



Mission2Mars: Boosting Community Engagement with NASA Resources

Year 1 Evaluation Report March 2023

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Introduction

In preparation for Year 2 of the Mission2Mars: Boosting Community Engagement with NASA Resources program (Mission2Mars), Education Development Center (EDC) analysed formative evaluation data from Year 1 of the program. The following report documents key takeaways from the data regarding five areas, (1) Informal science institutions' capacity to train amateur astronomers and community-based organization staff, (2) Community-based organization staff capacity to implement astronomy events and activities, (3) Amateur astronomers' capacity to support events, (4) Relationship-building among informal science institutions, community-based organization staff, and amateur astronomers, and (5) Satisfaction of participants at events.

The Franklin Institute implements the Mission2Mars program with NASA funding.

Report Organization

In this report, we first provide an overview of the program model and the evaluation data collection activities to date. Second, we describe key takeaways from the evaluation data. Finally, we highlight considerations and next steps. This report is based on six data sources including: 1) Informal science institution post-training survey, 2) Interviews with community-based organization staff and amateur astronomers, 3) Community-based organization annual survey, 4) Amateur astronomer annual survey, 5) Informal science institution annual survey, and 6) Event satisfaction survey.

Program Model

Mission2Mars operates on a train-the-trainer model in which The Franklin Institute trains informal science institutions on disseminating the Mission2Mars program and on training community-based organizations and amateur astronomers to host events and implement Mission2Mars activities. Informal science institutions subsequently train community-based organizations to host events and facilitate Mission2Mars activities, and train amateur astronomers to support community-based organization with their events. In Year 1, Mission2Mars consists of five Cohort 1 informal science institution grantees from five different states (Arizona, Louisiana, Montana, New Mexico, and West Virginia). The institutions have partnered with approximately 24 community-based organizations.¹ Community-based organizations host Mission2Mars events and implement Mission2Mars activities with support from their informal science institution and local amateur astronomers.

In Year 1, Mission2Mars activities focused on Moon-related space content. The Franklin Institute provides informal science institutions and community-based organizations with a variety of activities they can use during their events. Amateur astronomers attend events to share equipment like telescopes and share their knowledge of astronomy with participants. Community-based organization staff and amateur astronomers are encouraged to talk about the Artemis program during events with participants.

¹ Informal science institutions were each expected to partner with five community-based organizations. As of March 2023, approximately 24 total community-based organizations are recorded in informal science institutions' site profiles.

To support program dissemination, The Franklin Institute holds quarterly community meetings to share updates, information, and to provide an opportunity for informal science institutions to talk with each other.

Evaluation Overview

The external evaluation of the Mission2Mars program is conducted by EDC. As part of the first year of the program, we worked closely with The Franklin Institute to develop a logic model that identified outcomes by audience. Based on this logic model, EDC and The Franklin Institute developed an evaluation plan to document data related to three key areas of interest: 1) Capacity, 2) Relationships, and 3) Youth and families (i.e., event participants).

Data Collection

We are using a mixed methods approach to collect data about The Franklin Institute’s areas of interest. In Year 1, we collected data through surveys and interviews. Participants included staff from Cohort 1 informal science institutions, community-based organizations, amateur astronomers, as well as event participants (Table 1). All staff were invited to participate in the annual surveys. A sample of community-based organization staff and amateur astronomers were invited to participate in interviews. Informal science institution staff were asked to coordinate with their community-based organizations to administer event surveys at up to five events.

Table 1. Data collection methods.

Method	Audience	Sample size	Response rate
Training Post-Survey (April 2022)	Informal science institution staff	n=10	77%
Interviews (November - December 2022)	Community-based organization staff	n=5	N/A
	Amateur astronomers	n=4	N/A
Annual Surveys (January 2023)	Informal science institution staff	n=8	62%
	Community-based organization staff	n=29	55%
	Amateur astronomers	n=10	42%
Event Survey (October 2022 – February 2023)	Youth and family participants	n=48	N/A ²

Limitations

The Year 1 evaluation has several limitations. Survey data collected from informal science institution staff, community-based organization staff, and amateur astronomers represent a small sample of staff, and as such survey results should not be generalized to be representative of all staff. Survey responses from informal science institution staff and amateur astronomers represent four out of five informal science institutions. Event satisfaction survey data represent a sample of events as participant responses and are intended to offer a snapshot of participant perception of events.

