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**THE STATUS OF RESEARCH ON LEARNING SCIENCE
WITHIN INFORMAL EDUCATION SETTINGS**

THINK PIECES

**Research Questions of Informal Learning Practitioners:
A Seriously Informal Survey**

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Introduction

The problem: The academic research community acts as if it has stumbled onto the continent of informal science education and has found it “uninhabited.” That is, since little academic research and publishing has taken place in the field of informal science education, it is perceived as “up for grabs.” As a practitioner for over 30 years, I feel like an “unwashed native,” invisible to those in the midst of the land grab. And new research projects appear daily on the horizon, while many of my gifted and experienced colleagues in the field write off these “colonialist” ventures as uninformed at best, and more often misguided and wasteful.

The counter-problem: Informal learning practitioners – at least many of us in museums and science centers – are rooted in oral and visual traditions, our knowledge acquired at the feet of elders, around the campfire, and over years of trial and error. Many of us lack the time or skills necessary to keep abreast of the latest educational theories and research, and consequently our research questions may be uninformed. We may have a wealth of expertise and knowledge, embedded in long traditions of practice, but it is often difficult to access for those from outside our field. Conversely, not all practices and projects are worthy of examination, and researchers unfamiliar with the field may not know how to select appropriate projects on which to focus their research affection.

There are, of course, the exceptions. Some researchers have been working alongside practitioners for many years, particularly in the domain of exhibition and program evaluation. Some are actually embedded in museums, like those in the Exploratorium’s

Visitor Research and Evaluation Department. Some are practitioners who have gone back to the academy to gain credentials and research skills much needed in the field. But despite the presence of these dual citizens, there exists a lack of commonality across the differing cultures of research and practice. While many people write off the differences as superficial or attribute them to the rewards systems within each group, I am not so sure. It is not yet clear to me whether simply developing a common language can ameliorate the differences, or whether there are deeper fundamental differences in cultural goals and values. As one colleague lamented, "It's difficult to research the issues I care about."¹

Notes from the Field

In order to get a sense of the issues and questions that research might help practitioners address, I polled my colleagues across the country who work primarily in museums, science centers, visitor centers, and other similar public venues: "If you could set the research agenda for informal learning experiences and environments, what research questions would you ask? What would you like to find out about your work and practice? What are the most important things we should be asking as a field?" This was not a rigorous study, mind you, but an informal query about informal learning.

I contacted about 40 practitioners – an eclectic mix of designers, developers, managers, directors, educators, filmmakers, writers, and artists. Twenty people responded to my email, and the ensuing conversations that developed when someone hit the "reply to all" icon are evidence of the depth of their interests and concerns. Despite the small sample size, my gut sense and prior experience tell me that these comments indeed reflect general attitudes of practitioners. And although the responses are broad and diverse, I can detect some overarching and interrelated themes. It is important to remember that, while these "themes" are organized to describe practitioner questions, they also very well could be areas with the densest accumulation of practitioner expertise and collective knowledge.

The inherent value of museums

Underlying most of the comments and questions I received is a desire to more fully understand the perceived value of our institutions. "Why do people choose to spend their precious leisure time with us?" "What good do we do? We need data to help make our case to our stakeholders, and we need to do so in a simple and clear fashion without academic jargon." (One colleague described her meeting with a state Department of Education Under-Secretary, in which he said the only way he would believe that museums are making an educational difference would be if museums could document statistically significant impact on standardized test scores, using control groups that

¹ In the spirit of informal learning, no references are included in this paper. Sources are available upon request.

had not experienced museum programs.) “How can we document the value of what we do without getting forced into playing by the rules of someone else’s game, especially when it is a game we are unlikely to be able to win?”

The nature of learning in informal environments

Most respondents articulated a deep interest in the essential nature of informal learning: “How do people learn in our multi-sensory environments?” “What is the importance of prior knowledge?” “What is the relationship between affect, cognition, and behavior?” “Would more learning take place if visitors had to teach something to someone else?” Several colleagues wondered how often visitors see past the literal exhibit experience or exhibit device into the workings of their own minds or to make associations with the world beyond the museum: “My worry is that people are so accustomed to looking at science exhibits as being about external phenomena that they don’t easily use them as tools for looking inward.” “How can we foster a love of learning?”

Many questions focused on broadening the definition of learning to include states of awareness such as emotion, contemplation, reflection, inspiration, introspection, delight, perplexity, wonder, and awe: “How does emotion anchor learning?” How often are visitors’ experiences personally significant, relevant, edifying, abiding, and truly engaging? “If visitors actually respond to the question of why they visit by saying ‘to learn something,’ does that really mean they want to learn facts and content, or does it mean they want to be entertained intellectually by a new idea? . . . I recently visited the Spy Museum with my family, and after watching a video related to modern terrorism, I had an engaging conversation with my husband about it. Today, I cannot remember the main message of the video or what we actually talked about. But I remember clearly that I really enjoyed talking to my husband about something other than what bills need to be paid, who was going to pick up the kids from soccer practice, or what was for dinner. Admission to the Spy Museum for a family of four: \$53. Remembering why I married my husband: priceless.”

