NASA@My Library

Summative Evaluation Report

Findings from 2016–2020

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NASA@ My Library Executive Summary

With funding from the NASA Science Activation program, the Space Science Institute (SSI) launched *NASA@ My Library* in 2016. The vision of *NASA@ My Library* was to help public libraries and state library agencies increase NASA and STEM learning opportunities for library patrons throughout the U.S., including those in geographic areas and populations currently underserved in STEM education. SSI worked closely with its partners, including the American Library Association (ALA), Cornerstones of Science (CoS), the Lunar and Planetary Institute (LPI), and the Pacific Science Center's Portal to the Public Network (PoPNet). Major components of the project included:

- **engagement of 78 public libraries** (75 partner libraries and 3 pilot libraries) that received in-person and virtual professional development, resources to use in library programming (including four kits with NASA SMD and STEM hands-on materials, activities, and digital learning tools), circulating backpacks (for patrons to check out and use at home), a Community Dialogue Guide to help partner libraries identify ways to engage their community in STEM, and a virtual community of practice
- **engagement of 18 State Library Agencies** (SLAs) that received virtual professional development and two kits to circulate to public libraries in their state
- **professional development for an additional 363 public library staff in 12 states** through one- or two-day state-wide NASA STEM Workshops featuring hands-on space science activities, information and resources on NASA science and missions
- **preparation of more than 30 NASA-funded scientists** (Subject Matter Experts, or SMEs) to use the PoPNet model to facilitate virtual programs for public library patrons
- **promotion of major Earth science, space science and library events** such as the 2017 total solar eclipse, Earth Day, and Collaborative Summer Library Program themes through professional development opportunities, hands-on activities, and kit distribution.

Education Development Center (EDC) conducted the external evaluation of *NASA@ My Library*. The evaluation utilized mixed methods to investigate the implementation of the project and its outcomes. EDC administered pre- and post-exhibit surveys to library staff from the 75 partner libraries; conducted interviews and focus groups with library staff and SLA staff; collected more than 15,000 patron surveys following attendance at a *NASA@ My Library* program; observed virtual SME programs; conducted site visits to a sample of libraries to observe library programs and interview library staff and patrons; and reviewed annual reports partner libraries submitted to ALA describing their *NASA@ My Library* activities.

Key findings included:

Library staff from partner libraries increased their confidence and ability to facilitate library programming related to Earth, space, and engineering.

Library staff reported that *NASA@ My Library's* professional development (in-person workshop, webinars), materials (facilitation kits, activity guides), and other supports (informal check-in calls) provided them with the information they needed to feel more confident and comfortable facilitating Earth and space-science related programming.

The majority of partner libraries (71%) increased the amount of STEM-related programming they offered because they participated in *NASA@ My Library*.

The 75 partner libraries facilitated a total of almost 2,300 *NASA@ My Library* programs from 2017-2020 (an average of 10 programs per library per year). Almost all

participating library staff (92%) said they planned to continue to use their kits after their formal relationship with *NASA@ My Library* ended, including 51% who expected they would continue to use the kits from *NASA@ My Library* at least once per month.

Similarly, almost all the library staff (96%) who attended one of the NASA STEM workshops and who have a responsibility for planning programming reported that they had used activities they learned in the months following the workshop.

Engaging NASA-affiliated scientists was a challenge for many libraries.

About two thirds of the partner libraries (63%) were able to engage at least one NASA-affiliated SME to support their programming, most often a Solar System Ambassador or Night Sky Network volunteer. Libraries reported challenges identifying, reaching, and/or hearing back from NASA-funded SMEs. However, at the end of the project, nearly all library staff (97%) would like to work with NASA-affiliated SMEs in the future.

Engaging SMEs was also a challenge for SLAs. While SLAs shared SME resources with public libraries in their state, SLAs rarely made strong connections with NASA-funded SMEs on behalf of public libraries. Only about one in ten programs that public libraries offered using a *NASA@ My Library* SLA facilitation kit involved an SME (who was typically not affiliated with NASA).

The SLA model of distributing facilitation kits was largely successful, although many SLAs struggled with determining how to reach communities with underserved audiences.

A total of 672 public libraries received SLA kits and >16,000 patrons were reached with kit programming in approximately one year. Most SLA staff (89%) plan to continue circulating their existing *NASA@ My Library* kits and many (61%) plan to create and circulate additional kits with new materials.

While SLAs were successful in reaching rural communities with the kits, many SLAs noted that they faced challenges determining what underserved groups to focus on and coming up with strategies to reach these groups. They would have appreciated more information and suggestions about reaching underserved populations, especially from other SLAs who have experience doing so.

Patrons overwhelming reported that they enjoyed the *NASA@ My Library* programs they attended and that they learned about NASA science; a substantial majority of patrons said they were interested in learning more about earth science, space science, or engineering.

Libraries reported that more than 225,000 library patrons attended *NASA@ My Library* Programs from 2017-2020. The vast majority of patrons who completed post-program surveys said they found the programs interesting (98%), and that they learned a lot about earth science, space science, and/or engineering (93%). A substantial majority (85%) of patrons said that the program made them interested in looking for more information about NASA science or NASA careers.

NASA@ My Library helped libraries engage new—and often underserved or underrepresented—audiences.

As the project progressed, partner libraries reported recruiting several underserved audiences to programs more frequently, including African American and Latinx audiences, women and girls, people with disabilities, and economically disadvantaged community members. About 43% of patrons who completed surveys identified themselves as a person of color. Patrons who identified as Black or Latinx were the most likely to report that a *NASA@ My Library* program was the first science program they had attended at their library. On the final post-survey, over two-thirds of libraries (69%) felt they had been *mostly* or *very successful* at reaching underserved audiences with *NASA@ My Library* activities and resources.

The COVID-19 pandemic had a large impact on how libraries were able to offer programs to their patrons during the final year of *NASA@ My Library* 1.0.

When libraries were forced to close to the public, many libraries relied on virtual programs and curbside pickup of materials to engage their patrons. Regional barriers to virtual program participation were removed, which enabled library participants to attend—and SMEs to facilitate—virtual programs they might not have been able to attend in person.

Based on these findings, the following recommendations emerged for *NASA@ My Library* 2.0:

❖ Many participating librarians wanted more opportunities to connect with and learn from one another. Provide ways for libraries to connect to one another in small groups around shared interests, such as through affinity groups. Recruit some *NASA@ My Library* 1.0 partner libraries to serve as mentor libraries and share their past experiences to support new libraries.

• The in-person workshop was amongst the most highly rated components of *NASA@ My Library* 1.0, but the continued COVID-19 pandemic (and shorter duration of *NASA@ My Library* 2.0) mean that the next cohort of *NASA@ My Library* partner libraries will not be able to be participate in face-to-face workshops. Consider other ways to build excitement, camaraderie, and connection between libraries and with the project team, and to build library staff's confidence and skills in facilitating hands-on STEM activities.

• Library staff would like *NASA@ My Library* to help libraries connect with NASA-affiliated SMEs. Offer more virtual programs with SMEs due to the high interest in online programs with SMEs. Libraries would especially like connections to a diverse group of NASA scientists (in terms of gender, race and ethnicity).

• Employ a deliberate strategy to recruit libraries that serve underrepresented audiences, including outreach to libraries, the application materials, and the rubric used to select libraries. Provide more information during in-person training and follow-up webinars about how libraries can engage underrepresented audiences of various kinds.

Introduction

Overview of *NASA@ My Library*

With funding from the NASA Science Activation program, the Space Science Institute (SSI) launched *NASA@ My Library* (*NASA@ My Library*) in 2016. The vision of *NASA@ My Library* was to help public libraries and state library agencies increase NASA and STEM learning opportunities for library patrons throughout the U.S., including those in geographic areas and populations currently underserved in STEM education. SSI worked closely with its partners, including the American Library Association (ALA), Cornerstones of Science (CoS), the Lunar and Planetary Institute (LPI), and the Pacific Science Center's Portal to the Public Network (PoPNet). Activities were focused in three areas:

1. **Stakeholder engagement** of public and state library staff and NASA Subject Matter Experts (SMEs) centered around high-visibility NASA, Earth, space, and library events (e.g., the 2017 solar eclipse, the 2019 summer library learning program theme "A Universe of Stories")
2. **Professional development** for public library staff and state library agency staff to utilize NASA Science Mission Directorate (SMD) assets to provide authentic, accessible SMD-focused learning experiences
3. **Resource and experience development** of SMD-focused STEM opportunities for public library patrons, especially youth and lifelong learners in rural and other underserved communities.

