applications to combine audio, video, and observational data, and to identify the spans of time where the TST was being held and operated by interpreters. These were then transcribed, focusing on interactions where interpreters or visitors used the TST. The research team then identified a range of cases where the TST was part of an interpreter's facilitation, and resources on the TST were incorporated into the discussion. These cases allowed us to identify potential ways that the TST can benefit facilitation.

## Results

The TST supported interpreters' existing practices by providing core exhibit content as well as additional representations for peripheral visitors, through the use of images, text, and data representations. Additionally, the images and text on the TST helped interpreters start conversations with peripheral visitors, elicit background knowledge, and guide on-going conversations towards exhibit learning goals. Interpreters appreciated having the TST at hand to support their facilitation. Furthermore, the TST was able to extend beyond interpreters' existing practices by affording new forms of facilitation that would not have been available without the tool. Interpreters used the TST to improve their situational awareness, monitoring the changing state of the interactive exhibit so that they could more easily transition between topics. They also used images and data representations to connect visitors' personal comments and exhibit content, and to position exhibit resources as available for collaborative questioning and meaning-making.

## Importance

While others have investigated visitors' experiences with interactive exhibits, our work highlights how technology can support interpreters. Our findings can help visitors studies researchers identify core practices of facilitation that can be influenced by interactive technology both in-the-moment and over time. Through collaboration among interpreters, staff, and researchers, our work has helped build capacity for future collaborative design-work and professional development. Using tools to extend interpreters' facilitation and training is a promising avenue of research that demands future study. For future work, we would also like to learn about ways that a platform for re-representing visitor experiences and providing at-hand resources could be useful for facilitation in other institutions besides zoos, or around non-STEM content. To the extent that the TST is adopted by interpreters, it provides new opportunities for interpreters to self-reflect on their performance, as well as additional data (e.g. usage logs) for evaluators to better understand facilitation.

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### **Additional Links**

Other work by Brian Slattery  
<http://bslatt2.people.uic.edu/>

Climate Literacy Zoo Education Network (CLiZEN) project page  
<http://clizen.org/>

Learning Sciences Research Institute (LSRI)  
<http://www.lsri.uic.edu/>

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## **Drawing on Prior Experience to Catalyze Evaluation Capacity Building**

### **Presenters**

Rich Pennington, Science Museum of Minnesota  
Zdanna Tranby, Science Museum of Minnesota  
Gina Svarovsky, Science Museum of Minnesota

### **Purpose**

As the Visitor Studies field seeks to build evaluation capacity, it is essential to increase our understanding of the experiences of new and developing evaluators who are engaged in a range of capacity building efforts. By learning more about how new professionals learn about and are introduced to our community of practice, we can create new and better pathways into evaluation and research positions, and ultimately identify novel approaches and audiences for building evaluation capacity on a broader level. As such, the key questions this poster will address include:

1. What are some different types of prior work experience that may be particularly relevant and useful to look for within professionals seeking to transition into the field of visitor studies?
2. What are some new and innovative places or methods to recruit for and identify potential evaluators who come from underrepresented backgrounds?

## **Perspectives**

At the Science Museum of Minnesota, Rich Pennington holds a joint appointment in the Department of Evaluation and Research in Learning as well as in the Community Engagement Group. Rich has held several positions within the Museum, and over the past two years, he began collaborating with the Evaluation and Research department on studies that connected directly with his other work. Building on this introduction to evaluation and research, Rich is now an integral part of a new grant-funded project that focuses on museum-community partnerships, where he occupies a unique appointment that incorporates both evaluation and community engagement. Within each of his work experiences at the museum, as well as throughout his broader life experience as an African-American male, Rich has cultivated essential knowledge and skills that will catalyze his growth as a new evaluator and his development of several evaluation competencies.

## **Importance**

A potential key area of focus for the field is to explore the ways that members of underrepresented groups become invited and attracted to our profession. Fostering the next generation of more diverse and demographically-representative visitor studies professionals is vital to the continued growth of our field and our ability to meet the changing needs of our primary clients – institutions of informal learning who are seeking new and innovative ways to engage members of traditionally underserved communities.

## **Exploring Gender Differences in a Science & History Gallery**

### **Presenter**

Allison Cosby, Evaluation Coordinator, Conner Prairie Interactive History Park

### **Purpose**

This poster presentation will show how:

1. The addition of more immersive historical settings in Create.Connect, a STEM-and-history gallery, changed how guests, and particularly girls, interacted with the gallery.
2. Create.Connect was developed through an iterative process of prototyping and evaluation.
3. Partnerships between novice and experienced evaluators are a very effective way to build capacity for evaluation.

## **Perspectives**

The topic of this poster presentation is one small part of the multi-year evaluation of Create.Connect, a guest experience at Conner Prairie Interactive History Park that combines hands-on STEM-focused activities with relevant stories from Indiana's past. The project, funded by the IMLS and NSF, seeks to develop a replicable model for history institutions to incorporate STEM. The evaluation of this project is managed by evaluators at the Science Museum of Minnesota (SMM), and as a Conner Prairie employee I provide on-site support to the SMM team by collecting, analyzing and reporting on data. This is my first major project as an evaluator.

The Create.Connect gallery that is currently installed is the result of iterative development, with each iteration shaped by preceding phases of evaluation. When formative evaluation suggested there was a gender imbalance in favor of boys in the gallery's first iteration, the project's leadership asked that we look at gender balance in the gallery more intentionally. Subsequent iterations of the gallery contained more immersive historical settings with the goal of making the historical content more hands-on and providing more context for the activities. Formative evaluation after this development showed positive changes in the way girls interacted with Create.Connect.

## Methods

Formative evaluations of the Create.Connect gallery used observation and timing and tracking methods as well as interviews with adults and family interviews. We have also used "listening" observations that involve observing and listening in on guest conversations as they occur in the gallery. We have also piloted methods involving audio recording and observation of parent-child dyads while in the gallery, followed by a reflective interview with the adult.

## Data & Analysis

We explored overall trends in the observation and timing and tracking data. We compared the activities to one another in terms of how frequently guests displayed certain behaviors, like working with the items, or the median dwell time. We also determined median dwell times under different crowding and facilitation conditions and for different subsets of visitors. Observations of family conversations were analyzed for themes and the frequency of different kinds of historical thinking or the integration of science and history. Recorded family dyads and reflective interviews are still being analyzed, but have already been analyzed for emergent themes.

## Results

During the first round of evaluation, it was found that there were 13 boys observed in the gallery for every 9 girls, and girls were spending less time than boys in the exhibit and at almost every activity table. However, when there was costumed historical facilitation the ratio was more even. Also, guests were not attending to the historical narrative presented in labels and images.

The exhibit team built a more immersive historical setting for the hands-on activity in the Circuit Blocks area as a prototype. Evaluation of the change found that dwell time in the gallery increased for both boys and girls, and girls were now spending more time in the gallery and at each activity table than boys. This change was most pronounced in the Circuit Blocks area. Girls also seem to engage in historical conversations with adults in this area more often than boys.

## Importance

During the first round of evaluation, it was found that there were 13 boys observed in the gallery for every 9 girls, and girls were spending less time than boys in the exhibit and at almost every activity table. However, when there was costumed historical facilitation the ratio was more even. Also, guests were not attending to the historical narrative presented in labels and images.

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**Additional Links**

Conner Prairie Interactive History Park website

<http://www.connerprairie.org>

Create.Connect gallery Flickr stream

<https://www.flickr.com/photos/connerprairie/sets/72157644206161472/>

**A Framework for Evaluation Quality: Evidence for its Viability****Presenter**

Alice C. Fu, SK Partners

**Purpose**

Calls for increasing the rigor and relevance of evaluation in informal science education (ISE) are growing. The purpose of the work presented, in broad terms, is to contribute to strengthening ISE evaluations and building capacity for doing so.

More specifically, this session presents a framework for summative evaluation in ISE, building on our presentation at the 2013 VSA conference. We offer the framework as a synthesis of key elements of high-quality summative evaluation—a guiding lens for planning or conducting current or future summative evaluations and also in reviewing or using completed evaluations. We have now completed additional research on the viability of the framework—whether it adequately defines criteria for quality and how these criteria might be used in practical ways. In our session, we will highlight findings from these research activities to illustrate the various dimensions of the summative evaluation framework.

**Perspectives**

This project focuses on summative evaluations, which have been called upon to inform decision-making and practice, contribute knowledge to the field, and help make the case for the value of informal experiences. To serve these functions, summative evaluation must be high quality. Our framework provides a lens on quality, featuring three dimensions:

- **Intervention Rationale:** Examine the intervention (program, exhibition, etc.) being evaluated: what participants experience, underlying theories or logic, and reasonable alternative interventions. Consider how these factors influence evaluation planning and design, including whether a summative evaluation is warranted.
- **Methodological Rigor and Appropriateness:** Maintain clear and reasonable scope and purpose, given available resources. While allowing for unexpected findings, tightly link questions, design, methods, interpretations, and conclusions. Be as rigorous as possible, while remaining sensitive and authentic to the informal context.
- **Evaluation Uses:** Address stakeholders' needs and questions. Be clear, concise, and timely with communications. Be strategic about framing findings, making recommendations, and supporting stakeholders and the field in using the evaluation.

Summary judgments or reflections on the intervention's value should be reasonable and justified, drawing upon all framework dimensions—information about the intervention and its rationale, empirical evidence from the evaluation, and an understanding of what is useful for stakeholders.

