

Bringing STEM to Libraries through the *Explore!* Program: Findings from a Follow-Up Survey

Sanlyn Buxner¹, Amanda Jaksha², Keliann LaConte³, Christine Shupla³

¹Planetary Science Institute (buxner@psi.edu), ²New York Hall of Science, ³Lunar and Planetary Institute

Explore! Program

The Lunar and Planetary Institute's *Explore!* Program is designed to support library professionals and other community educators in Earth and space science programming. *Explore!* professional development training provides facilitators background information and instructions for hands-on activities. Topics range from the science and exploration of the Moon, the planets Earth, Jupiter, and Mars, and comets to astronaut health in space, as well as space science engineering concepts and the engineering design process.

The activities are designed for free-choice learning environments and have been tested by library professionals and adapted based on feedback. Lessons focus on activities that are "fun" for participants, employ inexpensive materials, and can be flexibly implemented in existing or new programs. The activities undergo review by educational professionals and scientists and engineers, and are correlated to National Science Education Standards. Materials are continually updated, and current and future revisions reflect the Next Generation Science Standards in Performance Expectations and Crosscutting Concepts.

Program Evaluation

Formative Evaluation: In-person and online sessions are highly rated; participants report sessions are engaging, informative and valuable.

Summative Evaluation: The goals of the *Explore!* program are to increase library staffs' knowledge and confidence in providing science events to their communities. End of workshop evaluations consistently demonstrate that participants leave with increased content knowledge and intent to use what was modeled at the workshop, this includes concrete ideas about using activities at their own institutions.

Follow-Up Study:

This follow-up study of library staff includes individuals who attended *Explore!* programs between 1993 and 2013, to understand the long-term impact of the trainings as well as successes and barriers in the implementation of activities. It was also used to better understand how, and in which ways program materials were being used and what support was needed for future implementation of activities. Overall the study has been used to determine how to improve trainings, materials, and resources. It has also added to the research literature on trainings for library professionals.



Number of Times Explore! Activities Used Since Training (n= 182)

Frequency (n=182)	# of responses	% of responses
Never	27	15%
Once	27	15%
Yearly	32	18%
Quarterly	24	13%
Monthly	17	9%
Several times	34	19%
Planning for the future/not yet	16	9%
Gave to others	5	3%

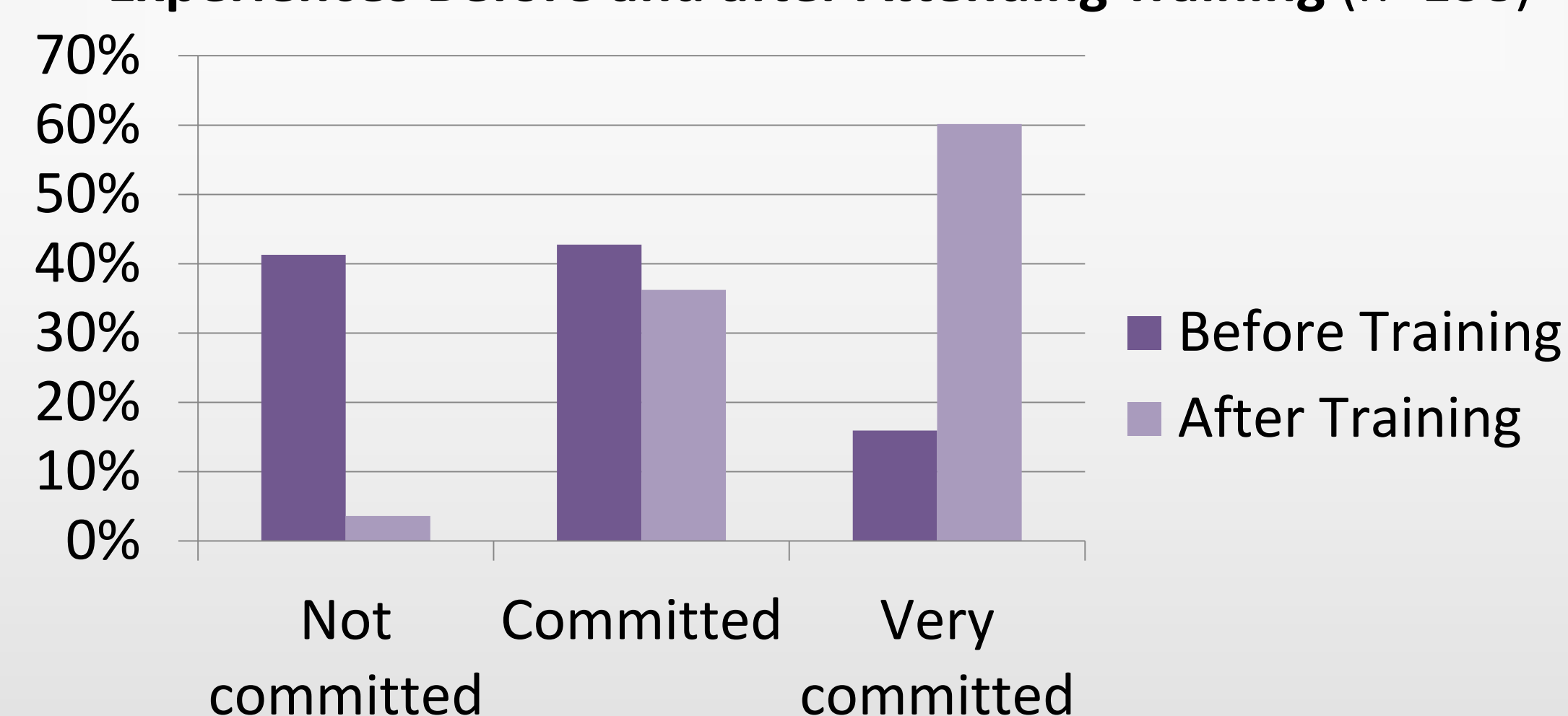
Number Programs Implemented Using Explore! Activities (n= 182)