The major components of the project included:

- **engagement of 78 public libraries** (75 partner libraries and 3 pilot libraries) that received in-person and virtual professional development, resources to use in library programming (including four kits with NASA SMD and STEM hands-on materials, activities, and digital learning tools), circulating backpacks (for patrons to check out and use at home), a Community Dialogue Guide to help partner libraries identify ways to engage their community in STEM, and a virtual community of practice
- **engagement of 18 State Library Agencies** (SLAs) that received virtual professional development and two kits to circulate to public libraries in their state

- **professional development for an additional 363 public library staff in 12 states** through one- or two-day NASA State STEM Workshops featuring hands-on space science activities, information and resources on NASA science and missions
- **preparation of more than 30 NASA-funded scientists** to use the Portal to the Public (PoPNet) model to facilitate virtual programs for public library patrons, executed in two major phases
- **promotion of major Earth science, space science and library events** such as the 2017 total solar eclipse, Earth Day, and Collaborative Summer Library Program themes through professional development opportunities, hands-on activities, and kit distribution
- **a Patron Experience Pilot research program** led by CoS and a researcher from Northern Illinois University that tested a model of patron interest development in three partner libraries. This report does not cover this facet of the *NASA@ My Library* project.

Figure 1. *NASA@ My Library's* primary components
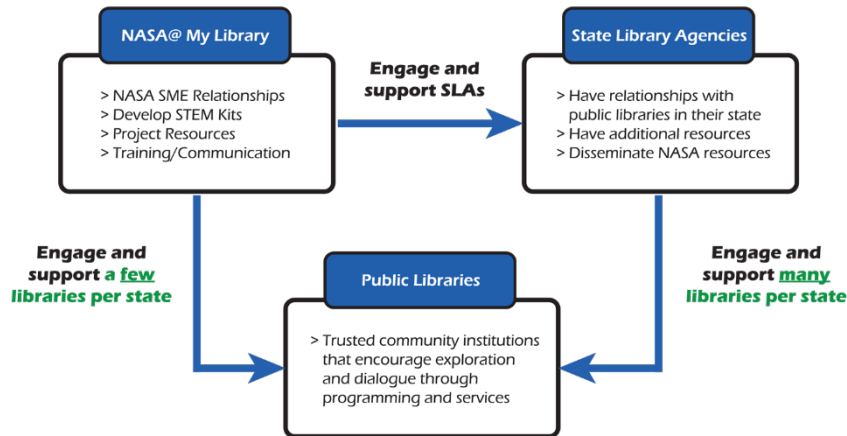
The *NASA@ My Library* logic model (Appendix A) provides an overview of the project's activities and outcomes. An initial logic model was developed during the first year of the project in collaboration with project leaders to ensure a common vision for the project and to guide the evaluation questions, methods, and measures. The logic model was revised each subsequent year to reflect changes in project activities. Key project outcomes included that: participating library staff would have increased confidence and ability to facilitate earth and space science library programming; participating state library agency staff would encourage public libraries in their state to offer earth and space science programs and services; SMEs would be prepared to co-facilitate earth and space science library programming; and public and state library staff, SMEs, and participating PoPNet sites would develop ongoing collaborations to benefit library patrons. Ultimately, the project expected patrons who accessed SMD-related content and SMEs through their libraries would demonstrate greater interest and engagement in earth and space sciences and engineering.

Overview of Evaluation

Education Development Center (EDC) conducted the external evaluation of *NASA@ My Library*. This report describes the findings from the evaluation. The evaluation team at EDC worked closely with project leadership throughout the five years of project activities to understand the main components and intended outcomes, and to develop and revise measures. We provided formative feedback on project activities to the project team throughout the duration of the project via written reports, presentations, and meetings.

Methodology

Evaluation Questions

The evaluation of *NASA@ My Library* included both formative and summative components.

The formative evaluation focused on understanding (1) pilot testing of the Community Dialogue strategy; (2) SME engagement; and (3*) NASA@ My Library* active learning experiences, kits, digital learning tools, training components, and additional resources. Formative evaluation questions included:

1. How are the *NASA@ My Library* program elements implemented?
   a. What are the characteristics of the libraries that the *NASA@ My Library* team engages?
   b. To what extent are the webinars, training, and online Community of Practice effective in helping library staff and SMEs prepare to implement program activities?
   c. To what extent do libraries use the *NASA@ My Library* active learning experiences, STEM Kits, *NASA@ My Library* STEM Guides, and digital learning tools?
   d. To what extent are SMEs involved? What elements of the project support SME engagement?
   e. To what extent are SLAs involved? What elements of the project support state library agency engagement?
   f. What are the challenges and successes of the project in Years 1-2?

2. Based on what has been learned to date, what modifications should the project team make to the project plan?

The evaluation team continued to collect formative feedback throughout the life of the project, but shifted to focus on summative findings beginning in Year 2. The summative evaluation focused on understanding the project's impact on library staff and patrons from libraries that partnered with the project; understanding the SLA model of library engagement; and the development of collaborations between public libraries, informal STEM education partners, and *NASA@ My Library* PoPNet sites that prepared SMEs to work with library staff. The summative evaluation questions included:

1. Is the project's stakeholder engagement plan an effective way to increase SMD-focused programming quality and quantity at public libraries? If so, what elements of the plan are effective?

a. To what extent (and how) do *NASA@ My Library* team members, library staff, and NASA mission partners (SMEs) develop partnerships with the goal of providing STEM programming for youth and adult library patrons? To what extent (and how) do libraries work with NASA resources, people, and/or programs?
b. To what extent (and how) do SMD SMEs, *NASA@ My Library* team members, and NASA@ My Library PoPNet sites deliver informal STEM programming at public libraries?
c. To what extent does the professional development provided by *NASA@ My Library* help partner library staff deliver effective informal STEM programming?

2. Is the project effective at reaching audiences that are underserved and underrepresented in STEM?
   a. What is the impact of *NASA@ My Library* on patrons at *NASA@ My Library* partner libraries? Do they become more interested in, knowledgeable about, and engaged in NASA/STEM topics?

The evaluation utilized mixed methods to investigate the implementation of the project and its outcomes, and to answer the evaluation questions. Institutional Review Board approval was received for the evaluation plan and instruments before data collection began. EDC administered pre- and post-exhibit surveys to library staff from the 75 partner libraries; conducted interviews and focus groups with library staff and SLA staff; collected patron surveys; observed virtual SME programs; conducted site visits to a sample of libraries to observe library programs and interview library staff and patrons; and reviewed annual reports libraries submitted to ALA describing their *NASA@ My Library* activities. Appendix B describes the methodology in more detail, including the data collection instruments, when they were administered, and the data collected.

Figure 2. Overview of *NASA@ My Library* program elements and evaluation instruments
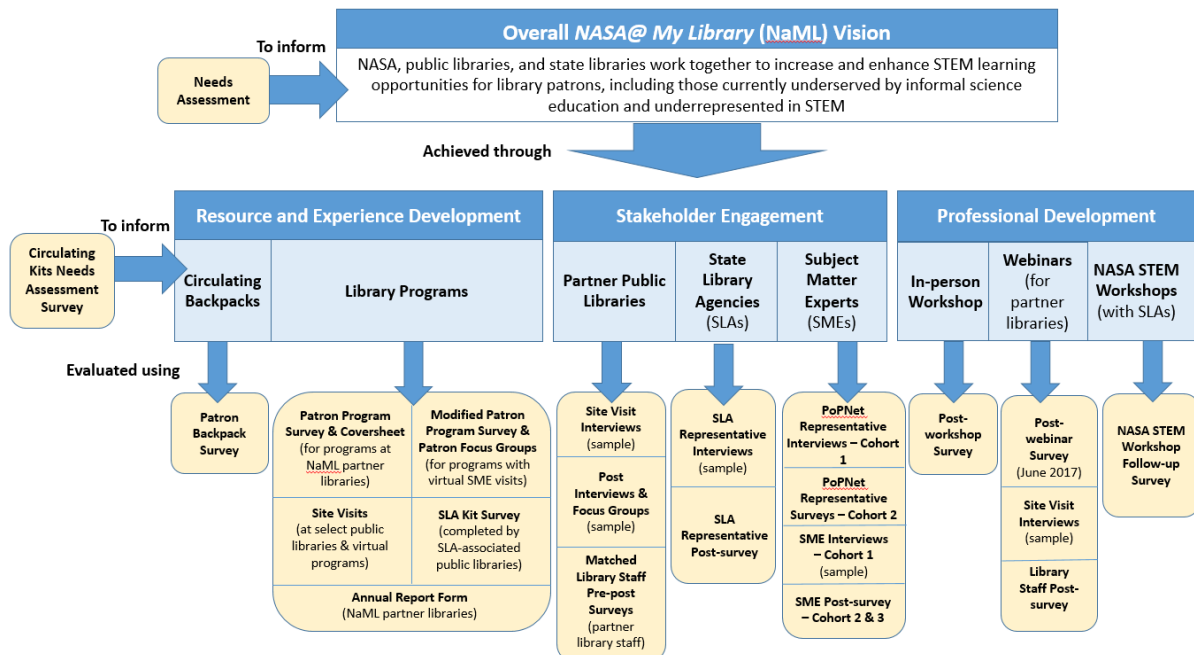
Findings

The findings are organized into four major sections: (1) the impact of providing training and NASA resources to public libraries; (2) the SLA approach to disseminating NASA resources; (3) the project's impact on library patrons; and (4) the project's ability to reach underserved audiences. Within each section, a brief summary of findings is presented, followed by more detailed strengths and highlights, any weaknesses or challenges, and recommendations related to that project element.