## Methods

We developed an initial framework based on a literature review and then refined it iteratively over the course of our research. Activities included:

- Case study: We selected a summative evaluation report that scored highly on criteria from our framework. We conducted a case study of this evaluation, interviewing key players to understand how it was designed, conducted, and used.
- Interviews: We conducted interviews with eight ISE leaders and asked for their perspectives on pressing evaluation issues and visions for the future of the field. We also interviewed individuals from three research/evaluation studies that employed experimental designs in informal settings.
- Review of reports: We reviewed all 2012 summative evaluation reports posted on [informal.science.org](http://informal.science.org) to gauge commonly-used study designs and methods. We also used criteria from our framework to review other reports gathered from purposive snowball sampling, focusing on those recommended as exemplary (by colleagues, team members, or citations in other works).

## Data & Analysis

Data gathered from the activities just described were both qualitative and quantitative. Qualitative data included transcripts from case study and other interviews, as well as our qualitative reviews of exemplary reports. These data were analyzed according to the three main dimensions of our framework, as well as for other, emergent themes. Quantitative data were mostly comprised of results from coding the 2012 summative evaluation reports posted on [informal.science.org](http://informal.science.org) (N=36). These were analyzed for the frequencies of reports in the sample with various characteristics such as type of study design and methods/instruments used.

## Results

**Intervention Rationale:** Our review of reports found that, although evaluators may develop a deep understanding of the intervention and its underlying rationale, little of this is typically reported. We identified examples that illustrate how reports could benefit from a clear presentation of how the evaluation builds from knowledge about the intervention.

**Methodological Rigor and Appropriateness:** Most of the summative evaluations we reviewed lacked comparison groups or pre-post comparisons. Causal-effect questions are difficult to answer in the absence of experimental and quasi-experimental designs. Interviews illuminated the complexities of using such designs in ISE evaluation.

**Evaluation Uses:** Stakeholders in our case study used a summative evaluation to inform remediation, support the future use of multi-lingual labels at their museum and elsewhere, and influence institutional initiatives. However, our review of reports found that actual uses of an evaluation are mostly unreported, as these uses typically occur after report writing and submission.

## Importance

We propose that the framework can help build capacity by providing ISE stakeholders with a shared lens for systematically judging, reviewing, planning, or conducting summative evaluations. Our intention is not to replace the many, valuable evaluation-related resources available but rather to succinctly synthesize key elements that comprise a high-quality summative evaluation. While recognizing the need for more evidence, we have collected some evidence bearing on the framework's viability as a tool for identifying and considering indicators of quality in summative evaluations. It points to potential areas for capacity-building efforts if summative evaluations are to be realized as a means of building knowledge and advancing the field.

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# Getting to Know Family Audiences: Evaluating Family-Oriented Programming at MOHAI

## Presenters

Amanda Dearolph, New Directions in Audience Research: University of Washington Museology Graduate Program

Emily Schmierer, New Directions in Audience Research: University of Washington Museology Graduate Program

## Purpose

The purpose of this evaluation is to understand family groups' motivation for visiting the museum and how they engage with the programming and resources made available to them. To achieve this purpose, the following evaluation questions were formed:

1. Why are families visiting MOHAI?
2. To what extent are families opting in to the programs and resources provided for them?
3. What programs do families consider the most beneficial, if any?
4. What are the demographic characteristics of MOHAI's family audience?

Investigating these questions through qualitative and quantitative methods sheds light on the resources and programming offered by MOHAI that families find valuable. Increasing institutional knowledge of these audiences helps inform future programming and resources for families.

## Perspectives

There are two critical pieces of background information to contextualize this study. First, on an institutional level, the Museum of History and Industry (MOHAI) recently relocated. Moving to a new neighborhood closer to downtown Seattle, MOHAI has noticed an uptick in their family audience. Responding to this shift, MOHAI has increased their program and resource offerings specifically for family audiences. Additionally, MOHAI chose to collaborate with the New Directions in Audience Research Initiative of the University of Washington Museology Program to complete this evaluation. Thus, this study comes from a combination of institutional desire to better understand a new audience as well as a collaboration between university and museum to train a new generation of evaluators.

## Methods

Two instruments were created for this evaluation. The first is a structured interview conducted at the museum using a convenience sampling method. The second is an electronic survey sent to the museum's members. The target audience for both instruments were family groups which we define as one or more adults with at least one child.

## Data & Analysis

Data from both instruments was entered in Excel and coded using emergent coding. Both qualitative and quantitative data were analyzed with descriptive statistics.

## Results

### Key Findings:

- The average family that participated in this evaluation has one to two children of elementary school age or younger.
- More than half of respondents liked exhibit interactives because they allowed them to better engage with the information presented in the exhibits.
- More than half of the respondents stated that they would like more hands-on programming that would be appropriate for all ages.
- 53% of respondents interviewed participated in specific family-oriented programming, while 96 % viewed exhibits.
- Half of the visitors interviewed believe the activities MOHAI has available currently add a significant amount of value to their visit.
- Coming to see the exhibits is the most frequent motivation cited on the member survey, only 39% said they were more likely to visit on a programmed day.
- Though families choose to visit MOHAI for a wide variety of reasons, there is a correlation between field trip attendants and family visits

### Importance

This study is important because MOHAI is an institution that is trying to build institutional capacity and a culture of evaluation through a partnership with New Directions and Museology students. This evaluation is the second project to be completed for MOHAI and is a building block for the museum. By engaging in evaluation MOHAI is trying to better understand the audiences that visit the museum, in particular the family audience. Focusing on the family unit through the lens of evaluation allows for MOHAI to build educational capacity through informal programming. MOHAI can use this study to develop programming that is impactful for the institution and the individuals visiting the museum.

## Harbor Seal Exhibit Summative Evaluation at the Seattle Aquarium

### Presenters

Anna Johnson, New Directions in Audience Research: University of Washington Museology Graduate Program

Lauren Marallo, New Directions in Audience Research: University of Washington Museology Graduate Program

Julia Miller, New Directions in Audience Research: University of Washington Museology Graduate Program

Kelley Staab, New Directions in Audience Research: University of Washington Museology Graduate Program

### Purpose

Students in the University of Washington New Directions in Audience Research program undertook a summative evaluation of the recently renovated Harbor Seal Exhibit at the Seattle Aquarium. The purpose of this evaluation project was to understand visitor use of and attitudes towards the new Harbor Seal Exhibit and to assess the extent to which visitors are aware of the exhibits' primary messages. The project addressed the following four evaluation questions: (1) How do visitors use the Harbor Seal Exhibit?; (2) What are visitors' attitudes towards the Harbor Seal Exhibit?; (3) To what extent are visitors obtaining new information from the Harbor Seal Exhibit?; and 4) To what extent are visitors able to recall conservation messages in the Harbor Seal Exhibit?

## **Perspectives**

The primary source informing this study was methodology and results from the front-end evaluation of the Harbor Seal Exhibit at the Seattle Aquarium conducted in 2012. In addition, studies assessing the impact of zoos and aquaria on visitor behavior also informed the development of this evaluation.

## **Methods**

Two instruments were designed and implemented for this evaluation: a timing and tracking that returned quantitative data and an interview that resulted in a mix of quantitative and qualitative data. Data collectors of the timing and tracking instrument were assigned to watch one of two locations, ensuring that all five pathways of entry into the Harbor Seal Exhibit received equal amounts of time and attention.

Interview protocol dictated that data collectors wait until the visitors had been in the Harbor Seal Exhibit for at least thirty seconds before approaching them to participate in the instrument. All interview participants were over eighteen years of age.

## **Data & Analysis**

The evaluation team collected 187 timing and tracking instruments on total exhibit time, time spent in indoor and outdoor portions of the exhibit, locations of stops, visitor behavior in the exhibit, and some relevant demographic and environmental condition information. The team collected 118 interviews on visitors' attitudes toward the exhibit, specifically perceptions of the care and environment of the seals and the algae visible in the pool, as well as on what information visitors recalled from the exhibit space, with a focus on conservation messages.

Quantitative data from both instrument types was analyzed using Excel and SPSS software. Qualitative data was quantified through an iterative coding process, first using a priori categories of exhibit themes as provided by the Aquarium. Any outliers were coded using an emergent coding schema as determined by the team.

## **Results**

Data suggests that the Aquarium's renovations increased visitors' time in the space. Median total exhibit times for visitors who took pathways through the outdoor portion of the exhibit increased by over 35% from the front-end evaluation. The average number of times visitors who took outdoor pathways stopped similarly increased 40%-55%.

Visitors responded positively to the exhibit, particularly enjoying the visibility of and proximity to the seals offered by the space. Most visitors did not notice the algae in the pool and those who did generally thought it made the exhibit look natural or realistic.

Half of visitors reported learning something new from the exhibit, with the greatest number of visitors citing information about the seals' appearance, diet or behavior. One-fifth of visitors recalled seeing or hearing conservation messages in the exhibit space. Of these, most recalled messages related to exhibit themes of "Marine Debris" or the Marine Mammal Protection Act.

## **Importance**

This evaluation contributes research of how, and in what ways, an experience at an aquarium exhibit impacts visitors. Specifically, findings from this study will contribute data concerning visitor awareness of conservation messages and exhibition effectiveness. Results will help to inform other informal science learning institutions conducting evaluations relevant to conservation awareness or renovating their exhibits.

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## Henry Art Gallery Formative Evaluation of Lobby Experience and Resource Materials

### Presenter

Taline A. Kuyumjian, New Directions in Audience Research: University of Washington Museology Graduate Program

Emily Shin, New Directions in Audience Research: University of Washington Museology Graduate Program

Drew Bowen, New Directions in Audience Research: University of Washington Museology Graduate Program

### Purpose

The purpose of this evaluation is to understand the effectiveness of the Henry's existing lobby resources in (1) orienting visitors to the museum, (2) providing visit information about admissions & exhibitions, and (3) providing additional information about current and future program offerings. The outcome of this evaluation will inform design content and structure of future resources.