Long-term effects and impacts

Many colleagues are concerned about the impact of museum programs and exhibitions on visitors over time. They would like to learn more about what happens *after* visitors leave an exhibition—how they reflect back on their exhibit experiences, what they recall most vividly, whether they think about their life or the world differently after visiting an exhibition (and why), and whether the experience caused them to act in new ways. One exhibit developer said, “I’d like to see a more focused research effort by a consortium of museums and other informal learning environments” (on the long-term impact of a museum visit).

The influence and effects of design

A major area of practitioner concern focuses on the effects of environmental, graphic, physical, visual, and soundscape design. Colleagues posed a number of big-picture

questions about juxtapositions and adjacencies, communicating metaphorically, and creating context: “We can track how long people spend at a given exhibition element, and whether they appear to stop at it, but how do we know that the very fact that something is there, next to something else, affects visitor receptiveness to ideas? How do you measure a sum that is greater than its parts?” “What are the effects of including abstract, conceptual, or ironic ideas, images, and artifacts?” “Can a variety of design methods be effective in engaging visitors in problematic situations that reliably empower and enable them to think their way through issues and develop their own solutions?”

There are also many questions about specific design elements such as sound, color, lighting, materials, typography, interfaces, and designing for all the senses: “What are the universal interfaces that transcend language (on/off, forward/reverse, highlighting for attention) and how might we use them more effectively?” “What is the effect of presenting simultaneous auditory and visual information, as opposed to either by itself?” “How can attention be enhanced by movement.” “Design. This is a big one, but the museum field is generally poorly equipped to talk about effective exhibit design, and its relationship to visitor learning, comfort, and pleasure.”

Promoting social interaction and exchange

A number of questions arose regarding the social nature of museum experiences and how developers and designers can foster even more interaction through the design of their exhibits and programs. Their focus is less on social interaction among family groups (which seems to be an ongoing topic of interest among researchers) and more on social interaction among strangers, particularly in the context of serious social issues, controversial topics, and public debate. “Science centers have spent decades defining themselves as science-themed family entertainment centers. Is it possible to address the very real science-related concerns that face our society in the context of what I can only think of as pediatric science? There are institutions that literally use ‘science=fun’ as a slogan. Science does not always equal fun – when science is documenting species extinction, the end of the petroleum economy, and global pandemics. Is it possible to address these issues in a meaningful way in institutions that compete in the leisure economy? If so, how?” “I would like to know if our exhibitions could create a more activist citizenry who participates and engages in real science and technology and the accompanying issues.”

Influencing and changing visitor behaviors

A number of colleagues, particularly those working in organizations committed to environmental education, wonder whether, in visitors’ short visits to museums, we can influence their future behaviors: “What are the most effective ways to change visitors’ attitudes and move them to change their behaviors – around health, social justice, and conservation issues?”

Examining effectiveness

While many colleagues articulated an interest in the effectiveness of museums overall and of specific elements and components, several point to the lack of a shared definition of effectiveness: “What does ‘effective’ mean? The field is faced with conflicting definitions of success. An exhibition or program can be enormously successful in educational terms, but a disastrous failure in the marketplace. Or visa versa.” One senior professional responded, “I am interested not so much in what or how visitors learn, or how museums will affect their lives twenty years later, but how well *we* do our jobs. To what extent do we create exhibitions in which visitors can clearly understand our intention and take a personal and informed position in relation to that intent (as opposed to taking a position that is based on a misunderstanding of the intent or a lack of understanding, when the intent is not known)?”

Pragmatic questions

Given that the respondents are all practitioners “in the trenches,” responsible for the actual designing, making, and managing of museum experiences, there was surprisingly little discussion of the pragmatic issues of the field. One person voiced an interest in assessing bilingual labels. Another would like to see research on the real resources of time and money required to do exemplary work: “As someone recently complained, ‘good, cheap, and fast have become perfect, free, and now.’ Having solid, reliable information allows us to say, ‘No, you CAN’T fill a gallery with the latest interactive technology for \$100 per square foot.’” One person questioned the importance of change for repeat visits: “Is incremental change within exhibitions noticeable or meaningful (mounting, for instance, spot exhibits on current issues, or changing things around in different groupings, etc.)? Would it drive any repeat visitation, or does it really require major change to get people to think there is enough novelty to come back? This is obviously a long-term study, but it would be wildly useful to the field, as dependent as it thinks it is on discreet, large, changing exhibitions to keep up visitation.”

Practitioners and Researchers

Undoubtedly these practitioner questions run parallel to questions and concerns in the research community. But I also see some striking differences. Researchers may say “We know what happens in the museum and during a museum visit” and practitioners will argue that we really don’t know very much. Researchers may focus on learning in school settings, while practitioners repeatedly emphasize questions about emotion and inspiration as the most predominate and powerful experiences in informal settings.