Connecting NASA Resources to Libraries

A major *NASA@ My Library* strategy was to provide NASA SMD resources to public libraries. *NASA@ My Library* provided libraries with a variety of NASA resources and support, including in-person training, pre-packaged facilitation kits with programming resources and tools, circulating backpacks for patrons, and SMEs for programming. *NASA@ My Library* used multiple strategies to share these resources with libraries, most notably by deeply engaging 75 partner libraries for 18-42 months[1], and by providing short-term training to an additional 363 library staff. This section describes findings related to *NASA@ My Library* training and support, impact on library staff, facilitation kits and library programming, circulating backpacks and Take and Make kits, engagement of SMEs, and State STEM Workshops.

Training and Support Provided by NASA@ My Library and Impact on Library Staff

Library staff reported that being a part of *NASA@ My Library* provided them with the training, support, and resources they needed to feel more confident and comfortable facilitating Earth and space-science related programming.

➢ Strengths/Highlights

Partner library staff reported that the in-person training and webinars prepared them to implement program activities. Partner librarians gave especially high marks to the in-person partner library workshop, which was held in February 2018 in Denver, CO. More than 90% of workshop survey respondents *agreed* or *strongly agreed* that, following the in-person workshop, they were more knowledgeable, confident, and interested in delivering NASA-related library programming. They felt that the in-person workshop was especially beneficial because they were able to participate in hands-on training and meet the project team and colleagues face-to-face.

> "This has been the most supportive grant community I've been part of. The initial trip to Denver, monthly calls…this is the kind of gold standard for support and resources."
>
> ~Library staff member

Many library staff also found the webinars and informal check-in calls (which were held monthly during the libraries' third and fourth year in the project) helpful for learning about specific activities, strategies
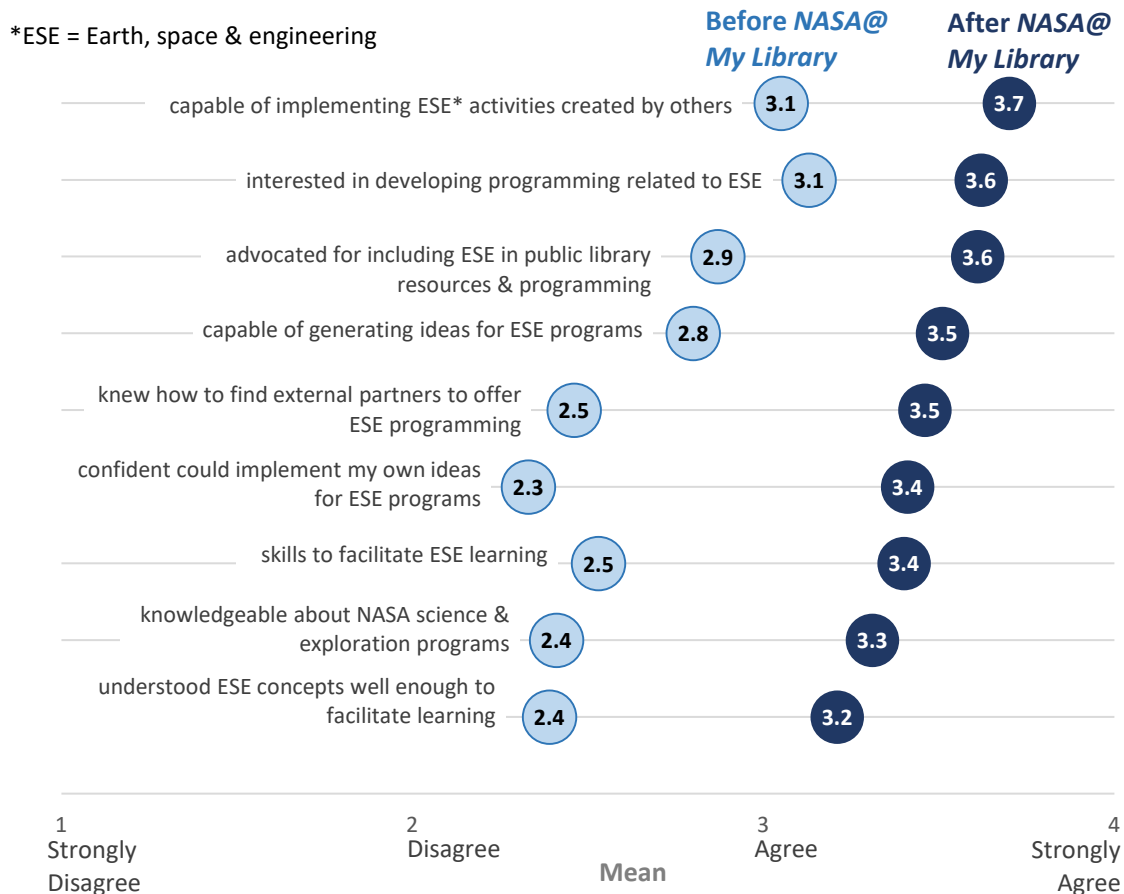
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[1] The 75 partner libraries began their involvement in *NASA@ My Library* in May 2016. After 18 months, partner libraries were offered the option to exit. A total of 67 partner libraries continued through October 2019.

for programs, and what other libraries were doing. Inter-library connections were especially valuable for library staff from smaller libraries or libraries where only one staff member was working on *NASA@ My Library* programming. One library staff member explained:

> *"STEM fields can seem intimidating. It's just very out of my comfort zone. Even though I'm very interested in it, I just don't have the scientific background or rigor.* [NASA@ My Library] *showed us that it can be done easily and simply. It gave us the basic understanding of scientific processes and concepts that we needed in order to lead other people in it. We learned that a lot of this stuff was a lot easier to explain and a lot easier to demonstrate than we thought. Having the kits, especially, and going through those kits beforehand really showed us that we can do this. Then for the things that were more complex, we had a network of experts…It got us really excited."*

Figure 3. Library staff from partner libraries reported that *NASA@ My Library* increased their interest, confidence and ability to facilitate library programming related to Earth, space, and engineering.

Near the end of their involvement with *NASA@ My Library*, partner library staff were asked to answer two sets of questions: "Think about your PAST [CURRENT] interest in Earth, space, and engineering as well as your familiarity facilitating programming related to Earth, space, and engineering BEFORE you began participating in *NASA@ My Library*. Please report your level of agreement with each of the following items."

*ESE = Earth, space & engineering

	Before *NASA@ My Library*	After *NASA@ My Library*
capable of implementing ESE* activities created by others	3.1	3.7
interested in developing programming related to ESE	3.1	3.6
advocated for including ESE in public library resources & programming	2.9	3.6
capable of generating ideas for ESE programs	2.8	3.5
knew how to find external partners to offer ESE programming	2.5	3.5
confident could implement my own ideas for ESE programs	2.3	3.4
skills to facilitate ESE learning	2.5	3.4
knowledgeable about NASA science & exploration programs	2.4	3.3
understood ESE concepts well enough to facilitate learning	2.4	3.2

1 Strongly Disagree — 2 Disagree — 3 Agree — 4 Strongly Agree

Mean

Source: Partner Library Post-Survey, matched questions (n = 60 or 61, depending on question)

In interviews, a number of library staff noted that they are planning to do more STEM-related programming on a regular basis in the future and that the resources they have learned about through *NASA@ My Library* will help them to do so.