### Perspectives

The New Directions in Audience Research and Henry Art Gallery have a long-standing collaborative relationship. Previous evaluations include a year-long study of the visitor experience in the Henry's gallery spaces. The Henry asked for a complementary study to be conducted, with the goal of evaluating the Lobby Experience. This research team was excited to take on this project, believing it provided a unique opportunity to test out such a dynamic space, and utilize a variety of instruments in the process.

### Methods

The methods utilized for this study were exit interviews, timing and tracking maps, and diary studies from the Visitor Services staff. The data was collected over a three week time period, at several different days and times to get the broadest range.

### Data & Analysis

The Timing and Tracking map included a combination of tracking visitor's use of the lobby space and the actions performed while in the lobby. Timing and tracking data was coded according to area entered and actions performed. All visitor types were included in the study. Types included those coming to visit the galleries, for an event, or those going to Henry's cafe.

The Lobby Exit Interview included a combination of qualitative and quantitative questions. Responses to the qualitative questions were coded and statistical were run. Because visitors could either be Henry patrons or patrons the Henry's cafe, analysis on both visitor types was for both groups as separate entities to account for their varying needs. Analysis was also run for both visitor groups as a whole, because all individuals had the same opportunity to experience the Henry lobby and garner information from the experience.

### **Results**

Visitors self-report that they are most frequently using the Henry map as their intended means of garnering additional information for their visit. The most visible resource seen in this space was the Gallery Services Representatives (GSRs), however this was also one of the least utilized resources. Use of a more passive resource may indicate that visitors want to utilize tools that are portable and can answer questions as they progress through the museum. However, 64% of participants did not use any resources at all. The most common means of learning about exhibition content is the internet, through friends/word-of-mouth and "off-site." Participants expressed confusion regarding how to read and use the map, as well as questions about admission pricing. Contrary to visitor's answers in the exit interview, visitors used the space in front of the GSRs most often. Additionally, visitors interacted with the GSR most often in their lobby experience.

### **Importance**

This study analyzes how visitors utilize lobby spaces, and what kinds of information they are garnering from that space. The findings demonstrate that paying attention to lobby spaces are worth further investigation from the field. Existing research tells us that visitors come into museums with pre-existing motivations and needs. The lobby, as an entry point into the museum, is where visitors begin to shape their experience. As such, evaluation of these spaces will help ensure that the visitors' initial interaction with the museum aids in satisfying their needs from the get-go.

### **References**

This evaluation was built off of a previous front-end evaluation done the previous year through New Directions at the same institution. This focused on how visitors interacted on with gallery staff and spaces.

## **Implications of the Value Ratio on Visitor Attention**

### **Presenter**

Stephen Bitgood, Professor Emeritus of Psychology, Jacksonville State University

### **Purpose**

To describe some of the implications of applying the value ratio to visitor attention in museums.

### **Perspectives**

The attention-value model (e.g., Bitgood, 2010; 2011; 2013) argues that attention and value are key concepts for understanding visitor attention. To maximize attention and learning, designers must understand the art and science of capturing, focusing, and engaging visitor attention. Visitors expect high value for the time and effort they invest when paying attention to exhibits. The model applies a behavioral economic definition of value, i.e., a ratio of utility (satisfying curiosity, enjoyment) divided by cost (money, time, effort) as well as a psychological model of attention. Higher value results from either improving the utility, from decreasing the cost, or from a combination of both.

Three implications are discussed in this paper: (1) visitors select which exhibit elements to view based on the value of available alternatives at any moment; (2) value is relative rather than absolute – value changes based on the situation (a medium-interest object will be chosen when contrasted with a low-interest object, but when contrasted with a high-interest object); (3) as a general rule it is easier to reduce the cost (time & effort) than to increase the utility (interest level, satisfaction)

## Methods

A meta-analysis of the literature is combined with simulation studies specifically designed to test the implications of the value ratio. The simulation studies examined interest ratings in artwork and the number of words in text passages to assess the relative predictive power of the value ratio (interest rating/number of words) and interest rating and workload by themselves.

## Results

1. Findings from the visitor literature are consistent with the value ratio:
  - When the number of art works were systematically increased in a gallery, visitors become more selective, viewing a smaller percentage of objects (e.g., Melton, 1935; Porter, 1938; Serrell, 1998).
  - Workload (number of words per text passage) is consistently inversely associated with visitor reading.
2. In museum simulated studies, the value ratio has been a consistently better predictor of percentage of a text passage read than either interest level or workload (total number of words in text passages) alone.

## Importance

When designing visitor experiences, both utility and cost must be considered to significantly engage visitor attention. Increasing utility (satisfaction, benefit) by itself is not enough if the amount of time and effort necessary to process exhibit content is too high.

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## **Instrument Development and Validation: A Tool for More Rigorous Evaluation**

### **Presenter**

Lei Zhao, John G. Shedd Aquarium

### **Purpose**

Understanding the learning experience at museums, zoos, and aquariums has been attracting prominent interest from museum leadership and academic professionals. Audience Research and Evaluation (AR&E) Department at Shedd decided to develop measurement tools in order to better understand the general guest learning experience and take advantage of the standardized instruments to systematically and longitudinally track the aquarium's impact on its guests. Empathy and Curiosity (E&C) was the primary focus during the first phase of development.

### **Perspectives**

Understanding the learning experience at museums, zoos, and aquariums has been attracting prominent interest from museum leadership and academic professionals. Audience Research and Evaluation (AR&E) Department at Shedd decided to develop measurement tools in order to better understand the general guest learning experience and take advantage of the standardized instruments to systematically and longitudinally track the aquarium's impact on its guests. Empathy and Curiosity (E&C) was the primary focus during the first phase of development.

### **Methods**

An internal panel of subject matter experts (SMEs) was formed to develop 60 questions to measure the nine E&C elements above. A 10-point agreement scale accompanied each item with response options from 1 "strongly disagree" to 10 "strongly agree"; After several iterations, a total of 44 items were kept and arranged in a random order on the instrument. Eight of the forty-four questions were negatively worded (Riley-Tillman et. al, 2009; Ory &Valois, 1980) in order to detect responses indicative of guests not reading items completely or responding serially with the same rating.

### **Data & Analysis**

Factor analysis was utilized to determine which of the 44 items were most correlated to the 9 E&C elements. This was done to shorten the instrument to the most efficient items and differentiate and enhance the meaning of the components of E&C. The statistical programs used for analysis were SPSS (IBM version 22) and R (version 3.0.1).

### **Results**

Data using the 44-item instrument was analyzed using PCA using promax rotation, and this procedure revealed a three-factor structure from the correlation matrix. Together, the extracted factors accounted for 45.53% of the variance among items. Each of the three factors had an eigenvalue larger than 2.00 and contributed over 5% to the overall variance.

### **Importance**

In general, the three-factor model fit the data well indicating the current 15-item instrument measuring three facets of E&C construct at Shedd. As factor analysis would not be able to assist us to explore the between and within factor relationships, confirmatory factor analysis would be a solution for further inspection of the instrument. Current research serves as a preliminary exploration in measurement development and validation to inform future research agenda include but not limited to: apply Confirmatory Factor Analysis to examine relationships between the three factors of E&C with a larger sample, generalize this survey development procedure to other learning outcomes, and last but not least examine differences in models between zoological institutions.

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## **Interpretation and Visitors: Building a Body of Institutional Knowledge**

### **Presenter**

Lynn Courtney, Museum of Fine Arts, Boston

### **Purpose**

To foster thought and discussion on how museums and other informal learning settings can move beyond particular studies for single constituents to create a body of institutional knowledge derived from multiple evaluation studies, and then to use that knowledge in planning programs and exhibitions. Attendees are invited to discuss with the presenter such questions as: How can we disseminate learning drawn from visitor research across our institutions? What factors allow us to generalize evaluation results, and when is new research called for? What can we do to create an expectation that program and exhibition planners will consult existing visitor research?

### **Perspectives**

In an art museum, interpretation can take the form of traditional labels next to works of art and wall texts that introduce a gallery or exhibition as well as a variety of media experiences and hands-on resources. Interpretive resources constitute the “user interface” between visitors and works of art.

At the Museum of Fine Arts, Boston, several studies over the past 5 years have built a considerable body of knowledge about how our visitors respond to, use and learn from a broad variety of interpretive resources: (1) Prototype testing of a hand-held multimedia guide for the collection; (2) A study of visitor usage and preferences for five different types of interpretive resources in a gallery of ancient coins; (3) A study of visitor response to a temporary “sound and light” show associated with a single work of art that combined a visual presentation with narration, music and spotlighting of elements in the artwork; and (4) A study of visitor preferences and reactions to a specific multimedia guide tour. A series of recent gallery renovations have drawn on conclusions and recommendations from these and other internal studies to inform interpretive choices as well as decisions about when additional studies are needed.

### **Methods**

Methodology across studies included timing and tracking of visitor behavior as well as semi-structured interviews, card sorts, and visitors’ “think-aloud” exploration of prototypes. All studies included a demographic survey and two studies combined an additional brief paper-and-pencil survey with open-ended interview questions. All studies included both quantitative and qualitative measures.

