

Broader Impacts: Understanding STEM Principal Investigators' Approaches to Informal Education

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STEM: Science, Technology, Engineering, and Mathematics

Introduction

The Center for Research on Lifelong STEM Learning worked with the Center for the Advancement of Informal Science Education – CAISE – to assist the NSF Advancing Informal STEM Learning (AISL) program to enhance the quality of investigators' broader impact (BI) efforts by improving their understanding of and connections with out-of-school educational resources. Center staff conducted 21 interviews with volunteer STEM investigators from a variety of disciplines to better understand how STEM researchers go about designing, planning and executing the BI portion of their NSF funded work. This information being used by CAISE to enhance the usability of www.informalscience.org for STEM investigators seeking to connect with out-of-school science education resources.

Participants engaged in a variety of BI activities associated with informal science education (ISE) such as working with museums and science centers, public outreach (e.g. science pubs), news and informational media (print, video, radio), diversity initiatives, afterschool and school supplemental programs, citizen science, stakeholder workshops, web and digital learning interfaces, engaging community partners or policy makers into the research process.

Approximately half of the researchers interviewed were seasoned investigators and the rest were early-mid career. They valued anonymity and spoke freely about their perceptions and practices.

Two widely held assumptions were confirmed 1.) misconceptions and narrow thinking about BI abound; and 2.) there is substantial confusion about NSF expectations further complicated by inter-program variation.

Methods

Researchers who participated in the study volunteered. The study team made an effort to include disciplinary diversity and a variety of known perceptions and levels of activity with regard to BIs. Interview transcripts were broken into several sections: 1) Perceptions about BIs; 2) Planning and Processes; 3) Resources and Supports; and 4) Marketing and Communication. A qualitative analysis was conducted on each section to glean:

1. An overall assessment of the topical responses.
2. Dominant themes (stated by 4 or more participants).
3. Repeated themes (stated by 2 or 3 participants).
4. Other themes not necessarily repeated but potentially insightful.

This poster offers a small selection of dominant and other insightful themes. The quotes on this poster are not direct, rather amalgamated from several participants. The full report can be viewed at the website below.

Key Findings

1. Widely held beliefs about BIs and the NSF are influenced by lore, but the actions and words of program managers are more meaningful. More than half of the participants specifically stated the need to hear information about BI expectations, developments, and processes directly from program managers.
2. There is a strong commitment to known, often regionally-based partners with which there is a personal connection.
3. "Outreach" is a catch all phrase used by investigators for any activity outside of university research life and reward systems. BI professionals use a more specific vernacular that is not necessarily meaningful to researchers.
4. Participants perceive high variability between different programs within NSF. Policies and review practices are not perceived as consistent and transparent.

PLANNING AND PROCESSES

"Broader Impacts are time-intensive, it's easy to get in over your head, a real problem if it distracts from the science."

RESOURCES AND SUPPORTS

"There is real potential in partnering with the art community, poets, painters, visual artists..."

BROADER IMPACTS CONTINUUM

"There is a perception that NSF has gone too far and should not require BI for all proposals."

RESOURCES AND SUPPORTS

"I would love it if there were a compendium of outreach strategies with related cost/benefit analyses"

PLANNING AND PROCESSES

"I use my personal network. I don't really plan, I just call the people I know and we talk about what we want to do"

RESOURCES AND SUPPORTS

"I rely on my personal bank account to pay for my outreach work"

Broader Impacts Continuum

"Having a Broader Impact is part of my personal mission as a scientist"



How I see myself



How I see my colleagues

"I don't have time for Broader Impacts, they shouldn't be a condition of funding"

Participants were asked to rank themselves and their colleagues on a continuum of perceptions about BIs. Participants collectively tended towards the BI champion side of the spectrum. Most viewed themselves as highly committed yet only moderately successful with regard to BIs. They generally reported their colleagues as less committed. Colleagues were more difficult to assess because of the many possible scales on which one could interpret "colleagues". Many participants provided 2 or 3 different designations for colleague groups and provided answers for each. The figure is weighted to reflect this. The bias is unlikely one of participant self-opinions, rather a bias in our volunteer-based study sample.

BROADER IMPACTS CONTINUUM

"Outreach is important, but only for projects in which it makes sense and is natural"

"Perceptions are changing over time. Young faculty present a real opportunity; they are enthusiastic and looking to be more competitive."

PLANNING AND PROCESSES

"It's an after-thought. It's the last thing to plan, the last thing to do, and the first thing to get dropped"

<http://informalscience.org/images/research/CAISEBIISEFront-endReport.pdf>

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