Several library staff also said that their library, as a whole, benefited from *NASA@ My Library* because the project showcased the library as a place for STEM and STEM learning. One librarian stated:

> *"I feel like* NASA@ My Library *has been a bridge and has created multiple other opportunities and opened different doors for us to get further funding, grant funding, or even recognition throughout our area…If* NASA@ My Library *hadn't been there, I don't know if we would be at the level that we are, especially with STEAM. It's been a very good resource."*

NASA's reputation and cachet were prime draws. On the library staff post-survey, library staff were asked to rate how important various factors were in their library's decision to participate in *NASA@ My Library*. "The connection to NASA" was the most important factor, with 94% of library staff saying it important (including 57% who said NASA was *very important*). Library staff mentioned that the connection to NASA "created validity." One library staff said, "There's a lot of meaning behind NASA, so people think, 'I'm getting to come to something special.'"

➢ Weaknesses/Challenges

Although participating librarians generally rated *NASA@ My Library* training and resources highly, many of them wanted to have more opportunities to connect with and learn from one another. In particular, iMeet Central (an online discussion platform and central repository for documents) provided a mechanism for library staff to connect with one another, but thoughts were mixed about how useful it was. Library staff appreciated that there was a place they could go to for support and resources, but indicated that iMeet Central itself was confusing and difficult to navigate. One library staff member said:

> *"Posting online is helpful too, but not as strong as small group conversations. The group is too large for everyone to participate in live virtual conversations, but placing everyone in small groups for online meetings would work. It would be nice to have the same small group as support throughout the process, brainstorm ideas, and simply keep in touch."*

➢ Recommendations/Areas of Consideration

❖ The in-person workshop was very highly rated by library staff. The continued COVID-19 pandemic (and shorter duration of the next phase of *NASA@ My Library*) means that the next cohort of *NASA@ My Library* partner libraries will not be able to be attend in-person workshops. The project team should consider other ways to build excitement, camaraderie, and connection between libraries and with the project team, and to build library staff's confidence and skills in facilitating hands-on STEM activities.

❖ Provide ways for libraries to connect to one another in small groups around shared interests, such as through affinity groups.

❖ Recruit some *NASA@ My Library* 1.0 partner libraries to serve as mentor libraries and share their past experiences to support new libraries.

Facilitation Kits and Library Programming

Libraries increased the amount of STEM-related programming they offered because they participated in *NASA@ My Library*. The majority of libraries (71%) reported offering more STEM-related programming in Year 4 of the project (2019) compared to the year before joining the project.

Among the resources provided by *NASA@ My Library,* library staff felt the physical materials in the kits were the most useful (87% named them as *very useful*). About half to two thirds of librarians reported that the Activity Guides, resources from *STAR Net's* online *STEM Activity Clearinghouse*, Quick Facilitation Guides, and how-to videos were *very useful*.

> A total of
> **227,854**
> library patrons attended
> **2,293**
> *NASA@ My Library*
> Programs from 2017-2020
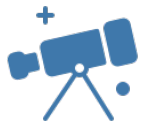
71% of librarians **offered more STEM related programs** as a result of participating in *NASA@ My Library*

➢ Strengths/Highlights

Library staff members felt that the *NASA@ My Library* facilitation kits and accompanying guides were well-organized and provided the materials and information needed to easily run the programs. *NASA@ My Library* resources were especially helpful for library staff without STEM backgrounds because it made them feel more confident in facilitating their programs.

79% of librarians indicated **the STEM Facilitation Kits were "must-haves"** for future iterations of the project (the top item on the list)

Nearly all library staff (97%) reported sharing *NASA@ My Library* resources with colleagues at their library and many (66%) shared resources with staff at other libraries.

On the post-survey administered near the end of partner libraries' involvement in *NASA@ My Library*, about half (51%) of library staff said they would continue to use the kits from *NASA@ My Library* at least once per month even after their formal relationship with *NASA@ My Library* ends. Most (92%) predicted they would use their kits at least a few times per year.

92% of **librarians expected to continue to use** their *NASA@ My Library* kits after the end of the grant

➢ Weaknesses/Challenges

The tablet was seen as being the least useful resource and was also the least likely to been seen as a "must have," with 30% of library staff feeling that it was not necessary to provide tablets to future libraries.

➢ Recommendations/Areas of Consideration
   ❖ Although most libraries felt that the stipend amount provided was appropriate (77% indicated the stipend was "just right"), they noted that additional funds could help them purchase more materials, expand their programming, and allow them to produce additional circulating or take-home activities.

   ❖ Although facilitation kits were most often identified by library staff as being a "must have" for future libraries participating in the project, supporting resources such as other activities on the STEM Activity Clearinghouse and resources about connecting with NASA Subject Matter Experts were also viewed as "must haves" by at least 70% of libraries. Training resources (e.g., webinars, how-to videos) were also seen as a "very important" reason many libraries joined the project. The perceived value of these additional supports and resources should be kept in mind as the project team plans ways to support additional libraries in the future.

   ❖ Helping more library staff find ways to share *NASA@ My Library* resources would increase the overall reach of the project. While almost all librarians shared *NASA@ My Library* resources with colleagues at their own libraries, 36% of librarians found opportunities to share more broadly, with the library community or beyond, with teachers and other networks.

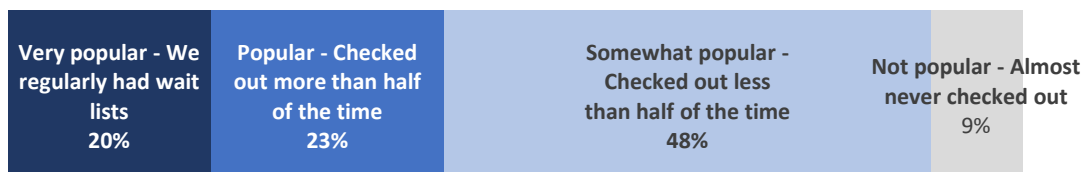## *Circulating Backpacks and Take and Make Kits*

Each partner library received two circulating backpacks in spring 2019; each backpack included a telescope, flashlight, planisphere (star chart), Code and Go Robot Mouse, books, activity guides, and links to how-to videos. The backpacks were designed for libraries to make available for their library patrons to check out.

Prior to their circulation, in fall 2018, a needs assessment survey showed that 85% of librarians were interested in circulating STEM-specific kits as part of the *NASA@ My Library* project; libraries also provided data on their preferences for the content of the kits, targeted ages, and plans for using the kits.

➢ Strengths/Highlights:

During *NASA@ My Library,* a large majority of libraries (85%) circulated the backpacks to patrons' homes and some also used them for facilitated programming in the library (41%) or at outreach events (34%). Nearly all libraries (98%) *agreed* or *strongly agreed* that the circulating backpacks were a good way to provide their patrons to access to STEM activities.

Figure 4. Many libraries reported that the circulating backpacks were popular: 43% of libraries indicated the circulating backpacks were checked out the majority of the time they were available.

Very popular - We regularly had wait lists 20%	Popular - Checked out more than half of the time 23%	Somewhat popular - Checked out less than half of the time 48%	Not popular - Almost never checked out 9%

Source: Partner Library Post-Survey (n = 56)

Analysis of 109 patron surveys[2] in the circulating backpacks showed that they were mostly used by elementary-school aged children, and had an average use time of 3 hours. Patrons most commonly used the telescope (84%), the books (76%), and the Code and Go Robot Mouse (66%). At least 96% of survey respondents agreed that the backpack made them want to look for other science activities and that it helped them learn about space science.

During COVID-19 related library closures, some libraries were able to make their *NASA@ My Library* circulating backpacks available for curbside pickup. Additionally, two-thirds (66%) of libraries elected to receive Take and Make bags provided by the project team in summer 2020 (which included the "GLOBE Observer" kit and/or the "Our Planet: EARTH" kit).

The post-survey showed that most library staff were interested in continuing to circulate their existing backpacks (94%) and create additional STEM-related circulating backpacks in the future (87%).

➢ Weaknesses/Challenges

Consistent with the pre-assessment predictions, librarians shared that major barriers to circulating kits were backpack maintenance and loss or wear-and-tear of items, and challenges with cataloging and setting up circulation systems and policies.