### **Data & Analysis**

Across studies, data were collected on visitors’ preferences for, and their reported and observed usage of, the interpretive resources offered in various MFA galleries and exhibitions. Resources included a prototype of the multimedia guide launched in 2010, labels and wall texts, iPads, magnifying glasses, and a touch-screen interactive in the Michael C. Ruetters Gallery for Ancient Coins (opened 2012), an immersive multimedia experience paired with extensive written interpretation in the exhibition *The Triumph of the Winter Queen* in 2013, and a multimedia guide tour for the exhibition John Singer Sargent Watercolors in 2013-2014.

While specific data collected varied among studies, they included, among others, demographic information, visitor ratings of satisfaction, learning reported by visitors, visitor ratings of and preferences for specific interpretive content and delivery methods, instances of visual referencing of artworks prompted by the resources in question and, for the multimedia guide, visitor perceptions of and issues with usability.

## Results

Key findings across studies include the following:

- Looking prompts that draw the eye to unnoticed details enhance the visitor's experience of art
- Visitors treat multimedia guide videos of curators and other experts as purely auditory experiences while they look at the art
- Effective interpretation can prompt visitors to engage with a single work for an extended time
- When offered multiple interpretive options, visitors are most likely to use traditional, "low-tech" methods (e.g. object labels, magnifying glasses)
- Other methods (iPads, touch-screens) engage up to 40% of visitors and serve varied learning styles
- Multiple interpretive options may be associated with extended time spent in the gallery that contains them
- Social, historical and cultural context and personal information about artists and subjects are associated with visitor reports of richer encounters with art
- Perceived excessive amounts of information can overwhelm visitors even when not used

## Importance

Building a body of knowledge about the visitor experience in a given informal learning setting and making it broadly accessible to stakeholders across the institution can help build capacity for evaluation by increasing demand among institutional stakeholders. Paradoxically, it can also decrease demand by creating efficiencies through study results that can be generalized. As those of us who are internal evaluators may have experienced, providing actionable results to program managers or exhibition planning teams can lead to more requests for visitor research. Over time this may create advocacy for increasing the institutional resources devoted to visitor studies. But when those resources remain limited, educating stakeholders about how they can draw on already existing research can support the efficient and effective allocation of the evaluation resources that do exist.

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## **Additional Links**

Press Release, Opening of the Michael C. Ruetters Gallery for Ancient Coins

[http://www.mfa.org/sites/default/files/MFA\\_Coin%20Gallery%20Press%20Release.pdf](http://www.mfa.org/sites/default/files/MFA_Coin%20Gallery%20Press%20Release.pdf)

*Triumph of the Winter Queen*

<http://www.mfa.org/exhibitions/triumph-winter-queen>

John Singer Sargent Watercolors

<http://www.mfa.org/exhibitions/john-singer-sargent-watercolors>

## **Math Attitudes and Interests of Adult Science Café Participants**

### **Presenter**

Anna Johnson, University of Washington Museology

### **Purpose**

The goal of this research is to describe the math-related attitudes and interest levels of adult participants in science café-type events. The specific research questions are:

1. What are science café participants' attitudes toward math, including their self-confidence, value and enjoyment of math?
2. How do participants define math and recognize math in the science café setting?
3. To what extent are participants interested in hearing about math-related topics at science café-type events? Which types of math-related topics interest participants the most?  
Together, findings on these affective characteristics will provide baseline information on existing adult program participants, which may be useful to professionals looking to expand their programming options to include math-related content for adults.

### **Perspectives**

Negative math culture in the United States is a contributing factor to Americans' low numeracy skills, even among those who are highly educated. Science centers, with a focus on lifelong STEM education, may have the opportunity to contribute to a more positive math culture by incorporating explicit math concepts into their existing exhibits and programs. Anderson and Thompson (2001) and Makros et al. (2006) have described math-related projects and initiatives in science centers and museums and several evaluations have been conducted on related exhibits and programs. However, little research has been conducted on math attitudes of visitors or program participants in informal learning environments.

Math attitudes research has largely been conducted in formal education environments. Although definitions and subscales of attitudes vary, influential work by Fennema and Sherman (1976) and later Tapia and Marsh (2004) resulted in instruments that measured self-confidence, enjoyment, value and motivation as factors of attitudes toward math.

### **Methods**

This research was conducted using an explanatory, sequential mixed methods approach:

- Stage 1: Pencil-and-paper questionnaires distributed to a large sample of science café participants, using Likert and rating scale items
- Stage 2: Semi-structured interviews conducted with a subsample of questionnaire participants

## Data & Analysis

Science cafés were chosen as the context for this research because of their popularity as a format for science programming for adult audiences, both in terms of audience size and as well as frequency of repeat attendees, and because of their potential for increased integration of math-related content.

Questionnaires were distributed to participants at six science café events: three of Pacific Science Center's Science Cafés and three of Oregon Museum of Science and Industry's Science Pubs. 340 participants completed the questionnaires. Twenty-five minute interviews were conducted with 15 questionnaire participants representing all six data collection sites. Quantitative data from questionnaires was analyzed using Excel and SPSS software. Qualitative data from interviews was analyzed using NVivo software. Codes were developed using an iterative process; first a priori from responses suggested by previous literature and then as emergent codes as new themes became evident.

## Results

A significant minority of respondents report low self-confidence in math to some degree: 15% disagree with the statement "I am good at math" and 25% agree that "Sometimes I find myself saying I can't do math." The majority of respondents (65%) agree that they enjoy learning about math, but fewer than half (44%) agree that math is a topic of particular interest to them. Interview data suggests that the main value science café attendees see in learning math is as a benefit to healthy aging, although several see understanding math as a way to better understand important scientific concepts like evolution and climate change.

The majority of participants indicate that they are moderately to extremely interested in hearing about math-related topics at science café-type events. Participants are overall most interested in surprising or unexpected applications of math, such as math in art, and least interested in current research in math.

## Importance

This research illustrates the opportunity science center professionals have to incorporate more explicit math into an already successful and popular program format for adult audiences.

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## **New Challenges for Exhibit Evaluation: The Modern Medicine Show**

### **Presenter**

Steven R. Guberman, Science Museum of Minnesota  
Gretchen Haupt, Science Museum of Minnesota  
Maggie Sandford, Science Museum of Minnesota

### **Purpose**

As informal learning institutions increase their capacity for evaluation, evaluators are being called on to assume new roles and undertake new forms of study. Whereas exhibit evaluations typically focus on formative and summative studies of the work produced by exhibit development teams, increasingly evaluators are asked to contribute to the foundational planning and conceptual issues that arise during exhibit development. Evaluators from the Science Museum of Minnesota have been involved in the creation of a new exhibition from its conception, conducting front-end studies prior to submission of the exhibit proposal and continuing to evaluate audience responses and exhibition possibilities throughout the development process. In this poster, we report on three dilemmas that emerged in our work to develop a 5000 square foot traveling exhibition, tentatively titled the Modern Medicine Show, that will use items from the museum's collection of Questionable Medical Devices (QMD) supplemented by current.

### **Perspectives**

The overarching goal of the project is to develop an exhibition in which visitors will have entertaining and enlightening experiences as they examine health claims—past and present, big and small, personal and social—using methods and tools that improve their approach to and confidence in making informed healthcare decisions. The focus is not on any particular healthcare content, but on the processes that members of the public can employ to make informed decisions for themselves and their families. Our approach to accomplishing this goal is to help visitors to recognize and evaluate various types of evidence—from claims with little scientific support to recommendations based on the experience of friends, the wisdom gained from professional practice, and the results of large-scale, double-blind, placebo-controlled clinical studies.

### **Data & Analysis**

Three key issues emerged from our work. We believe they are essential to our work and, indeed, for any museum that wants to engage the public with issues of health and healthcare; they also may be relevant for introducing information to the public more generally. They are: (a) How do we present information in ways that are fun and exciting and, at the same time, engage visitors in thoughtful reflection about serious topics, such as illness and the need to make healthcare decisions? (b) How can we use historical objects from the QMD collection to make points that are relevant to today's consumers? and (c) How do we emphasize the central role of science in making decisions about healthcare and also recognize the contributions of other ways of knowing, such as advice from a trusted and knowledgeable friend, practitioner experience and judgment, and the role of cultural beliefs and values?

### **Results**

Although we are likely to grapple with these issues throughout the development process, in this poster we present some strategies we have employed to address these issues that others may find useful in their own work. Strategies that we are testing include the use of games intended to bridge

engagement and contemplation, pairing historical objects with contemporary versions that appear to be similar, and building on conceptions of the nature of science to encourage visitors to understand that as our state of scientific knowledge advances so does our understanding of disease and the tools we use to treat it.

### **Importance**

As developers of museum exhibitions are increasingly relying on audience research to guide their work, evaluators face new challenges when they are asked to take on new roles, expand the types of questions they ask, and employ a variety of methods. In this poster, we describe three such challenges and our ongoing attempts to address them.

## **Outcomes and Lessons Learned from Evaluation of Explore Library Program**

### **Presenter**

Marti Canipe, Planetary Science Institute

### **Purpose**

This poster shares the outcomes and lessons learned from the evaluation of the Explore Library Program, an in-person and online training program designed to support librarians in bringing Science, Technology, Engineering, and Math (STEM) programming to audiences of all ages. The goals of the Explore Program are to assist library staff in facilitating active Earth and space science and engineering experiences for children, youth and families, support patron's access to STEM resources through libraries, and assist libraries in attracting new audiences and supporting novel interactions at library programs.

### **Perspectives**

More than 17,000 public library branches and bookmobiles lie at the hearts of their communities across the nation (Swan 2013), offering free access to information and learning opportunities. An American Library Association task force describes STEM as "one of the hottest topics in education and library circles" (YALSA STEM Resources Taskforce, 2013a), and libraries report the popularity of STEM programs (Staskus, 2008, Koester, 2012). Increasingly, librarians want their programming to encompass science (e.g., IMLS, 2009, Braun, 2011, Anderton 2012, Fields, 2012, Heid, 2012), but they lack training and confidence in science subjects (Mardis, 2009). They seek materials, resources, and partnerships (YALSA STEM Resources Taskforce 2013b).