² Attendance data for Mission2Mars events were incomplete. As a result, response rates are not able to be calculated for events sampled for survey administration. Surveys represent approximately 11 events across three states.



Key Takeaways

The following section describes six key takeaways from the evaluation data collected to date. While these findings provide fodder for conversation and reflection, EDC will continue to explore these takeaways in upcoming data collection efforts.

1) Informal science institutions use a variety of strategies to support their relationships with community-based organizations and amateur astronomers, however; they report feeling less effective at supporting the relationship between these two groups.

Informal science institution survey respondents report using different strategies to support their institution's relationships with community-based organizations and amateur astronomers with some strategies used more regularly with one group than the other (Figure 1). For example, 100% of respondents indicate using the strategy of "communicating regularly" with community-based organizations, while 40% of respondents report using this strategy with amateur astronomers. On the other hand, "collaboratively selecting Mission2Mars activities" is a strategy that fewer respondents indicate using with either group, with 20% of respondents using with community-based organization staff and 40% of respondents using with amateur astronomers.

In terms of supporting the relationships between community-based organizations and amateur astronomers, informal science institution survey respondents report connecting these two groups together over email, hosting in-person trainings where these groups are introduced, and attending events to facilitate in-person introductions. Despite using strategies to connect these two groups, informal science institution survey respondents report feeling less effective at building the relationships between community-based organization staff and amateur astronomers than at building their institution's relationship with each group individually. Sixty percent of survey respondents feel only "slightly effective" at supporting the growth of the relationship between community-based organizations and amateur astronomers (Figure 2).

"We served as the liaison and emailed amateur astronomers when organizations were hosting events. We sent introductory emails between community-based organizations and amateur astronomers and were occasionally at the event to introduce them in person."

– Informal science institution staff

Figure 1. Setting program expectations is a strategy regularly used by informal science institution respondents with both community-based organizations (CBOs) and amateur astronomers (AAs).³ (n=5)

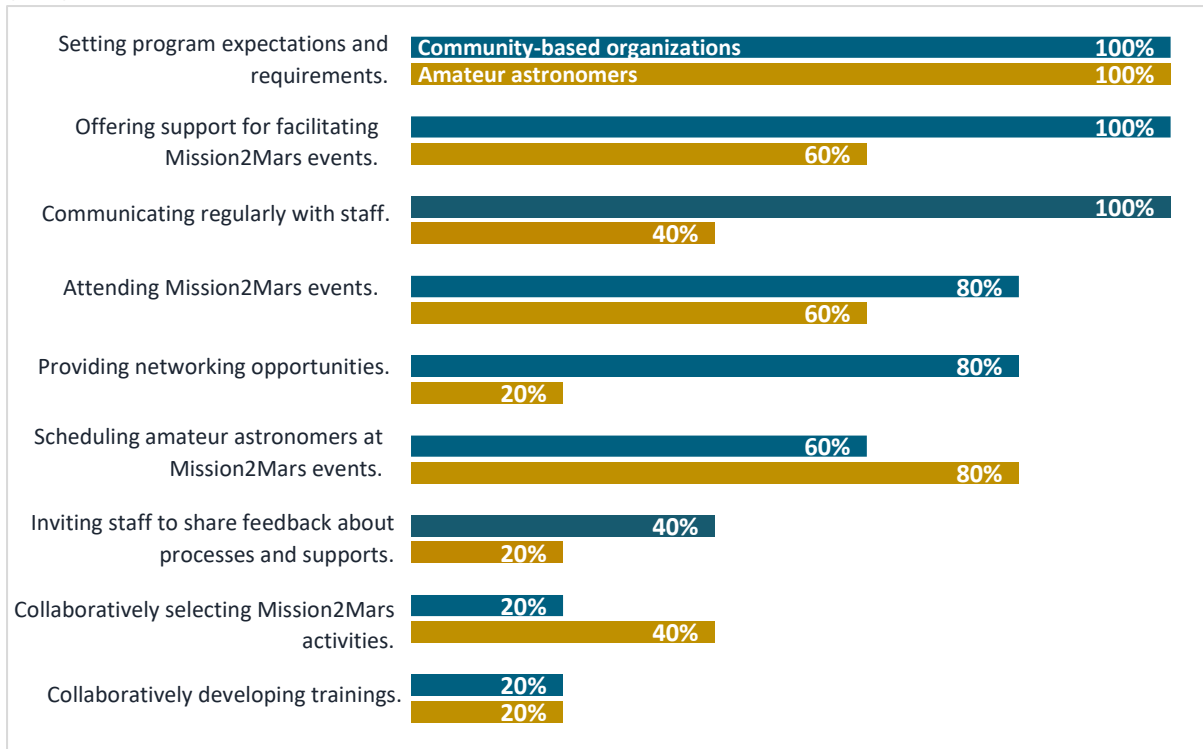
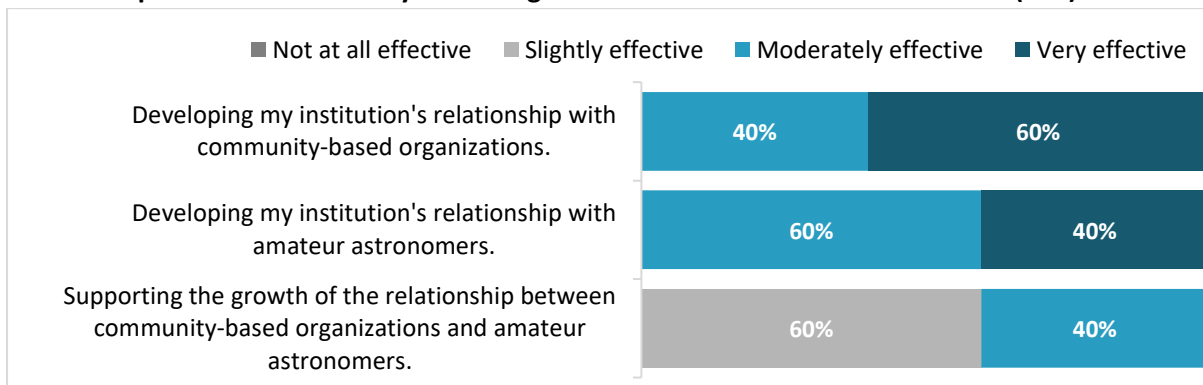


