NASA Science Mission Directorate Science Education and Public Outreach Forums Informal Educator National Survey Results

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1. Introduction

As a part of the strategy to reach the NASA Science Mission Directorate (SMD) Science Education and Public Outreach Forum Objective 1.2: Provide resources and opportunities to enable sharing of best practices relevant to SMD education and public outreach (EPO), the Informal Education Working Group members designed a nationally-distributed online survey to answer the following questions:

• How, when, where, and for how long do informal educators prefer to receive science, mathematics, engineering, and/or technology content and professional development?

• What are the professional development and material resources that informal educators prefer that could be provided by current and future NASA SMD Education and Public Outreach (EPO) efforts?

The results of the survey will be used to help NASA's SMD EPO community better meet those needs and plan future opportunities for the informal education community. This survey was distributed in October and November 2013. Recommendations from the Informal Education Working Group, or the Working Group, on how EPO professionals should use this information when planning their programs are included on the SMD EPO website.¹

The Working Group members identified existing NASA informal educator networks and other informal education communication outlets that could be used distribute the survey information and link. Special emphasis was made to achieve distribution among a wide variety of informal education professionals, as well as nationwide representation in the responses. Survey distribution outlets included newsletters, email lists, list-servs, and other communication tools. Through the careful selection of distribution outlets, this effort encouraged survey responses from individuals who did not necessarily have an existing relationship with NASA SMD EPO programs.

¹ http://smdepo.org
The following institution segmentations were used to consolidate survey results to provide specific recommendations by audience:

- Science/technology museums/centers
- Non-science museums/sites
- Parks
- Public libraries
- Community/afterschool centers
- Government agencies
- Other, including other nonprofit

The full report, recommendations and a summary presentation from this work are available online.2

2. The Respondents

A total of 1,073 educators responded to the survey with 714 educators (66%) completing the entire 29-question survey. Most of the respondents (88%) were paid informal educators, leaving a small amount identifying as volunteer (10%) or not reporting their status (2%). The majority of the respondents indicated that they have worked in informal education for at least 6 years (70%), with more than half of that having more than 10 years experience (42%). Nineteen percent had more than 20 years experience. By comparison, only 30% of the respondents indicated having 5 years or less experience working in informal education, with 3% having less than a year, 7% 1–2 years and 20% with 3–5 years experience. When asked about their roles in their position, 358 (33%) reported themselves as front-line staff/implementer/interpreter, 87 (8%) as having multiple roles, 22 (2%) having some other role, 260 (24%) as program developers, 309 (29%) as staff managers/decision makers, and 37 (3.4%) as trainers. When asked how many years of experience they had in providing or facilitating science, technology, engineering, and mathematics (STEM) activities, almost half responded to having 5 years or less and the rest having 6 or more, with the greater amount of responses being in the middle range of 3–5 years (25%) and 6–10 years (20%).

3. STEM Programming

The majority of the respondents (90%) indicated that their institution offers STEM programs at some point during the year, with only about 26% saying they conduct STEM activities everyday. While frequency of offerings did have a correlation to the type of institution, only 10% of respondents claimed to never offer STEM programs. The STEM topic covered most widely is Earth Science and the STEM topics covered the

2http://www.smdepo.org/post/7213
least widely are Engineering and Mathematics. Respondents whose centers do not offer STEM programs indicated a lack of resources/materials and funding for STEM programs; another top response was that STEM programs do not fall within their institutions’ missions. This indicates areas of need that could be supported by NASA SMD programs and resources. When asked about program evaluation, the greatest percentage of respondents across all institution segments reported being responsible for evaluating their own programs, resources, and/or materials. Across most sectors, the second-largest percentage of respondents use in-house evaluation services. However, for respondents from public libraries and other non-profit organizations, the second-largest percentage indicated that they do not formally evaluate their programs.

4. Professional Development

For almost all of the institution segments, the greatest percentage of respondents indicated that attending professional development (PD) sessions is a required part of informal educator job duties. Overall, respondents preferred PD sessions that they can attend in person (rather than access remotely), last up to one day in length, and can be on a weekday that does not coincide with a holiday. The exception to the length of time was the other non-profit organizations segment, where a larger number preferred to attend PD sessions that are two days in length. Respondents across all institution segments indicated that they preferred mornings for PD sessions lasting for part of a day, followed by afternoon and evening, respectively.

When considering where they attend PD sessions, the highest percentage of respondents in both the science/technology museums/centers and the non-science museums/sites reports only travelling within their home states for PD, and the second highest response was travelling regionally. For all other audience segments the most frequent response was that they travel regionally.