Programs for libraries support lifelong learning and literacy-related goals. Few programs exist to support librarians in science programming and few librarians report that they bring science into their current offerings. Despite this, libraries are great places to reach new audiences who may not have access to science museums and represent a new avenue for bringing science and engineering content to new audiences. We report findings from evaluation data and a follow-up study that surveyed participants from several months to nine years after training to give insight into the long-term impacts and outcomes of the program.

### **Methods**

Initial evaluation data was collected at each of 38 trainings over ten years. This included content questions and questions probing participants' intentions to use pieces of the training materials. In 2013, we conducted a follow-up study of participants who had attended a least one online or in-person training. After pilot and revision, all past participants were recruited to complete the survey through email. Respondents shared information about their institution, work responsibilities, the training they attended, and their use of materials or reasons they did not use the materials.

Respondents also shared barriers to program implementations, partnerships they had created and successes they had in program implementation.

### **Data & Analysis**

Survey responses were collected at each training; content responses were scored to assess changes in pre and post knowledge of science and engineering topics and workshop feedback was analyzed using descriptive statistics. 183 individuals participated in the follow-up survey which included forced-choice response and open-ended questions. Descriptive statistics were used to analyze forced-choice questions and qualitative coding was used to categorize responses detailing barriers, successes, and lessons learned.

### **Results**

Over 800 individuals from 35 states participated in the trainings through the Explore Library Program over the last ten years. Of the 168 respondents who completed the follow-up survey, 86% reported that they are actively using Explore materials and 60% implement Explore activities on a regular basis. Over 50% feel more prepared to offer science and engineering experiences, are more comfortable using related resources, and are more likely to lead science and engineering programs themselves (instead of hiring others). 60% are very committed to providing science and engineering experiences for their visitors (compared to 16% before the training) and over 75% are more likely to advocate for including science and engineering in the programs offered at their facilities. Most respondents reported an increase in confidence in presenting STEM programs. Through the training, participants gain the skills, knowledge, and virtual network of support to bring exciting, current science to their communities.

### **Importance**

These types of trainings have been effective for classroom teachers and museum practitioners, but librarians represent an underserved audience. This study gives us insights into how to serve this audience for STEM programming, understanding barriers and successes in implementing science activities supported by our work and giving us ideas about how to best support these practitioners.

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### **Additional Links**

Learn more about Explore!

<http://www.lpi.usra.edu/explore>

ALSC Blog – Launch into STEM Programming with LPI!

<http://www.alsc.ala.org/blog/2013/10/launch-into-stem-programming-with-lpi/>

## **Parent-Child Interactions that Foster Science Interest before School**

### **Presenter**

Scott A. Pattison, Oregon State University

Lynn D. Dierking, Oregon State University

### **Purpose**

Although efforts to understand and support science learning, both inside and outside school, most often focus on science skills and knowledge (e.g., Klahr, Zimmerman, & Jirout, 2011), there is broad recognition that helping children develop lifelong science interests is equally important (National Research Council, 2005, 2009). There is also growing evidence that the foundations of interest begin before children enter school (Leibham, Alexander, & Johnson, 2013; Neitzel, Alexander, & Johnson, 2008; Renninger & Su, 2012), with important implications for children's behavior and learning later in life (Alexander, Johnson, & Kelley, 2012; Leibham et al., 2013; Neitzel et al., 2008; Renninger & Leckrone, 1991; Rowe & Neitzel, 2010). Building on these findings, this poster presentation will describe an ongoing, mixed-method research study exploring parent-daughter interactions, including interactions in museums and science centers, that potentially contribute to early childhood science interest development.

### **Perspectives**

This research is informed by two theoretical frameworks: (1) the four-phase model of interest development (Hidi & Renninger, 2006; Renninger & Hidi, 2011) and (2) the bioecological model of human development (Bronfenbrenner & Morris, 2007; Bronfenbrenner, 1979). The four-phase model defines four phases of interest development, each characterized by varying degrees of affect, knowledge, self-efficacy, and value. Earlier phases of interest primarily consist of positive affect and self-efficacy, while later phases also incorporate knowledge and value. Bronfenbrenner's bioecological model provides a framework for studying long-term developmental processes, including the development of children's science-related interests. The model makes two central claims: (1) proximal

processes, or the ongoing, direct experiences of an individual, are the primary engines of development; and (2) the impact of these proximal processes is indirectly influenced by personal, environmental, and temporal factors that are more or less distal to the direct experiences of the individual.

### **Methods**

This two-phased, mixed-method study includes an initial quantitative survey used to recruit a purposive sample of families for a more extensive, in-depth qualitative investigation of proximal processes that may shape early childhood science interest development. In phase one, 138 English- and Spanish-speaking parents of Head Start children completed a questionnaire designed to assess their childrearing beliefs and science-related attitudes and interests. In phase two, currently underway, questionnaire data was used to recruit eight parents, with varying levels of science interest, and their four-year-old daughters. Parent-daughter dyads are being observed and videotaped in four everyday contexts in which science-related discourse is likely to be elicited: (1) engaging in an in-home, hands-on, science-related activity, (2) reading a science-related book together at home, and (3) visiting the Oregon Museum of Science and Industry (OMSI). Families also choose one context they identify as science-related. In-depth qualitative interviews are also being conducted throughout the process.

### **Data & Analysis**

Questionnaire data is currently being analyzed, using univariate and multivariate techniques, to understand parents' science interests and science learning activities and to explore how these variables relate to other factors, such as parenting beliefs and values. Video and interview data from phase two will be extensively analyzed, following a constructivist grounded theory approach (Charmaz, 2006). Analysis will include three broad phases: (1) initial coding, (2) focused coding, (3) interpretation, and (4) theoretical sampling. Throughout, we will use the constant comparative method (Charmaz, 2006; Glaser & Strauss, 1967), including comparing data within and across participants and settings, to guide and motivate analysis and interpretation.

### **Results**

The research study is ongoing and preliminary findings from both the quantitative and qualitative phases will be presented at VSA 2014. Initial analysis of questionnaire data suggests that, not surprisingly, family time and activities are priorities for parents and caregivers and that some of the most common contexts for parent-child interactions outside the home include spending time outdoors, going shopping or to the mall, and visiting the library. Most parents expressed a positive view of science and many associated science with active practices, such as experimenting, inventing, discovering, exploring, and learning. Many participants also associated the word science with nature or biology and mentioned nature or the outdoors when asked to describe any other activities they do related to science. Aligned with national data, watching science-related TV programs was by far the most common type of science learning activity reported by parents.

### **Importance**

Findings from this study will have important implications for the visitor studies and informal/free-choice science education fields by deepening our understanding of how museum learning experiences may relate to parent-child interactions in other settings; suggesting promising parenting strategies for supporting young children's interest development, particularly in poor, culturally diverse families; identifying family funds of knowledge (González, Moll, & Amanti, 2005) that museums can leverage to create engaging and culturally relevant learning experiences; and helping to develop a theoretical model and research hypotheses to guide further studies of parent-child interactions and early childhood interest development. Ultimately, the study will advance the larger research agenda to

understand the implications of early childhood development and help parents and caregivers, with the support of cultural institutions like museums and science centers, to guide their children towards positive developmental pathways as lifelong, science learners.

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## **Perception of Contemporary Art in Younger and Older Adults**

### **Presenter**

Andrea Granell  
PhD candidate in Psychology at Ramon Llull University  
Visiting Scholar at Boston College

### **Purpose**

Conceptual art is often very difficult to understand unless the viewer knows what the artist is trying to achieve. The goal of this study is to determine how people make sense of conceptual art, and to investigate the effects of age (by comparing adults under 25 and those over 60 years of age) and viewing condition. Two kinds of viewing conditions were compared: the opportunity to view art works alone on a laptop or with a group in a museum with whom to discuss the works; and the opportunity to view art works with the artists' provided titles vs. without titles. The major thrust of this study is to determine the ways in which understanding of conceptual art is enhanced by knowledge of the titles and by the opportunity to discuss the work with others; and the extent to which greater understanding of such works leads to greater enjoyment.

### **Perspectives**

A great deal has been written about the psychological processes involved in the perception and response to art (Arnheim, 1966; Gardner, 1982; Gombrich, 1960; Gombrich, Hochberg, & Black, 1972; Solso, 2003; Winner, 1982). In the field of visitor studies, psychological experiments have been carried out to study directly the experience of viewing art in a museum. For example, Hein (1998), Falk and Dierking (2000), and Packer (2008) studied the visitor experience from a learning perspective. The present study grew out of a book by Leinhardt & Knutson (2004) focused on the analysis of visitor conversations in museum. In the present study we are also analyzing participant's responses and discussions about conceptual art, but the visitor experience is studied in terms of understanding and enjoyment. Our aim is to contribute to the understanding of the cognitive and affective experience of visitors in museums, and provide useful data to museum curators and educators in terms of how to create a more meaningful experience for visitors.

### **Methods**

A total of 80 adults participated: 40 young and 40 older participants. First, participants were shown two works of art presented without labels and were asked not to talk to one another about their responses. Next they were shown two other works of art, this time with labels, and they were asked to discuss their responses with one another. After that, participants completed a questionnaire. The second part of the study took place at the Museum of Fine Arts, Boston in the contemporary art collection. The same participants visited in small groups of 4 people and were asked to do the same two kinds of activities in the environment of the museum, followed by the same questionnaire. Finally, a subset of participants from both age groups met together and shared their feelings about the experience in a focus group.