Figure 2. Sixty percent of respondents felt “slightly effective” supporting the growth of the relationship between community-based organizations and amateur astronomers.⁴ (n=5)



³ Source: Informal science institution annual survey. Respondents could select more than one response. Only respondents who indicated they were Program Leads answered this question.

⁴ Source: Informal science institution annual survey. No respondents selected “not at all effective.”

2) Informal science institution staff report feeling more confident to train community-based organization staff than to train amateur astronomers.

Informal science institution survey respondents report higher levels of confidence in training community-based organization staff than amateur astronomers. When asked to retrospectively reflect on their experience at the end of the year, 25% more respondents indicated that after their first year in the program, they feel “very confident” to train amateur astronomers (Figure 3). In terms of community-based organization staff, informal science institution staff survey respondents feel more confident about training community-based organization staff following Year 1. Over half (57%) of training survey respondents felt “very confident” to train community-based organization staff, and now at the end of the year, 50% more respondents feel “very confident” to do so (Figure 4).

Figure 3. Fifty percent of respondents are “moderately confident” to train amateur astronomers.⁵ (n=8)

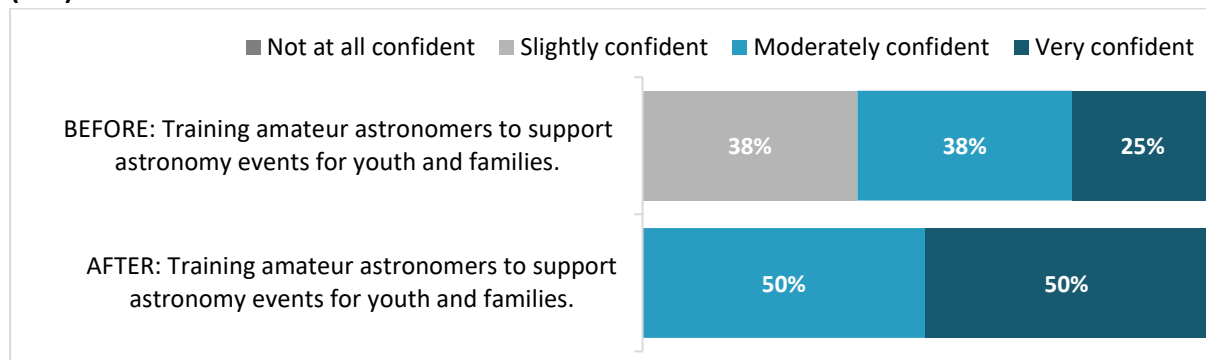


Figure 4. All respondents feel “very confident” to train community-based organization staff at the end of the program year.⁶ (n=8)



⁵ Source: Informal science institution annual survey. No respondents selected “not at all confident.”