Some libraries had trouble getting the backpacks catalogued and into circulation because they did not have an existing system in place for circulating hands-on items. Others mentioned that some patrons would check out the backpacks but return them unused, for example, if they checked it out specifically to use the telescope but the weather was not good during the time they had the backpack. One librarian suggested it would be helpful if the backpacks included instructions on how to replace lost or broken items, "It would be nice if there was a replacement cost list and list of vendors to purchase replacement items/pieces that came with each kit."

➢ Recommendations/Areas of Consideration

❖ In response to early feedback from library staff, the project team provided libraries with information about how to purchase replacement parts and MARC records (to make it easier to add the backpacks to libraries' circulation systems), but not all libraries appeared to be aware of these resources. If the project team distributes circulating backpacks to additional libraries, provide the accompanying resources to libraries early and highlight these resources in multiple ways to increase the likelihood that libraries are aware of them (e.g., via webinars, the online community of practice).

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[2] Completed surveys were received from 24 out of 57 libraries that circulated backpacks (42% coverage). This relatively low response rate suggests that the circulating backpack survey results should be interpreted with caution.

Engagement of NASA Scientists or SMEs

Partner libraries were asked to involve NASA scientists (subject-matter experts, or SMEs) in their programs. Many libraries successfully reached out to NASA-affiliated scientists, especially those affiliated with the volunteer networks Solar System Ambassadors and Night Sky Network.

For many libraries, though, engaging SMEs was a challenging program component. Challenges included identifying SMEs, difficulties reaching or hearing back from SMEs, planning the role of the scientist, ensuring the program would be engaging to their audience, and ensuring a large enough audience. In addition, the time and funding required for travel were barriers for libraries and scientists, and especially for libraries in rural locations.

NASA@ My Library partnered with the Portal to the Public Network (PoPNet) to support six PoPNet sites as they recruited and trained scientists to present virtually at *NASA@ My Library* libraries in their region between May 2018 to April 2019. PoPNet sites prepared scientists and helped each scientist create an engaging virtual presentation and activity suitable for a library audience. The PoPNet sites then partnered with libraries and offered 40 programs to patrons who were physically at a library with a virtual connection to the scientist (facilitated with help from the librarians).
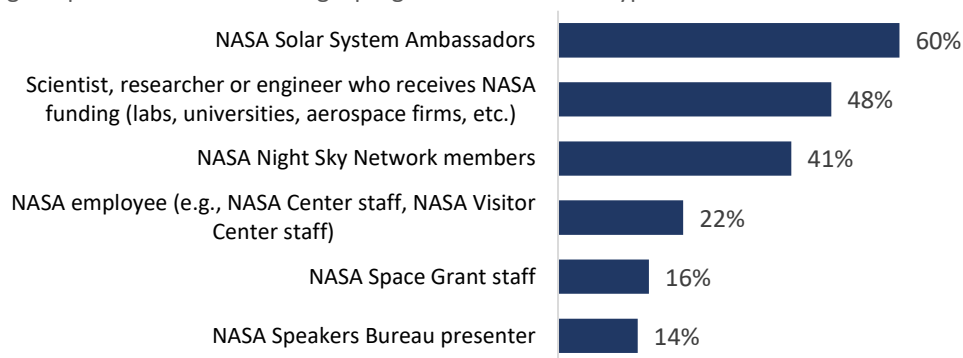
In 2020, the Lunar and Planetary Institute (LPI) recruited and trained SMEs for virtual presentations at a subset of the *NASA@ My Library* partner libraries. With the start of the COVID-19 pandemic, programs were modified to accommodate all-virtual attendance—for SMEs, library staff, and patrons to join a video call from their own connections. The 16 "Virtual Programs with NASA Scientists" were held between August and October 2020 at 15 different partner libraries.

➢ Strengths/Highlights

About two thirds of the libraries (63%) were able to engage at least one NASA-affiliated SME as part of *NASA@ My Library*. Libraries had most success engaging NASA Solar System Ambassadors to support their programming. Nine partner libraries (16% of post-survey respondents) were very successful engaging NASA-affiliated Subject Matter Experts, offering 5 or more programs with SMEs.

Figure 5. More than 40% of *NASA@ My Library* partner libraries held programs with Night Sky Network members or scientists receiving NASA funding; 60% of libraries held at least one program with a NASA Solar System Ambassador.

Percentage of partner libraries holding a program with different types of NASA affiliated SME

NASA Solar System Ambassadors	60%
Scientist, researcher or engineer who receives NASA funding (labs, universities, aerospace firms, etc.)	48%
NASA Night Sky Network members	41%
NASA employee (e.g., NASA Center staff, NASA Visitor Center staff)	22%
NASA Space Grant staff	16%
NASA Speakers Bureau presenter	14%

Source: Partner Library Post-Survey (n = 55)

Additionally, a very high percentage of partner libraries (92%) had success engaging non-NASA affiliated earth and space science SMEs (e.g., professors, amateur astronomers, planetarium or museum staff, researchers, or other professional scientists) for library programming.

Virtual programs with SMEs were also valuable during the COVID-19 pandemic with 28% of libraries reporting that they were able to offer virtual STEM programs with SMEs while the libraries were closed to the public.

Partner library staff reported that the most valuable aspect of the LPI and PoPNet programs was having a connection to a NASA SME who was prepared to present at a library. The virtual programs were thought to be engaging for all ages (according to patrons, librarians, and scientists), a convenient format to join, inspiring to participants to want to learn more about space science and more about NASA, and helpful for librarians to learn how to work with a SME and to host virtual STEM programming. The patron survey administered after the PoPNet programs showed that over 90% of patrons indicated they learned a lot at their *NASA@ My Library* PoPNet program and that the program made them want to learn more about earth science, space science, or engineering.

Library staff see the value of engaging NASA-affiliated SMEs. They see them as experts who can share knowledge with patrons and serve as role models providing a personal connection to science. Partner library staff noted:

> *"Experts bring first-hand experience that can't be reproduced no matter how prepared library staff try to be. Participants like being able to meet someone who actually has this career and hear stories about what it's like to live it."*

> *"Being in a rural area, kids often think that science careers are out of reach for them. In every program with NASA-affiliated Subject Matter Experts, our patrons were 'wowed' by what they learned and excited about the possibilities of science."*

Nearly all library staff (97%) would like to work with NASA-affiliated SMEs in the future. Ninety-seven percent of library staff also indicated they would like to offer online or virtual programs featuring NASA-affiliated SMEs in the future. Participating in the project helped library staff learn about and make connections with SMEs, and they reported feeling more comfortable reaching out to SMEs in the future.

➢ Weaknesses/Challenges

More than half of library staff responding to the post-survey (63%) reported that it was *Difficult* or *Very difficult* to connect with NASA-affiliated SMEs. They noted challenges such as reaching out but not receiving a response and the distance SMEs would have to travel for an in-person program at their library.

Thirty-six percent of partner library staff indicated they did not offer a program with a NASA-affiliated SME during *NASA@ My Library.*

Forty percent of partner librarians had reached out or communicated with the NASA Speakers Bureau, but did not schedule a program with them. One librarian noted:

> *"We tried to use the Speakers Bureau but were never successful. I submitted a few requests, but we were never able to ask for the right thing to match our needs with what NASA could provide."*

A few library staff also felt nervous that the programs would not be engaging to their audience or that there would not be a large enough audience for a program with a SME. One librarian said:

> *"I found it challenging to create a program that would both be engaging and hands-on for my target audience, and also a valuable use of the time and expertise of a highly knowledgeable NASA SME."*

Attendance at virtual programs with SMEs varied. While some programs were well attended, others had only a handful of attendees. During the PoPNet phase of the project (where library patrons attended programs in person at their library while SMEs participated virtually), six out of ten librarians were not satisfied with the number of attendees at their *NASA@ My Library* PoPNet program.

The challenges of the virtual programs through PoPNet and LPI included technical issues, low attendance, and difficulty for the SMEs and patrons to feel connected (especially in the all-virtual format).

➢ Recommendations/Areas of Consideration

❖ Consider ways to further support connections between libraries and NASA-affiliated SMEs, including helping libraries and SMEs have an understanding of expectations and ways they can work together and benefit from a partnership.

❖ Library staff would like *NASA@ My Library* to train more NASA-affiliated SMEs and encourage them to reach out to partner libraries.

❖ Offer more virtual programs with SMEs to partner libraries due to the high interest in online programs with SMEs. Broker the connection to SMEs. Support library staff in the roles of organizers, for outreach to target communities, and to help facilitate.

❖ Libraries would especially like connections to a diverse group of NASA scientists (in terms of gender, race and ethnicity).

❖ Prepare libraries and SMEs to address potential technical issues that may arise during programs.