## Data & Analysis

Responses are now being coded independently by two coders. Coders are coding for the positivity of the experience and the extent to which participants felt they understood the works and the artists' intentions. This will make it possible to compare for both age groups the experience with labels/no discussion vs. with labels/discussion; and the experience of without labels/no discussion and without labels/discussion. Data will be subjected to a mixed model quantitative and qualitative analysis (Miles & Huberman, 1994).

## Results

Responses will be presented at the poster presentation.

## Importance

This study contributes to our understanding of how viewers make sense of conceptual art, and how museums can facilitate the experience of viewing conceptual art to further understanding and thereby increase enjoyment. By testing the hypothesis that both viewing the title of the works and the opportunity to discuss with others what one is seeing are key factors in understanding and enjoyment of conceptual art, this study can offer guidance to museums in how to enhance the visitor experience for both younger and older adults who know little about conceptual art. The evaluative tools used in this study could be used in the future to evaluate visitor experiences of all kinds of art for more vs. less sophisticated museum goers.

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## **Playdates: How Evaluation Helped us Better Engage our Youngest Visitors**

### **Presenter**

Lynn Courtney, Museum of Fine Arts, Boston

### **Purpose**

The purpose of this session is both specific to the content and results of a particular evaluation study and more broadly focused on strategies for building institutional buy-in and advocacy for visitor studies. Goals are to foster discussion of: 1) age-appropriate pedagogical approaches for very young children that also engage parents; 2) professional development for museum educators to support successful teaching practices; and (3) strategies for the effective presentation of evaluation results and recommendations that lead to concrete improvements in program implementation.

### **Perspectives**

The Museum of Fine Arts, Boston's Playdates is one of a growing number of art museum programs for infants and toddlers and their parents or caregivers. Others include the Philadelphia Museum of Art's "Stroller Tours" and "Baby Bird Playdates;" the Denver Art Museum's "Totspot Sunday;" The Walters Art Museum's "ArtBabies," "ArtCubs" and "ArtTots"; the Toledo Museum of Art's "Baby Tours;" and the Cleveland Art Museum's "Stroller Tours" and "Art Stories."

Playdates, launched in 2011, was the MFA's first venture in serving very young children, and employs a team of art educators most familiar with teaching and designing activities for children 4 and up. From the beginning, Playdates drew a large and enthusiastic audience, necessitating logistical improvements to accommodate toddlers' need for structure and limited tolerance for waiting. An earlier survey explored audience characteristics, but did not touch on program outcomes or effectiveness. The current study explored these in depth and focused specifically on evaluating teaching strategies for engaging the toddler age group. Recommendations resulted in changes in program design and professional development strategies for museum educators that other institutions serving this population may find useful.

### **Methods**

A online survey of 104 parents and caregivers who participated in Playdates with their toddlers was conducted from October 2012 through April 2013. Playdates parents or other caregivers were recruited on site as they checked in for Playdates and asked to provide their email addresses if they were willing to complete an online survey after their visit. Recruiters used iPads to collect addresses; visitors could choose to dictate their email address or type it themselves. Participants were asked if they had previously completed a survey about their experience to ensure that they were recruited only once. They were sent a survey link within three days of their visit. Two reminders were sent in subsequent weeks. Emails were sent to individual participants from a staff member's museum email address. Wording was also carefully designed to maximize the chance that emails would bypass spam filters and would be received and opened.

### **Data & Analysis**

Participants rated their overall experience, as well as their satisfaction with specific elements of the Playdates program, and were asked their opinion about the relative importance of each element. They were asked about their reasons for returning, or intending to return, to Playdates; the success of MFA teaching staff in engaging their children with Playdates' activities; outcomes for their family; awareness and use of other MFA family resources; interest in parent-toddler Studio Art Classes; and suggestions for improvement of the Playdates' experience. Participants were also asked to comment on the teacher's strategies for engaging their children, to relate any behaviour or comments on the part of their children that showed engagement and to provide suggestions for improvement. Demographic

data collected included parent/caregiver's age, children's age(s), racial/ethnic self-identification, gender, disability and zip code. An emergent coding approach was used to analyze open-ended questions, and results were compared by age of child.

### **Results**

Participants expressed moderately high satisfaction, rating their overall experience as 8.1 on a scale where 10 is "Outstanding." A majority found the teaching staff to be welcoming and skilled at engaging young children. Evidence of children's learning included pointing at art, repeating songs, and using art-related terms.

Despite overall positive results, a mismatch was found between the program design and pedagogy and the predominant age of participants. 69% of Playdates children are two years of age and under; some parents felt that activities were not age-appropriate nor were all teaching staff successful at engaging very young children. Others noted that the theme, activities, and chosen art object were not well-integrated. They wanted more directed looking at art and more coaching in completing the art activity with their children. A key change prompted by the study was to redesign the program for two-year-olds and adapt to other ages as needed.

### **Importance**

This poster session focuses on a recent trend in art museums of serving very young visitors (4 years of age and younger) and their parents or caregivers, exploring both indicators of learning and factors influencing program effectiveness and audience engagement. It presents a study that resulted in clear, actionable results leading to specific program improvements, illustrating effectiveness in building an internal constituency for evaluation work. More broadly, it seeks to foster thinking and discussion about (1) effective and age-appropriate pedagogical approaches for serving very young visitors in informal learning settings and (2) the importance of interpreting evaluation results for internal clients in ways that support program improvements as a way to build internal advocacy and capacity for evaluation.

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### **Additional Links**

MFA Playdates

<http://www.mfa.org/programs/gallery-activities-and-tours/mfa-playdates>

## **The Prairie Science Professional Network: Evaluating Professional Impacts**

### **Presenter**

Gretchen Haupt, Science Museum of Minnesota

### **Purpose**

To learn how participants from five history museums of different sizes and focus understand and adapt the Prairie Science (a.k.a. CREATE.Connect) model of integrating STEM content with history narrative to their different visitor demographics and historical content so that their contributions might provide staff at other history center sites with examples of how the Prairie Science model could fit the specific culture and needs of their institutions.

### **Perspectives**

History centers are emerging as settings for informal science education, especially in communities with limited access to science centers. Historic sites and museums have stepped in to provide informal science experiences.

Prairie Science is an NSF project focused on developing a replicable model that situates science-focused activity benches (developed by the Science Museum of Minnesota) within historical contexts in a way that optimizes both science and history and encourages STEM learning dialogue among families.

Documenting the model's development from the perspectives of each partner institution is imperative to creating a successful model that promises easy adaptation to a variety of situations, rather than simply dictating practice.

### **Methods**

Staff from six museums were invited to participate in three workshops, and evaluators from the Science Museum of Minnesota were present to take notes, observe interactions, and record group discussions and break-out sessions.

Following each workshop, participants completed an online survey about their experiences.

Prior to the second and third workshops, evaluators at the Science Museum of Minnesota conducted phone interviews with participants from Conner Prairie and Science Museum of Minnesota who have been heavily involved since the early stages of Prairie Science.

### **Data & Analysis**

Recordings from the workshop were transcribed and coded for specific themes illustrating the evolution of the Prairie Science model and details problems, concerns, and successes unique to individual institutions.

Surveys were intended to gauge how well partner institutions understood and supported the project's goals. Survey responses were both qualitative and quantitative. Open-end feedback was also coded thematically.

The two rounds of interviews were conducted during the exhibit development. The first covered how respondents thought STEM and History content would be integrated in the final exhibit. The second explored their thoughts on how well that was being achieved. Interviews were coded for how the primary thrust of the project, an integrated science and history exhibit, was articulated and what facets of that integration appeared most important.

## **Results**

Recordings and observations from workshops tracked shifts in language as participants delved more deeply into content brainstorming and provided insights into the face-to-face collaborative process and creation of a community of support and resources.

Survey responses reveal excitement about participating in a groundbreaking project. As the project moved forward concerns changed from initial worries about the overall feasibility of the endeavor and buy-in to more specific practical concerns like staffing and facilitation resources.

## **Importance**

The museums involved in Prairie Science form the core of an emerging network of sites and institutions engaged in family learning around the subjects of science and history, documenting its development from the perspectives of each partner institution is imperative to creating a successful model that promises easy adaptation to a variety of situations, rather than simply dictating practice.

Understanding how the partner museums adapt the Prairie Science model makes a valuable contribution to the informal science education literature, providing much-needed insight into strategies for promoting family learning in interdisciplinary ways.

## **Additional Links**

Grant Details for Prairie Science: Integrating Informal Science and History Learning through Family Dialogue

[http://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1223770&HistoricalAwards=false](http://www.nsf.gov/awardsearch/showAward?AWD_ID=1223770&HistoricalAwards=false)

CREATE.Connect

<http://www.connerprairie.org/Plan-Your-Visit/1st-Time-Guests-or-What-is-Conner-Prairie/Create-Connect.aspx>

## **The Role of Front-End Research to Increase Capacity**

### **Presenter**

Kayte McSweeney, Senior Audience Researcher  
Amelia Robinson, Senior Audience Researcher

### **Purpose**

Front-end research at the Science Museum has been crucial in ensuring barriers are removed in order to engage audiences with science. Research has shown that science is often a subject audiences misunderstand, lack knowledge on, find controversial or are not motivated to engage with.

Through conducting front-end research the target audiences needs, wants and expectations have been identified and barriers to engagement with the content have been understood from the start of a project. This has increased capacity to overcome any challenges to a project delivering a learning experience from a very early stage.