⁶ Source: Informal science institution annual survey. No respondents selected “not at all confident” or “slightly confident.”

3) Community-based organization staff are building their confidence to implement astronomy activities and facilitate astronomy content.

Forty-one percent more community-based organization staff survey respondents feel “moderately confident” or “very confident” to implement astronomy activities following Year 1 (Figure 5). Forty-two percent more survey respondents feel “moderately confident” or “very confident” to facilitate astronomy content after participating in their first year of the program (Figure 6). Also, nearly one quarter of survey respondents feel “not at all confident” or “slightly confident” to implement astronomy activities after participating in a year of the program.

To support their facilitation of activities and content, community-based organization staff want more information and support around space content, NASA, and the Artemis program. They also requested more instruction on how to implement astronomy-focused events, such as how to plan a Star Party and how to plan activities that can be implemented despite weather-related issues.

Figure 5. Twenty-one percent of community-based organization staff respondents feel “not at all confident” or “slightly confident” to implement astronomy activities following a year of the program.⁷ (n=29)

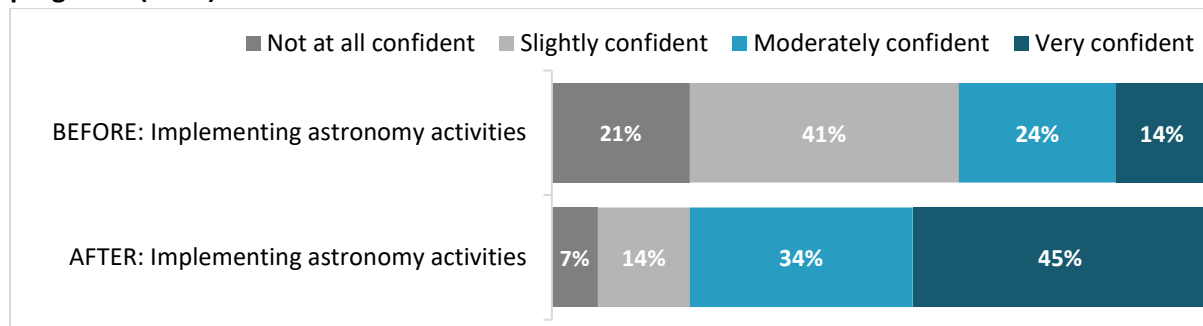
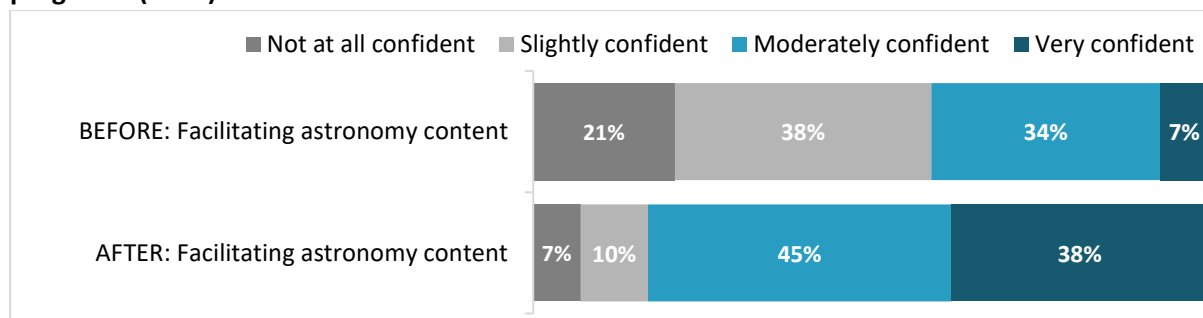


Figure 6. Eighty-three percent of community-based organization staff respondents feel “moderately confident” or “very confident” to facilitate astronomy content following a year of the program.⁸ (n=29)



⁷ Source: Community-based organization annual survey.