❖ Identify strategies for boosting attendance at programs with SMEs (e.g., more advanced planning time, conducting programs simultaneously with multiple libraries).

❖ Encourage SMEs to share information about their backgrounds, their career pathways, and personal interests (outside of science) to help connect with patrons.

State STEM Workshops

The NASA STEM workshops were facilitated by SSI and/or LPI and featured hands-on space science activities, information and resources on NASA science and missions to assist libraries in preparing for the

2019 summer reading theme, "A Universe of Stories." Workshops were held in 12 different states between October 2018 and May 2019, with a mean of 35 participants each (a total of 363 participants were trained). EDC followed up with participants from the NASA STEM workshop in September 2019 (4 to 11 months after their workshop) to gather feedback about the workshop and learn about how the workshop affected participants' knowledge, confidence and practice in facilitating hands-on space science activities.

➢ Strengths/Highlights

In the follow-up survey after the workshops, 96% of attendees who facilitate library programming had used activities they learned in the workshop; the small percentage of those who had not done so stated that they had not had time to do so yet. The workshop participants responding to the survey reported they had reached 72,013 total patrons or students with activities they implemented following the NASA STEM workshop. Respondents almost all indicated that participants were *very engaged* (73%) or *moderately engaged* (25%) in the NASA activities they had facilitated.

NASA STEM workshop attendees indicated that the hands-on learning opportunities and having the facilitators there in-person were *very valuable* in preparing them to facilitate STEM learning opportunities. Having the activities aligned to their summer learning program and having supervisor support were positive influences on their use of the activities.

Almost all respondents agreed that the workshop increased their confidence in facilitating hands-on space science activities increased and that they were prepared to use effective strategies for facilitating STEM learning.

Ninety-four percent of respondents agreed that the workshop led them to plan space science learning opportunities outside of the summer learning program and that the workshop increased the likelihood that they will dedicate more attention and resources to space science programming.

➢ Weaknesses/Challenges

Workshop attendees were generally extremely positive about the workshop. A few respondents would have liked to have had their workshop earlier in the year—they attended a workshop in the spring, but could have used more time to plan before summer learning started.

➢ Recommendations/Areas of Consideration

❖ Some workshop participants requested STEM activities for younger (preschool) and/or older audiences (teens).

❖ Participants indicated that having encouragement or support from supervisors was an important positive factor in their being able to utilize activities from the workshop. Consider how the project can encourage librarians to rely on or try to develop institutional support from their libraries to make it more likely that they will implement STEM programming.

State Library Agencies

SLA Background

Another model the project used to achieve its goals was to partner with State Library Agencies (SLAs) who promoted and circulated earth and space science kits and associated resources to public libraries in their states. In January 2018, four SLAs were selected by the *NASA@ My Library* project team to participate as pilot sites for testing this model of public library engagement. An additional 14 SLAs were on-boarded in December 2018, for a total of 18 participating SLAs.

The following sections describe findings related to SLA-specific training and support, facilitation kits, impact on library patrons, engagement of NASA SMEs, and reaching underserved audiences.

SLA Training and Support

All SLAs received support from the project team through monthly Zoom calls, one-on-one communications, *STAR Net* webinars, and access to iMeet Central. Additionally, the four pilot SLAs had the opportunity to attend the in-person workshop along with the partner libraries which took place February 2018 in Denver, Colorado.

Overall, SLAs felt supported and benefited from participating in the project.

➤ Strengths/Highlights

Most SLA staff agreed that they received enough training and support from the *NASA@ My Library* team to implement the project. SLA staff felt that direct emails with information about events and resources were especially useful because they could be easily forwarded to public libraries. They also valued the monthly Zoom calls with the project team and other SLAs. Additionally, the four pilot SLA staff who attended the in-person workshop felt it was very helpful because it provided hands-on training, clarified the scope of their role, and allowed them to connect with representatives from other SLAs as well as the public libraries participating in the larger *NASA@ My Library* project.[3] One SLA staff member who attended the workshop said:

> *"The initial training in Colorado was a magnificent kick starter. It really helped clarify the scope [of the project]. I don't think it would have been as clear without that. It would have just been another resource for me to circulate. But by attending that and getting a much bigger picture of what the State Libraries' role is, and we got to meet all of the libraries that are doing it on their own, and how do we incorporate what we're already doing and inject that into that stream. It made everything much more clear and kind of energized."*

On a final survey, all SLA staff participating in the project reported feeling more confident, knowledgeable, and interested in supporting earth and space science-related programming. The project benefited SLAs regardless of their prior experience with STEM kit circulation. For those with little experience, it opened their eyes to the demand for circulating kits in general and provided an

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[3] Only the pilot SLAs were able to attend the in-person workshop because it was held before the additional 14 SLAs joined the project.

opportunity to test the model of kit circulation. For those with more experience, it diversified their offerings to include earth and space science-related activities.

Figure 6. Every SLA that participated in *NASA@ My Library* reported that the project helped them become more confident, knowledgeable, and in interested in supporting public libraries in offering earth and space science-related programming.

Number of SLAs selecting each response option

	Strongly Agree	Agree
I am more confident in supporting public libraries in offering Earth and space science-related programming	9	9
I am more knowledgeable about how to support public libraries in offering Earth and space science-related programming	8	10
I am more interested in supporting public libraries in offering Earth and space science-related programming	6	12
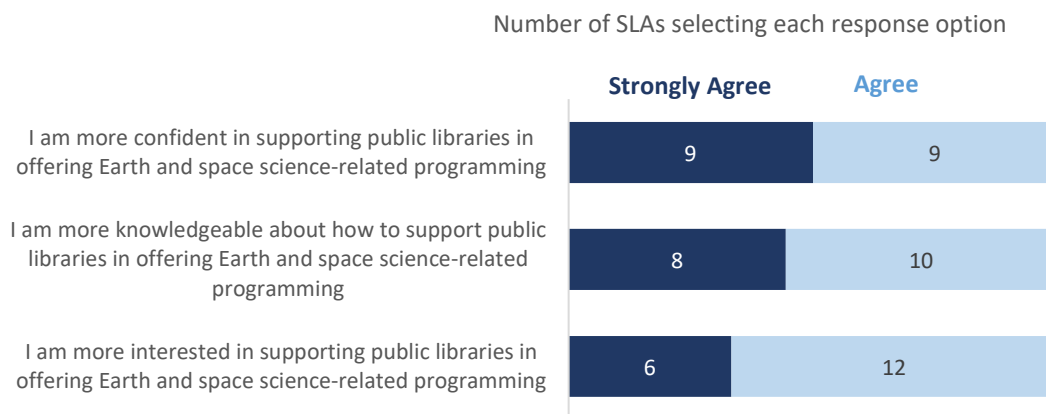
Source: Summative SLA survey (n = 18)

➢ Weaknesses/Challenges

Many SLA staff noted that they would have also liked to have an in-person training near the beginning of the project (as the four pilot SLAs did) to learn about and gain hands-on experience with the kits, make connections with other SLAs, and better understand project expectations and logistics.

SLA staff also noted that the unboxing webinars were useful to understand what was in each kit; however, they needed to spend a lot more time getting hands-on experience with the kit in order to be able to support their libraries.

➢ Recommendations/Areas of Consideration
   ❖ If possible, hold an in-person training near the beginning of the project to help SLAs learn about and gain hands-on experience with the kits, make connections with other SLAs, and better understand project expectations and logistics.

   ❖ Consider engaging SLA staff who have previously been involved in the project to share their experiences and tips with new SLAs. For example, they could serve as long-term "mentors" and/or share during a webinar for new SLAs.

SLA Facilitation Kits

The project team provided 52 kits for circulation that included science tools (a telescope, binoculars, and infrared thermometer), hands-on activities, and books. (Each SLA was given one copy of Kit 1 and two copies of Kit 2.) An additional 188 copies of the kits were created by SLAs for a total of 240 kits available for distribution by SLAs.

Overall, SLAs and public libraries valued the kits and related resources and were able to reach a large number of patrons.

➢ Strengths/Highlights

Based on circulation records from SLAs and reports from public libraries receiving the kits, 672 public libraries received SLA kits and >16,000 patrons were reached with kit programming over the course of approximately one year. SLAs also provided training to their public libraries on the use of the kits. They reported that in-person training was especially effective because the opportunity to see and interact with the materials helped to increase excitement and confidence around the Kit activities, making it an effective promotional strategy as well. SLAs also reported that the websites they created for the project were beneficial because it provided a place to put links to various resources and a specific place to direct people interested in the kits.