Number of activities implemented	# of responses	% of responses
0	39	27%
1-5	62	42%
6-10	26	18%
11-20	12	8%
21-50	6	4%
100 +	2	1%

Top Barriers Reported in Implementing Activities (n=182)

Barrier	# of responses	% of responses
Lack of staff time or funds	92	50%
No barriers/challenges	68	37%
Lack of science and engineering education partners to help facilitate the hands-on activities	23	13%
Not prepared to use the hands-on activities	16	9%

Level of Commitment to Providing Science and/or Engineering Experiences Before and after Attending Training (n=138)



Reported Changes After Training (n=169)

Response	# of Responses	% of Responses
I have started to offer science and engineering programs/events	54	32%
I have increased the frequency with which I offer science and engineering programs/events	60	36%
I have sought out more science and engineering hands-on activities to use with my patrons/visitors.	87	52%
I have updated our collection of science and engineering resources.	67	40%
I have participated in additional Explore trainings.	40	24%

Survey

An online survey was developed and pilot tested, which asked respondents to share information about their institution and responsibilities, their use of materials or reasons they did not use the materials, and their barriers to program implementations, partnerships they had created, and successes they had in program implementation. The survey was taken by 183 individuals who had completed training from 1998-2013. Survey participants included library directors, assistants, librarians, teachers, managers, and park rangers. Of those, 82% (n=150) worked at a public library, 10% (n=18) worked at a school library, 5% (n=10) worked at a museum, science center or planetarium, and 3% (n=5) worked for another type of institution (e.g. Girl Scouts Council, non-profit, park).

Findings

Participation in the *Explore!* program resulted in changes in participants' beliefs and behaviors around leading science programming at their institutions. Sixty percent of the respondents reported that they were very committed to providing science and engineering experiences for their visitors, compared to 16% before the training, and over 75% reported that they were more likely to advocate for including science and engineering in the programs offered at their facilities. Over half of respondents report that they have sought out more science and engineering hands-on activities to use with their visitors as a result of participating in *Explore!*. The largest number of respondents described *Explore!* activities being used for special events, afterschool programming, and for programs partnering with schools. The biggest barrier to implementation was lack of time. Respondents reported gains in their skills, knowledge, confidence, and in a virtual network of support to bring STEM programming to their communities, and reported ways in which they integrated it into their existing programs.

Implications

Participation in the *Explore!* professional training sessions resulted in changes in participants' beliefs and behaviors around leading science programming at their institutions. These results support how reported increases in content knowledge and confidence around science teaching can lead to increased programming of hands-on science and engineering activities and provide an effective way to provide STEM experiences for audiences through libraries.