Through examples this session will explore how this research has led to the Museum taking innovative approaches to engaging their audience with challenging science within its exhibitions and learning programs.

## **Perspectives**

The Audience Research and Advocacy team believe strongly in the value of conducting and investing in front-end research in order to identify and remove barriers to engagement at an early stage. This has benefited the Museum's capacity to deliver audience focused experiences. It ensures teams do not waste time and resources creating experiences which will not work for the target audience. Instead it has led to creative thinking and innovative approaches being implemented.

## **Methods**

The Audience Research team at the Science Museum use a range of approaches to gauge audience understanding of different science subjects including focus groups, interviews, surveys and concept testing.

## **Importance**

This poster will explore how front-end research has led to the Museum taking innovative approaches from the start of a project to overcome barriers to engagement for their audience. This is beneficial to supporting institutions capacity to deliver audience focused experiences and use resources in a way which will benefit the target audience.

## **Safari Adventure: Designing and Evaluating for Better Connections to Nature**

### **Presenters**

Sarah Edmunds, Exhibition and Graphic Arts Department, Wildlife Conservation Society  
Sarah Werner, Exhibition and Graphic Arts Department, Wildlife Conservation Society

### **Purpose**

How can zoo exhibits better connect people to nature? By what methods can we explore such themes to best suit our visitors.

Stemming from work for a proposed family exhibit, we will present how front-end and long-term evaluations, educator workshops, focus groups, and benchmarking trips to thirteen other US zoos and aquariums have come to inform our current thoughts about useful nature exhibit practices and their implications for Safari Adventure and many of our other planned zoo visitor experiences.

### **Perspectives**

A major challenge facing our institution and the entire field of zoo design is how to better connect people to nature. Authors such as Richard Louv say our children are becoming increasingly disconnected from the natural world. Others, including professors Louise Chawla and Nancy Wells, and author David Sobel, describe how early nature-play lays the groundwork for valuing nature as adults.

On these grounds, in 2011, the Institute of Museum and Library Services awarded WCS a grant to explore the development of a new family exhibit at the Bronx Zoo, Safari Adventure. This exhibit would aim to better connect the families in our community (part of the largest urban population in the United States) to nature.

Our exploration of the themes relevant to our project involved a suite of visitor study and informal education tactics, including evaluations and visitor focus groups, with the overall aim of providing effective informal education experiences for our visitors.

## **Importance**

This project marks the first time we have undergone a combined suite of such exploratory tactics. Using this level of research and evaluation to help drive the kind of experience we're looking for is unique to our institution. This, at least for us, speaks to an effort of capacity building and development methods relevant to the larger professional community.

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## **Science on the Move: Design-Based Research Outside Institution Walls**

### **Presenter**

Scott Pattison, Oregon Museum of Science and Industry (Session Contact)  
Marcie Benne, Oregon Museum of Science and Industry

### **Purpose**

In this poster session, we will discuss the Science on the Move (SOTM) project, led by the Oregon Museum of Science and Industry (OMSI) and focused on the creation and improvement of exhibit prototypes at local public transit centers. The SOTM project team used a design-based research (DBR) approach to iteratively test the exhibits and develop and refine a theoretical model for describing how individuals engage with science, technology, engineering, and mathematics (STEM) in transit centers and the exhibit design strategies that support this engagement.

### **Perspectives**

To guide our investigation, we drew from three broad literatures: situational interest, navigation, and design affordances. Situational interest is an emotional response to a specific situation that motivates attention and effort (Renninger & Su, 2012; Sylvia, 2006). The four-phase model of interest development posits that situational interest is a critical first step in the development of more enduring, individual interest (Hidi & Renninger, 2006) and has provided the team with a framework for understanding how and why individuals engage with interactive exhibits in transit centers. Navigation is an integrated behavioral system involving movement, physical orientation, conceptual orientation,

search, attention, and appraisal (S. Bitgood, personal communication, 2014). Research in a variety of environments has identified environmental characteristics that can guide human navigation by supporting legibility (Bruce & Green, 1991; O'Neill, 1991; Weisman, 1981) efficient movement patterns (Bell, 1991; Golledge & Stimson, 1997), and value to pedestrians in the particular context (Bitgood, 2013). Finally, prototype development has been guided by the concept of design affordances (Allen, 2004), including the factors that contribute to active prolonged engagement (Humphrey & Gutwill, 2005), advantages and challenges of interactive computerized exhibits (Allen & Gutwill, 2004), and general principles of effective user design (Johnson, 2010).

## **Methods**

In order to both refine the exhibit prototypes and develop an empirically-based model of how and why individuals engage with science in transit centers, the team used a design-based research approach (Brown, 1992; Cobb et al., 2003; Collins et al., 2004). Design-based research (DBR) is characterized by iterative cycles of research and design, investigations in authentic learning environments, the development and testing of theories and conjectures, and collaboration with practitioners (Cobb et al., 2003; Collins et al., 2004). In this project, the DBR followed three phases: front-end, progressive refinement, and retrospective analysis. During each phase, the team used a variety of methods to test and iteratively refine contextually-grounded “small” theories. Team members from multiple departments were integrally involved in research activities, contributing to a high level of excitement and energy regarding the collection and use of data to inform both theory and practice.

## **Data & Analysis**

At the end of each data collection shift, researchers first engaged in a short debrief to discuss the activities and any initial thoughts and reactions. After each data collection mini-cycle, data were analyzed as appropriate to identify emergent themes and explore which aspects of the project theory of action (TOA) were supported or contradicted. Based on these analyses, researchers compiled an express report to guide debrief discussions with the entire research and development team. If parts of the TOA were not supported, the team discussed necessary changes and adaptations. To document the process, notes from team discussions, relevant findings, and a summary of the changes made to the TOA were briefly summarized and archived. Finally, based on findings and discussions, the team adapted the exhibit prototype and data collection protocols to test new aspects of the TOA during the next mini-cycle.

## **Results**

While several mini-cycles remain before the conclusion of this study, certain findings have already become evident. First, when developing in situ informal learning experiences, project teams must attend to and account for contextual norms and expectations which may differ from those within the walls of our institutions. As a concrete example, the first iteration of an SOTM prototype included yellow “caution” tape as an attractor, in alignment with the “crime scene” theme of the experience. During testing, however, it became clear that whereas visitors to the museum might perceive such tape as being a “prop,” in a public location, many audience members interpreted it as a sign to “keep away.” Other preliminary findings have highlighted the increased importance of providing a clear, explicit invitation to engage, as well as unambiguous way-finding markers and instruction.

## **Importance**

The National Research Council has recognized the need for life-long learning to help adults understand and interpret the complex scientific information that impacts their lives—from climate change, renewable energy, and disaster preparedness to personal medical decisions or consumer technology purchases (NRC, 2009). Research shows that free-choice learning experiences are a critical contributor to adult science knowledge (Falk & Dierking, 2010). While science museums are effective in providing STEM education to those who visit (NRC, 2009), only 26% of the adult public

visits science centers (NSB, 2010). As part of a broader effort to understand how museums can bring interactive STEM learning experiences to new audiences outside institutional walls, the SOTM project is exploring promising strategies for engaging adults in transit centers and developing theoretical models that can be applied and tested in other settings.

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## **Understanding Visitors' Nostalgic Responses and Long-term memories in Museums**

### **Presenter**

Dr. David Anderson, University of British Columbia, Canada

Dr. Hiroyuki Shimizu, Kobe Gakuin University, Japan

Dr. Makiko Yuasa, Hokkaido University Museum, Japan

### **Purpose**

Research Objective and Focus: This presentation will report the outcomes of an empirical study that examined visitors' nostalgic responses to museum experiences and objects on their long-term memories. The study, conducted in three different Japanese social history museums, sought to understand specifically the kinds of museum experiences and objects that evoke visitors' nostalgic responses, and how the objects/experiences influenced the strength of nostalgic responses associated with museum experiences and their recalled personal long-term memories of life events.

### **Perspectives**

A total of 87 visitors, whose average age was 52 years, were interviewed face-to-face about the objects and experiences that triggered nostalgic memories immediately after they had visited one of three different museum sites: 1) the Osama Tezuka Manga Museum (OTMM), containing many historic comic books, toys, TV animations, and other original artefacts relating to works of Osamu Tezuka - the creator of Astro Boy and The Lion King; 2) The Shōwa Era Early Life Style Museum (SEELSM), containing many folklore exhibits of Japanese houses, common household objects, and daily necessities in the post WWII period of Japanese society (1945 to 1960); and (3) the Modern Transportation Museum (MTM) in Osaka, containing many exhibits about trains that helped connect and develop Japan over the past 100 years.

### **Methods**

During the course of the interviews, visitors were asked to identify at least three museum objects and/or experiences from their visit that triggered nostalgic memories, and then to rate these memories on a variety of scales, including, a) memory vividness (MV), b) the extent of rehearsal of the memories throughout life (R), c) past emotional affect associated with the memory (Affp), d) emotional affect now associated with the memory (Affn), and e) nostalgic strength of the memory (NS). These variables were known to be influencing factors on the recall of life events (Anderson & Shimizu, 2007; Reisberg & Heuer, 2004; Williams, Conway & Cohen, 2008), but their influence on recall of memories via nostalgia has not been the subject of investigation.

### **Data & Analysis**

From the 87 interviews, a total of 253 individual nostalgic memory episodes associated with museum objects or experiences were identified and subsequently investigated by means of Pearson correlation

analysis and analysis of variance (ANOVA) between variables and museum sites employing post-hoc Bonferroni tests.