On a final survey, all SLAs agreed that the kits and related resources were a good fit for public libraries in their state and nearly all (94%) reported that the kit materials were very useful to their public libraries. Most SLA staff (89%) plan to continue circulating their existing *NASA@ My Library* kits and many (61%) plan to create and circulate additional kits with new materials.

	>600	public libraries **received kits**
	>16,000	**patrons reached** with kit programming
	At least 87%	of **librarians were very or extremely satisfied** with the support from their SLA, found the kits easy to use, and interested in more kits
	89%	of SLAs **plan to continue circulating existing kits**
	61%	of SLAs **plan to create new kits** with new materials

Sources: SLA circulation records, SLA kit evaluation forms for public libraries, Summative SLA survey

On kit evaluation forms completed by public libraries, most public library staff reported that they were *very* or *extremely* satisfied with the support they received from their SLA (90%) and the majority (89%) would be interested in similar kits in the future. Public library and SLA staff both mentioned that having a "program in a box" with a set of vetted activities, detailed instructions and facilitation tips, along with supporting resources such as the how-to videos and other Clearinghouse materials helped public libraries feel more comfortable using the kits. For example:

> *"The fact that everything was there and ready to go and some of the activities basically had a script, lessened the anxiety for library staff because they knew it was coming from a trusted source and they could just follow the instructions provided."* ~SLA staff

> *"It was nice having someone else do all the program planning as for the activities and I just had to get it out of the box, study, set up, explain and help the youth, and then clean up (which*

was minimal). I did not have to take hours of planning and collecting. It was great! Thank you!" ~Public library staff

➢ Weaknesses/Challenges

Most challenges noted by SLA staff were around the circulation of the kits. They included issues related to transportation (e.g., the amount of time kits would be in transit, weather causing transportation delays, the cost of shipping), procurement of materials if duplicating the kits, and replacing consumable kit materials.

SLAs also emphasized that the kits need to be more user friendly in order to increase interest in and use of the kits by public libraries. Additionally, they mentioned the challenge of how to keep libraries interested in the kits after their initial roll-out.

➢ Recommendations/Areas of Consideration:

❖ Consider ways to make the kits more user friendly. For example, bundle materials in the kits so that all materials for one activity are packaged together. A quick-start guide or other way to indicate which activities are "quick and easy" may also help library staff quickly find something to try and incorporate into their programming if they are short on time.

❖ Consider ways to support SLAs in providing in-person training to their public libraries to help them become more interested and confident in using the kits. Some of the SLAs hosted NASA STEM Workshops (described earlier in this report) and saw them as valuable for participants.

❖ Consider creating an interactive calendar or other resources that highlight both recurring and special events. Including links to associated kit activities and promotional blurbs would help SLAs easily capitalize on these events and use them as a way to promote the kits. Activities not included in the kits could also be shared as options if SLAs would like to refresh their kits with a new activity.

SLA Impact on Library Patrons
Overall, public libraries reported that patrons enjoyed the program and benefited in various ways.

➢ Strengths/Highlights

91% of public library staff completing a kit evaluation form reported that patrons appeared to enjoy the programs that used the SLA kits. They described that the fun, hands-on learning and discovery played a big role in patron engagement. Specifically, they felt that the activities helped to increase patrons' interest in and positive attitudes towards STEM, STEM learning, and STEM careers. Public library staff comments included:

> *"We received many positive compliments from our participants. One of the best ones was a little boy who was so intrigued by the UV beads and flashlight. He kept coming back and coming back to play with the beads. After he came up to a staff member and said, 'I guess I made my decision.... I'm just going to have to be a scientist when I grow up!'"*

> *"This year most of our kids attended all of our programs. The learning plus fun activities did the trick. The day we made the wind streamers, after the kids came back in the library I was*

checking to make sure they were all inside, I saw one of the dads running with the streamer. He told me it was so cool. Not sure who was having more fun..."

"One elementary school girl became very excited when I spoke to her about space during the program. She enjoyed the conversation so much she immediately started looking at and checking out books about space to learn more. It was wonderful to see her enthusiasm!"

➢ Weaknesses/Challenges

Some public libraries would have liked to have more activities and books for very young patrons (e.g., 0-5 year olds).

➢ Recommendations/Areas of Consideration
   ❖ Consider creating a kit specifically focused on very young children (ages 0-5) or including a guide specifically explaining how activities can be modified for this age group.

SLA Engagement of SMEs

SLAs tended to promote resources on connecting with SMEs to public libraries in their state, but rarely made strong connections themselves, with the majority of SLAs connecting with one or two organizations, if any, based on reports in their final survey. Based on information provided in kit evaluation forms, public libraries engaged SMEs (e.g., amateur astronomers, science performers, science teachers, university and community college staff) for 12% of their programs using the SLA kit, but only 18% reported that their SLA helped connect them with the SME.

➢ Strengths/Highlights

On their final survey, most SLAs (83%) of SLAs reported that they had the resources needed to connect public libraries in their state with SMEs.

A few SLAs had success connecting personally with SMEs, especially for training. They noted that this was exciting for the library staff at their trainings. One SLA noted:

> *"Library staff loved meeting [SMEs] and were all blown away that [SMEs] are in the local community and they never tapped into them. I'm hopeful some connections were made and they will keep in touch. The group that came in was having just as much fun sharing their passion and knowledge as the library staff. We were excited to meet them and have them as part of our training. It was an element that enriched our workshops."*

➢ Weaknesses/Challenges:

The most common challenge mentioned by SLAs was that there were few Solar System Ambassadors or Night Sky Network members in their state.

➢ Recommendations/Areas of Consideration:
   ❖ Consider mechanisms to help SLAs identify and connect with SME organizations (e.g., hosting a webinar where others share ways they have had success working with SME organizations). Other suggestions from SLAs included having state-specific information sessions with specific

SME organizations such as the Night Sky Network or Solar System Ambassadors or providing a vetted contact list of SME organizations in each state. One SLA in a state with a large rural population was especially interested in the possibility of offering virtual SME visits as an option for their libraries.

SLA Reaching Underserved Audiences

Overall, SLAs felt that the project helped them reach underrepresented audiences in their state. Final SLA survey results indicated that nearly all SLAs (83%) were interested in reaching rural audiences. SLAs appear to have been successful in reaching rural, with public libraries reporting on their kit evaluation forms that 43% of their *NASA@ My Library* programs were targeted towards rural audiences. However, SLAs faced some challenges developing strategies to reach underserved audiences, including determining which groups to focus on and following-up with public libraries to know what audiences were actually being reached.
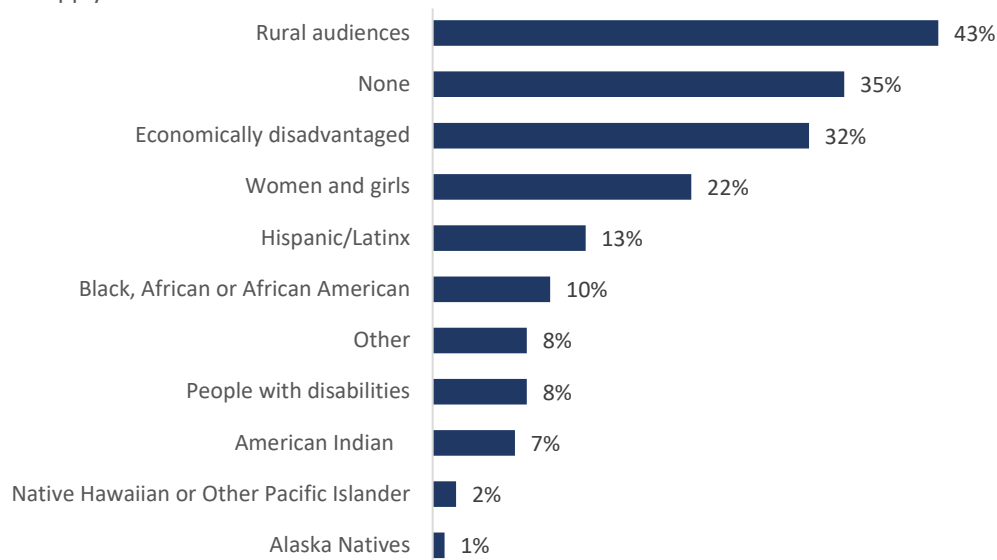
➢ Strengths/Highlights

On the final SLA survey, all but one SLA *agreed* or *strongly agreed* that participation in *NASA@ My Library* helped them reach underrepresented audiences in their state. In order to reach underrepresented audiences, most SLAs reached out to libraries in specific areas or that serve certain communities.