Regarding the availability of funding for informal educators to attend PD sessions, there was not a clear consensus among the answers across all segments. The need for an outside source of funding varied from 14% to 40% of respondents and 15% to 41% of respondents indicated that their organizations have sources of PD funding available.

Well over half of all respondents in all institution segments, ranging from 60%–90%, indicated that they would be likely or very likely to train others on topics, techniques, or content learned in workshops and PD sessions.

5. Resources

For resources received at PD sessions, the most preferred resource by respondents (rated as “Important” or “Very important”) found in the top three across all institution segments is lesson plan/activity facilitation instruction. This correlates with responses indicating lessons that are already aligned to the Next Generation Science Standards (NGSS) as the most important available resource needed by most institutions. The other two PD resources that were identified with a large percentage of “Important” or “Very important” responses across almost all of the institution segments are background information about session content and access to a community of practice including attendees, facilitators, and experts.
6. **Recommendations**

The NASA Science Mission Directorate Informal Education Working Group recommends the following courses of action for the NASA SMD education and public outreach community in designing material resources and implementing PD for informal educators. These recommendations are derived from the results described above.

6.1. **Professional Development**

- NASA should respond to the demand for PD for informal educators; PD is required for most respondents across institution types.

- NASA’s unique position of combining science and engineering practices with cross-cutting content and authentic scientific investigations should be utilized to fulfill STEM content needs expressed by informal educators through PD.

- NASA supports the literature-based philosophy that PD must be sustained in order to have an impact. However, survey respondents preferred one-day PD. Providers of NASA PD should collaborate and offer synergistic courses that provide a wider context for educators and build on one another. When scheduling offerings, PD providers should provide in-person PD when possible through one-day trainings on weekdays that do not coincide with holidays. Short-duration PD may be offered in the morning or afternoon. PD should be offered in the winter (some segments report availability in the fall). All segments report minimal availability in the summer.

- National conferences have a low representation of the overall profession. NASA PD may directly serve more front-line informal educators if it is offered at state and/or local meetings, rather than at national conferences. Informal educators are likely to very likely to train others (even though only a small percentage of survey respondents identified their primary roles as trainers).

- Volunteers make up a portion of the informal education workforce. Trainings for some groups of informal educators, such as those who identify as “other, including other non-profit,” ought to include volunteers.

- PD should focus on instruction about how to facilitate activities and background information about session content.

- Access to a community of practice for the session attendees, facilitators, and experts should be provided afterward. In light of the need for long-term professional development in order to make an impact, PD providers could consider partnering with other PD providers to maintain and support combined communities of practice.

- NASA designers should use these recommendations and the survey results themselves as part of a Project Cycle Design Process. These results can be used as part of the Needs Assessment step followed by goal and objective setting, activity design, implementation, and outcome assessment (Davis 2014).
Many successful NASA informal education PD programs have already been implemented. Before initiating a new project, designers should review project profiles on the SMD EPO homepage\(^3\) in order to review previous evaluation reports, avoid duplicative programs, and maximize impact by collaborating with partners.

### 6.2. Resources

- The needs of informal educators vary widely. Resource providers must design resources for specific informal education audiences.

- Informal education institutions frequently cover applications of science. Framing NASA resources in terms of this content area may encourage more informal education institutions to adopt them.

- Informal education institutions have barriers for implementing STEM programs. PD sessions should focus on easy-to-use materials and time-saving techniques to help institutions overcome the barriers of lack of funds, materials and resources, and staff to implement programs.

- NASA resource developers should avoid duplicative efforts by reviewing existing materials through the NASA Wavelength website.\(^4\)

- NASA resource developers can maximize the usability and adoption of their resources by following these guidelines:

  - Provide a point of contact so that informal educators can locate additional copies, get connected with NASA scientists or ask clarifying questions about the resources. As stated above, informal educators are very likely to train others using materials that they receive.

  - New and existing resources should be aligned to state standards, when practical, since there is alignment in all segments. Attention should be paid to the Common Core standards, since there is alignment in most segments. Only four segments have significant alignment to NGSS. For informal audiences working with teachers, alignment to standards is key. NASA resource and PD designers should reference the National Association for Research in Science Teaching report, *Supporting the Implementation of NGSS through Research: Informal Science Education*.\(^5\)

  - NASA STEM content that is suitable for children in grades 3–5 can be disseminated to all informal education institution segments. Children in grades K–2 are another primary population served by informal educators across most segments.

\(^3\)http://smdepo.org
\(^4\)http://nasawavelength.org
\(^5\)http://www.narst.org/NGSSpapers/Informal_Science_Education_June2014.pdf
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References