⁸ Source: Community-based organization annual survey.

4) Amateur astronomers are well-positioned to serve as resources for community-based organization staff; however, barriers prevent amateur astronomers from regularly attending events.

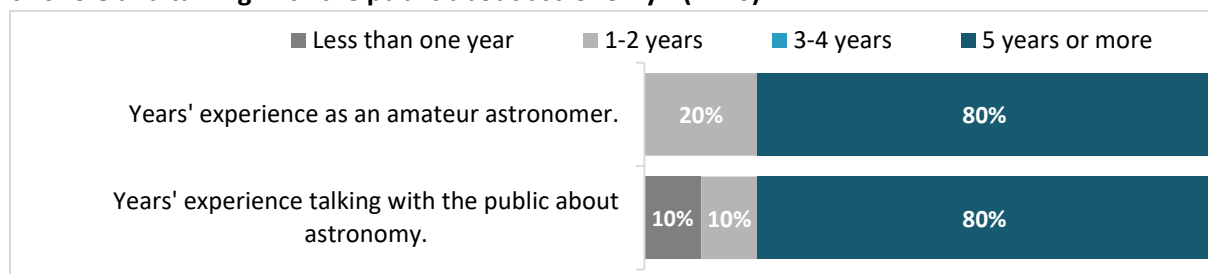
Amateur astronomers bring ample expertise to this work and share their expertise during events. Eighty percent of astronomer survey respondents indicate they have five or more years' experience talking with the public about astronomy (Figure 7). Even with respondents reporting high levels of experience in this role, 50% of respondents report that they "agree or strongly agree" that they gained skills in working with community-based organizations and talking with the public about astronomy content from their participation in the first year of the program (Figure 8).

"Our previous astronomy contacts have been absolutely on board with helping out and sharing knowledge and building out our astronomy curriculum."
 – Community-based organization staff survey respondent

Community-based organization staff value amateur astronomers' expertise at events and want to incorporate more amateur astronomers into their events. They especially value that amateur astronomers can clearly communicate science content to participants. Further, amateur astronomers interviewed were enthusiastic about sharing their expertise with community-based organizations and event participants. Additionally, community-based organization staff want more time to work with amateur astronomers during trainings so that they could more efficiently collaborate to plan events.

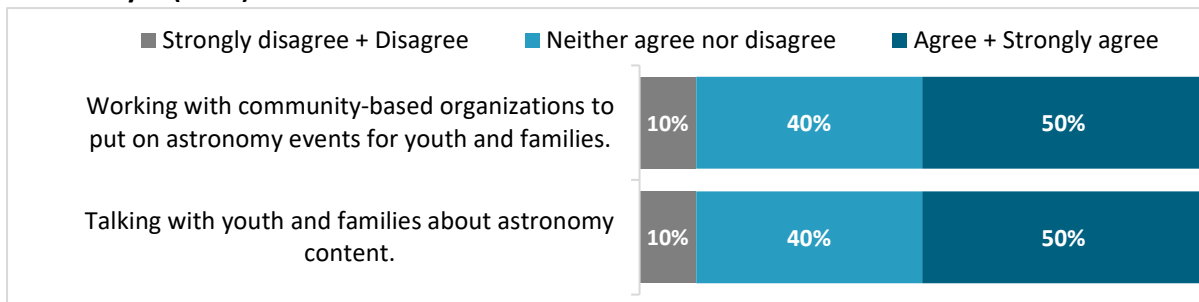
Amateur astronomers and community-based organization staff face challenges implementing events together. Amateur astronomers report that long travel distances, adverse weather conditions, and scheduling difficulties can prevent them from attending events. Community-based organization staff suggest that having a wider network of amateur astronomers may strengthen the likelihood that there would be an amateur astronomer available and willing to attend an event. At the same time, astronomers interviewed shared that they want to be invited to more events.

Figure 7. Eighty percent of amateur astronomer respondents had five years or more experience in this role and talking with the public about astronomy.⁹ (n=10)



⁹ Source: Amateur astronomer annual survey. No respondents selected "3-4 years."

Figure 8. Fifty percent of respondents “agree or strongly agree” that they improved their skills working with community-based organizations and talking with youth and families about astronomy.¹⁰ (n=10)



5) Community-based organization staff are adapting Mission2Mars activities to best fit the needs of their audiences.