Researchers consistently talk about the commonalities of formal and informal learning domains, but many practitioners seem to be more interested in the differences: “What is the particular learning value of the museum *as opposed to* formal education? I think measurement tools for museum learning tend to be more rigid than they should,

because they are usually derived from formal education testing paradigms. What needs to be explored are the more personal and idiosyncratic ways visitors get value from their museum visits.” One colleague described her interest in “getting at the differences between informal and formal educational experiences and the value of what museums offer. How can we measure inspiration? Delight? Perplexity? Especially with the potentially long time frame of return on any given museum experience? Not whether you remember any facts from an exhibition three months later when a researcher calls, but whether your wonder, or thrill, or outrage in an exhibition simmers in your brain and someday leads to a career choice, choosing a bicycle over an SUV, going back to school, volunteering in your community.”

I believe practitioners’ (including my own) interests in looking at the *differences* between formal and informal domains lie not in a fear of accountability (as some researchers have suggested), but in the belief that some aspects of informal learning – perhaps the most important aspects – lie far beyond the capacities of the formal education arena. And in the rush to focus on similarities, these important informal aspects might be ignored or lost.

Researchers talk about experimental design, socio-cultural theory, and epistemologies of learning while practitioners are focused on the power of instinct, hunch, and what Malcolm Gladwell calls “blink” – when our snap judgments and first impressions offer a much better means of making sense of the world. These tensions are often played out in practitioner debates about the role of the educator (as the keeper of pedagogy) and the role of the auteur (as the keeper of artistic vision). Parallel arguments focus on the value of research (in the scientific tradition) and the role of criticism and critique (in the artistic tradition).

Challenging Some Assumptions

If I were in charge of the research agenda for informal learning initiatives, I would probably start by looking at exemplary projects to understand why they are considered successful. And I would try to air out some of the untested assumptions under which the field generally operates. Obviously, we must look at prior research and build upon practitioner knowledge. But not so obviously, I think we need to look at all of these questions in the context of some commonly held field-wide assumptions that influence what we do, the questions we ask, and the ways we go about answering them. For argument’s sake, I’ve included here my own personal favorites:

Interactivity

Long before internet culture embraced interactivity as a way of engaging with the world, science museums had codified the notion as the pinnacle of best practices in informal learning environments. But in museums, as well as on the internet, “interactivity” can mean a multitude of things, from hands-on and point-and-click to

more constructivist experiences designed to be like the practice of science. I believe that, at its best, interactivity means designing *with* visitors, not *for* them. I'd like to see more research that teases out the critical aspects of interactive experiences, and actually investigates the assumption that in order for an exhibit to provide a powerful learning experience for visitors, it must be interactive.

Inquiry and open-endedness

Scientific inquiry and open-ended exploration are cornerstones of informal science education. But in the name of "open-endedness," some vague, overly complex, and confusing exhibits have been born. I'd like to see more research that teases out the degree to which unmediated inquiry and "open-ended" exploration support visitors in constructing their own knowledge. How much scaffolding do people need in order to be grounded in an understanding of each exhibit situation? How can we provide encouragement and incentive for visitors to reflect upon their experiences and use them to build deeper knowledge?

The big idea

Arguably, the notion of articulating "the big idea" at the beginning of exhibit development arose in response to an "anything goes" open-ended style of design that emphasizes the quality of an exhibit *experience* regardless of its connection to an idea. The reasoning: If practitioners would focus on the learning or communication goals of an exhibit, visitors would presumably not be left in the dark. Some museums have taken this notion to the extreme, and the resulting exhibits are dry and didactic at best, and more often preachy and boring. At the other end of the spectrum are "cool" experiential exhibits that exist in a world of their own. I'd like to see more research that compares idea-driven and experience-driven exhibits and identifies the strengths and weaknesses of each.

The role of design

Science museum professionals (and educational researchers) are notoriously naïve when it comes to thinking about the effects of environmental, graphic, and other design applications, which is why, in my opinion, so many science museums and science centers look more like airports and shopping malls than evocative places of learning. The Exploratorium is probably one of the most interesting and paradoxical examples: While some brilliant scientific minds have been employed over the years to create table-top exhibit experiences focused on light, shadow, color, motion, perception, sound, and heat and temperature, little or no attention was paid to the large-scale environmental effects on visitors of these same phenomena. Poor lighting and unnecessary shadows interfere with visibility; color, motion, and sound compete for attention; and building temperatures often stray into discomfort zones. All of these phenomena create psychological effects that play a role in visitor attention, focus, and openness to

learning. Yet the designed environment remains the most mysterious and least researched aspect of informal learning environments. I'd like to see more research, informed by the work of environmental psychologists, that systematically explores the effects of learning designs.

Going Forward

Clearly, the issues are not as black and white as I have characterized them (in the spirit of provocation). And the "straw man" approach is only helpful to a point. We need to bring researchers and practitioners together to design an agenda *in common*, based on the experiences in informal learning environments and the training in research communities. But this is no easy task. As practitioners expand their repertoire of design and development techniques to incorporate more diversity of styles and disciplines, the variables are increasing. How can we create a research agenda under increasingly variable conditions, with any hope of generalizing across the diversity of visitors, types of experiences, types of organizations, goals of projects, and definitions of effectiveness that we find ourselves immersed in today? Only by working *together* to define research goals, design and implement research projects, analyze outcomes, and reflect upon what we have learned will we contribute to the whole range of practices and their many shades of gray.