## Results

1. Nostalgic memories triggered by museum objects or experiences were also vividly recalled memories (NS x MV,  $r=.360$ ,  $p=.000$ ) and were positively emotionally toned in the past (NS x Affp,  $r=.248$ ,  $p=.000$ ), but not necessarily positively toned in the present (NS x Affn,  $r=.135$ ,  $p=.042$ ).
2. There were distinct differences between the strength of nostalgic responses (NS), vividness of memories (MV), and the extent of rehearsal of memories (R) that museum objects elicited by the type of social history museum (SEELSM, OTMM, and MTM) visitors experienced.
3. These distinctions in nostalgia, by memory vividness, rehearsal, and emotional affect across the museums were explained by the types of museum objects visitors encountered and the personal identities of visitors.

## Importance

The outcomes of this study, conducted in three Japanese social history museums, yields new understandings of the impact of museum objects and experiences through visitors' nostalgic responses. Moreover, the study provides valuable insight about the characteristics of museum objects and experiences that elicit strong nostalgic response and the recollection of vivid long-term memories. Specifically, this study show: 1) how museum exhibits evoke vividly recalled life memories connected with a nostalgia and how vividness of recalled memories in the museum is highly correlated with nostalgia and rehearsal, but nostalgia is not related to rehearsal of memories; and 2) how a) the nature of the object, b) type of past engagement with objects, and c) rehearsal of memories, influence nostalgic responses and the recall of memories associated with the museum object.

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# The Value of Early Childhood Professionals in Research and Evaluation

## Presenter

Stacy Niemiec, John G. Shedd Aquarium, Erikson Institute

## Purpose

The purpose of this poster is to highlight museums, zoos, and aquariums as early learning spaces and to underscore the importance of researching young visitor's experiences. At Shedd Aquarium, having researchers with early childhood knowledge has allowed for a richer understanding of the child's experience. The need to understand early learners' experience at one of Shedd's early childhood spaces, the Submarine, began as an intentional attempt to blend these two fields of early childhood and research and evaluation. Particularly we wanted to answer the following questions: how are children engaging in the space? Are they using imaginative play and/or creating story-lines within their play? Are they making any connections to the belugas or the natural world? And what does the parent-child interaction look like? This poster will share with conference attendees how Shedd Aquarium has utilized early childhood professionals in research and evaluation to better understand young visitor's experiences.

## Perspectives

Research on early childhood learning experiences in museums and aquariums is sparse. Many studies have highlighted the various benefits museums afford young visitors such as quality parent-child interaction (Acosta, 2000), play in learning (Henderson & Atencio, 2007), and the benefits of free-choice, informal learning in general (Falk & Dierking, 2003, 2010). However, few studies use empirical data on children's actual museum experience (Munley, 2012). Recently, the IMLS published "Growing Young Minds," a document calling for museums and libraries to play a more pronounced role in early learning across the country (Howard, 2013). In order to accomplish this there must be a deeper understanding of young visitor's experiences in these spaces.

At Shedd Aquarium, each phase of the Submarine evaluation has benefited from early childhood professionals. During instrument development they researched literature on learning and play in informal spaces to develop a behavior checklist and began considering what certain behaviors may indicate. Throughout the analysis of qualitative data, they helped interpret and make meaning out of young visitors' behaviors. Formal child development knowledge was relied on heavily throughout the evaluation process to ensure that the child's perspective was represented as accurately as possible.

## Methods

Running record observations and a behavior summary, coupled with an intercept interview, were used for this evaluation. When a child entered the Submarine space an evaluator would start the stop watch and begin a running record observation of the child's experience. Once the child and caregiver(s) exited the Submarine the evaluator would ask the adult for feedback. Once the interview was completed, the evaluator would go back and fill in any gaps or notes on the running record observation and would fill out the behavior summary checklist. The behavior checklist was developed to help organize the data and pull out patterns pertaining to the research questions.

## Data & Analysis

Emergent coding was used to analyze the qualitative data (Merriam, 2009). Analysis for the running record observations and the intercept interview was first conducted separately to pull out the more salient trends. In the open coding phase each occurrence of a caregiver-child interaction, play behavior, or nature connection in the data was coded. The data was then grouped into broad categories based on more specific behaviors within each of the categories. The qualitative intercept interview data was analyzed in the same fashion, using emergent coding to categorize adult's responses to open-ended questions and pull out prominent trends in the data. Quantitative data was

analyzed for percentage breakdowns and mean ratings. Once the data had been analyzed separately, audience research and evaluation considered all of the qualitative and quantitative data to confirm similar findings across all data sources. A total of 27 observations and 26 interviews were conducted.

## **Results**

Data showed that supervising was the primary adult- child interaction observed, followed by the adult helping the child engage in the Submarine. Notably, in 74 % of observations caregivers were observed helping their child, however, in the adult interview just 38.5% of caregivers stated helping as their role. This suggests a discrepancy between observed adult behaviors and adults' perception of their own behaviors.

Overall, there was sometimes a disconnect between the caregiver's interpretation of the child's experience and the evaluator's observation of the child's experience. Some caregivers stated that their child was too young to understand the Submarine or make connections to nature through play, however, some of these same children were observed saying things like, "I see a beluga!" or "I'm driving the submarine." These data underscore the importance of developing methods other than adult interviews to evaluate early learners' experiences.

## **Importance**

To soundly conduct research on early learners, researchers and evaluators must have the right combination of expertise, research and evaluation knowledge as well as an understanding of early learning and development. Building capacity internally at informal learning institutions means building partnerships with early childhood institutions, hiring consultants with early learning backgrounds, or having staff on hand with this knowledge base. The research methodology, as well as the interpretation of raw data, needs to be conducted through the lens of early learners. This combination of expertise provides an understanding of what learning experiences are developmentally appropriate and how exhibits can be modified to meet the needs of the youngest visitors. Since young children are a difficult population to study, making this knowledge more widely available is imperative to creating a deeper understanding of the learning experiences for children in these spaces.

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## **Why Is This Here? The Family Learning Potential of a Museum Collection**

### **Presenter**

Emily Izzo, Indiana University Purdue University Indianapolis  
Elizabeth Quay, Indiana University - Purdue University Indianapolis  
Laura Weiss, Indiana University - Purdue University Indianapolis

### **Purpose**

This poster presentation details our work on a project with the collection at The Children's Museum of Indianapolis (TCMI). The purpose of this research project was to test a rating criteria and evaluation system for assessing the museum's current collection along its new, evolving mission for family, or intergenerational learning. The question we sought to answer was whether or not the rating criteria and evaluation system were effective in meeting these goals. To answer this question we compared visitor feedback and observations with an independent analysis of the objects on their own

### **Perspectives**

The Children's Museum of Indianapolis is one of the few children's museums in the country with a permanent collection. Although the collection is a strong asset, it grew exponentially from the beginning of the museum in 1925 to the early 1980s due to an open donation policy. This led to the acquisition of thousands of objects, some of which were appropriate for family learning and some of which were questionable. With over 120,000 objects in its collection, TCMI and students from Indiana University - Purdue University Indianapolis set out to discover just what kinds of objects are in the collection, asking the question, "Why is this here?" all along the way.

### **Methods**

Using visitor feedback and observations, existing literature frameworks, and object research, the project evaluated the appropriateness of the collections objects to the family learning environment. Through a variety of interpretations – visual, historical, contextual – visitors ranked objects first on a four point scale, stating whether objects were familiar or unfamiliar and memorable or forgettable, linking the objects to audience knowledge and memory. Visitors also ranked objects in order of importance, giving reasoning as to why some objects were more important than others. These audience reactions, conversations, connections, and associations were all taken into account in order to capture impressions on the qualities of the objects and evaluate their relevance to the collection.

### **Data & Analysis**

Student researchers collected 634 responses on the subset of 37 objects from 128 adults and 141 children. Objects that were more memorable were more likely to be selected as more important. Visitors were just as likely to rank something as most important whether they were familiar with the object or not. For example, of the top five objects rated on a 1-8 scale as the "most important" (giving a ranking of 1) 67% of the objects were described as "memorable" whereas only 52% were described as "familiar"(n=103). Comparing the audience rating with the rating system, the object rating (defined on a scale of 7-100), the agreement between audience preference (e.g. high or low ranking) matched the assessment about 60% of the time. Some reasons for this discrepancy appear to be related to the condition of the object, the level of interpretation needed for the object, or the potential for interactivity.

### **Results**

The results of our visitor testing led us to conclude that objects that are seen as memorable are considered more important to visitors and both familiar and unfamiliar objects are of interest. We also discovered that there is currently a slight disconnect between what existing object research literature suggests about the importance of an object and what a visitor perceives, which hopefully will lessen as our evaluation method of objects is refined. We discovered that when objects were seen as

familiar, family discussion frequently included personal stories, and when objects were seen as unfamiliar, families tended to talk about the sensory features of the object.

### **Importance**

By researching and evaluating the potential for objects to support informal learning, this project sheds light on how family audiences interact with each other and objects in the museum setting. The tools we developed for this research, as well as our data and insights, can assist other museums and informal learning institutions in deciding how their objects can influence the visitors' experiences. Our research is intended to be cross-disciplinary, and can be used by many departments in a museum, including collections, interpretation, exhibit design, and education. We intend for this research to be expanded to more objects at TCMI, and the findings used to create better family learning experiences. We would also like other institutions to think about the questions we raised, and to see if our experiences with visitor research and our findings about the role objects can play in family learning are applicable to other informal learning institutions.

### **Additional Links**

Museum Studies at Indiana University Purdue University Indianapolis

<http://liberalarts.iupui.edu/mstd/>

Museum Collection at The Children's Museum of Indianapolis

<http://www.childrensmuseum.org/about/museum-collections>