Community-based organization staff report hosting events during existing programming, such as during afterschool library programs, library reading hours, a LEGO club, and a school fair. Events are also hosted as standalone events, such as a Star Party.

To adjust the Mission2Mars activities to suit the needs of different formats, community-based organization staff are adapting the Mission2Mars activities to best serve their audiences. Reasons for adaptation include:

- ❖ Suit a wide age range of youth. Community-based organization staff wanted to make sure activities were age appropriate. One survey respondent wrote, “Our programs often have a wide range of ages in attendance, so we have adapted activities to keep programming accessible to all ages, whether that means having parents or older kids assist with activities or preparing materials ahead of time.”
- ❖ Adjust to the context of the event. Community-based organization staff adjusted activities based on the context of where they were incorporating events. For example, one survey respondent wrote, “So far we have only used Mission2Mars in festival related events where short interactions are necessary.”
- ❖ Provide additional materials. Survey respondents bought additional materials and adjusted the wording of instructions. A respondent shared, “We had to buy a few additional materials to fit the needs of all our members. We also slightly adapted the length and the wording of some of the instructions to make it better fit the time allotted and make it easier for all staff to explain to the youth.”

Community-based organization staff shared that a lesson learned is that events are time intensive and require teamwork. As one survey respondent shared, “This is a huge endeavour and...it will take everyone’s support to see it to the end. Whether that support is in the form of financial, intellectual, or assembly. Everyone can play a part.” Community-based organization staff also learned that they need to allow more time for Star Parties by shifting event start times later so that they can take better advantage of the dark sky during the event.

¹⁰ Source: Amateur astronomer annual survey. No respondents selected “strongly disagree.”

6) Participants enjoyed events and learned about STEM career opportunities and about space.

Overall, event participant survey respondents were satisfied with the events they attended. Ninety-four percent of respondents reported that they were “very happy” with their events (Figure 9).

“All of the people were very informative and fun! My kids had a great time while learning.”

– Event participant survey respondent

Participant respondents reported that the most memorable experiences at the events were viewing objects in space and learning about space phenomena. In the community-based organization annual survey, respondents described that participants were enthusiastic about the content at events. As one community-based organization respondent wrote, “The greatest success has been seeing the enthusiasm of the participants to find out more about the mission to Mars and the Moon base.”

Although participants enjoyed the events and viewing and learning about space objects, 54% of respondents learned “a little more” about career opportunities in STEM and 51% learned “a little more” about the Artemis program (Figure 10). On the other hand, about half of participants are “a lot more” interested in learning about NASA and space following their event (Figure 11). An amateur astronomer interviewed suggest having take-home materials about NASA and Artemis for participants to support those interested in learning more.

Figure 9. Ninety-four percent of respondents are “very happy” with community-based organization events.¹¹ (n=48)

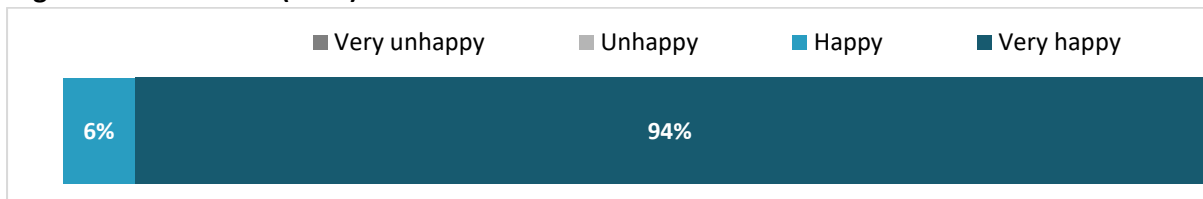
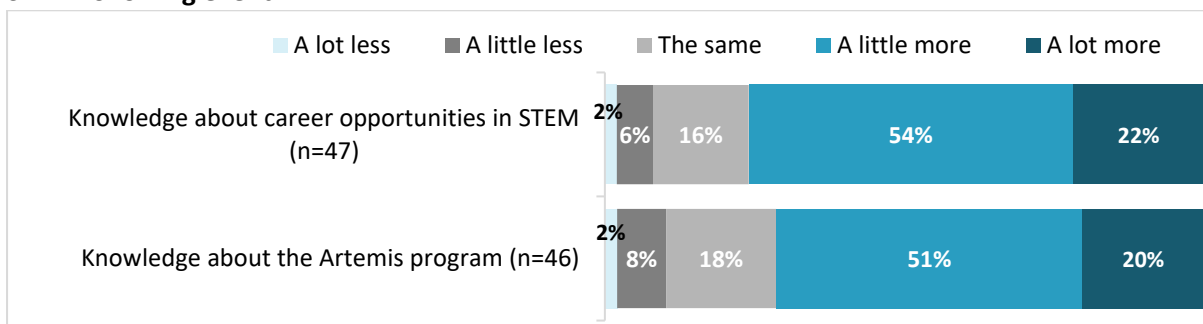


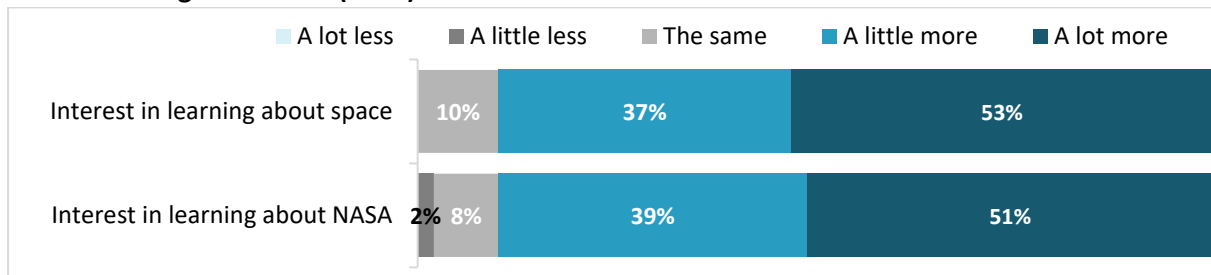
Figure 10. Fifty-four percent of respondents know “a little more” about career opportunities in STEM following event.¹²



¹¹ Source: Event satisfaction survey. No respondents selected “very unhappy” or “unhappy.”

¹² Source: Event satisfaction survey.

Figure 11. Fifty-three percent of respondents were "a lot more" interested in learning about NASA after attending an event.¹³ (n=49)



¹³ Source: Event satisfaction survey. No respondents selected "a lot less."



Considerations and Next Steps

Based on insights from the Year 1 evaluation, we offer the following areas of reflection for The Franklin Institute's consideration for Year 2:

- ❖ **Informal science institution relationship-building.** Informal science institution staff are more confident in training community-based organization staff than amateur astronomers. At the same time, they feel less effective at building the relationship between these two groups. The Franklin Institute might consider continuing to focus on strengthening the capacity of informal science institutions to work with and sustain regular communication with amateur astronomers, so that informal science institutions can more effectively serve as the liaison between amateur astronomers and community-based organizations. Since amateur astronomers who responded to the survey are bringing expertise to this work, informal science institutions may benefit from communicating with amateur astronomers about what role they would like to play in programming, and the level of involvement they would like to have (e.g., supporting community-based organizations with planning events and selecting activities in addition to showing space phenomena through their telescope during events).
- ❖ **Collaboration between community-based organization staff and amateur astronomers.** Community-based organization staff value the expertise of amateur astronomers. Amateur astronomers are also engaged in the program. The Franklin Institute might consider additional strategies for ensuring community-based organizations have access to a variety of amateur astronomers that are enthusiastic about supporting them before and during events.
- ❖ **Events.** A majority of event participants indicate that they are learning “a little more” about Artemis; however, half are “a lot more” interested in learning about space. The Franklin Institute might consider encouraging informal science institutions to work with community-based organizations to further encourage them to send home materials and resources with families that families could use to further learn about space and the Artemis program.

With these considerations in mind, the Year 2 evaluation will collect data via annual surveys and event satisfaction surveys. The evaluation team will work with The Franklin Institute to refine annual survey questions to continue to learn new insights about capacity, relationship building, and events.

For example, given that amateur astronomers are entering the program with extensive expertise, we may consider probing additional areas of capacity to understand what they are taking away from their experience. Additionally, the Year 2 evaluation may further investigate ways in which amateur astronomers and community-based organizations are continuing to work together after events, and additional strategies informal science institution staff are using to support relationships.