Based on results from kit evaluation forms, the most common underserved group that libraries reported specifically targeting were rural audiences (43% of programs). At least 20% of programs also targeted the economically disadvantaged or women and girls. On their kit evaluation forms, a few public libraries mentioned targeted promotional strategies such as translating promotional materials or promoting the kits at bilingual story times.

Figure 7. Many libraries receiving SLA kits reported reaching rural and economically disadvantaged audiences. Results are consistent with the underrepresented audiences that were a focus for SLAs.

Survey question: Which underserved audience(s) did you specifically reach out to for this program? Check all that apply.

Audience	Percent
Rural audiences	43%
None	35%
Economically disadvantaged	32%
Women and girls	22%
Hispanic/Latinx	13%
Black, African or African American	10%
Other	8%
People with disabilities	8%
American Indian	7%
Native Hawaiian or Other Pacific Islander	2%
Alaska Natives	1%

Source: SLA kit evaluation form completed by public libraries (n = 318)

➤ Weaknesses/Challenges

Many SLAs noted that they faced challenges determining what underserved groups to focus on and coming up with strategies to reach these groups. They would have appreciated more information and suggestions about reaching underserved populations, especially from other SLAs who have experience doing so.

SLAs also felt uneasy about how to define and determine where underserved populations are located in their state and which libraries would serve these audiences. They felt that this would be better addressed at the local level where libraries would be more aware of the underserved populations in their area. Furthermore, SLAs noted that it was difficult to follow-up with public libraries to know how successful they were in reaching underserved audiences with programming.

➤ Recommendations/Areas of Consideration

❖ Consider having an interactive webinar or brainstorming meeting shortly after new SLAs join to share and discuss ideas for identifying which target underserved audiences they would like to reach out to and the strategies they used for reaching these groups. Many SLAs felt that reaching underserved audiences was a very difficult part of the project and would have appreciated hearing from others with prior experience about strategies that have worked from them, including how to decide on which underrepresented audiences to focus on, strategies for reaching these audiences (both strategies for specific audiences and those that could be applied more broadly), and how to determine how successful public libraries are at ultimately engaging these groups. A similar interactive webinar from the public library perspective and aimed at public library staff could also be beneficial since SLAs felt that identifying and engaging underserved audiences may be better handled at a local level. The team might also consider finding ways to support networking between state and public library professionals to better connect state- and local-level efforts specifically around reaching underserved audiences.

Impact on Library Patrons

Each year, *NASA@ My Library* programs received high ratings on the patron surveys, suggesting patrons were overwhelmingly pleased with the events they attended.

Strengths/Highlights

To evaluate the impact of *NASA@ My Library* programming on library patrons, library staff were asked to administer the Patron Survey to program attendees after each *NASA@ My Library* program. As Figure 8 details, 98% of patrons *agreed* or *agreed a lot* that the program was interesting, and 96% of patrons *agreed* or *agreed a lot* that they would recommend the program they attended to others. A total of 93% of patrons *agreed* or *agreed a lot* that they learned a lot about earth science, space science, and/or engineering. A slightly smaller—but still substantial—majority of patrons said the programs had sparked an interest in learning more. A total of 91% of patrons *agreed* or *agreed a lot* that the program made them want to learn more about earth science, space science, or engineering, while 85% *agreed* or *agreed a lot* that the program made them interested in looking for more information about NASA science or NASA careers.

Figure 8. Patrons overwhelming reported that they enjoyed the *NASA@ My Library* programs they attended and that they learned a lot about NASA science; a substantial majority of patrons said they were interested in learning more.

	Agree a lot	Agree	Agree a lot + Agree
I thought this program was interesting.	63%	35%	**98%**
I would tell others to come to this program.	62%	34%	**96%**
I learned a lot about Earth science, space science, and/or engineering from this program.	46%	46%	**93%**
This program makes me want to learn more about Earth science, space science, or engineering.	50%	41%	**91%**
This program makes me want to look for more information about NASA science or NASA careers.	45%	40%	**85%**
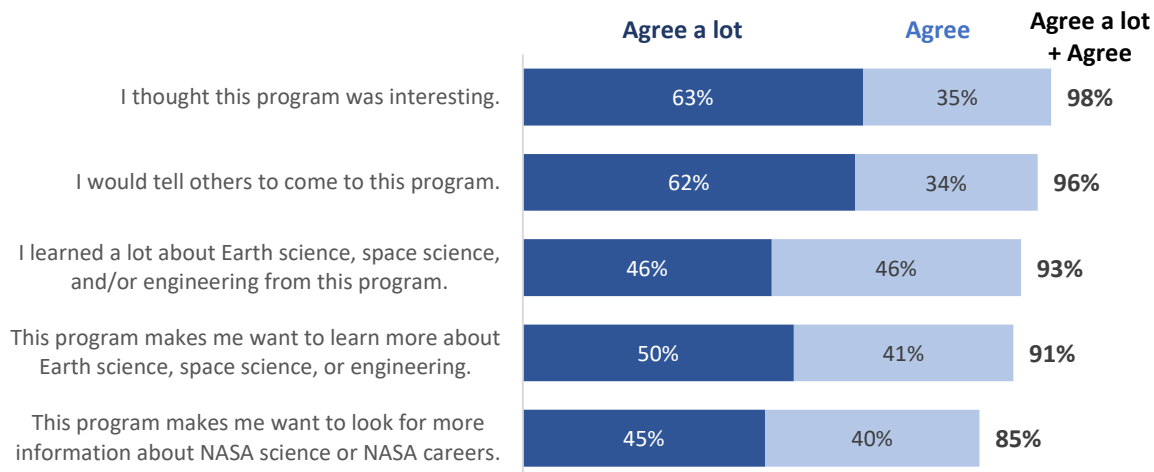
Source: Combined Patron Surveys from Years 2-5 (n = 15,883 – 16,220 depending on question)

Most library staff (90%) reported that patrons seemed engaged in program activities. All, or nearly all library staff, felt that patrons seemed at least moderately interested in learning more about earth and space science, engineering, NASA, and NASA missions.
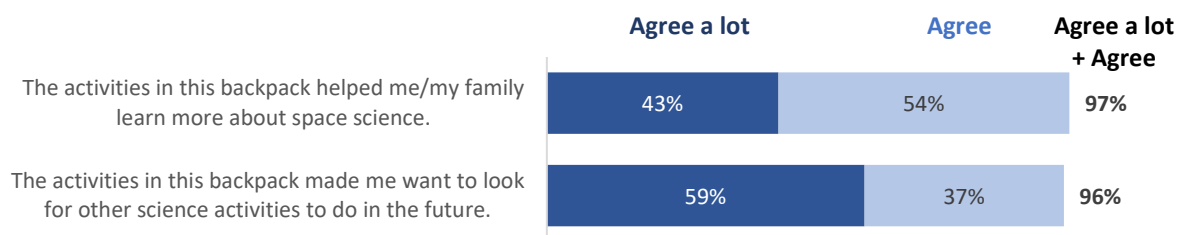
After attending virtual programs with SMEs, many patrons shared that they liked being able to have access to people who they would not typically be able to connect with and that they enjoyed being able to talk to and ask questions of "professionals" or "experts."

As mentioned in the earlier Circulating Backpack section of the report, patrons who checked out one of the circulating backpacks reported using them for an average of 3 hours. The vast majority of survey respondents said that the backpack helped them learn about space science and made them want to look for other science activities (Figure 9).

> "I've heard kids say things similar to, 'This is more fun than science in school' or 'I get to put my hands on things that I've never touched before'… That level of engagement has been exciting for them, and maybe made them more interested more in reading about science and in pursuing science, or doing a little better in their studies."
>
> ~Library staff member

Figure 9. Patrons who checked out a circulating backpack reported that they learned about space science and were interested in learning more.

	Agree a lot	Agree	Agree a lot + Agree
The activities in this backpack helped me/my family learn more about space science.	43%	54%	**97%**
The activities in this backpack made me want to look for other science activities to do in the future.	59%	37%	**96%**

Source: Circulating Backpack Patron Surveys (n = 104-108, depending on question)

As described in the SLA section of the report, 91% of public library staff completing a kit evaluation form reported that patrons appeared find the programs that used the SLA kits engaging, and library staff provided examples of how the activities helped to increase some patrons' interest in and positive attitudes towards STEM, STEM learning, and STEM careers.
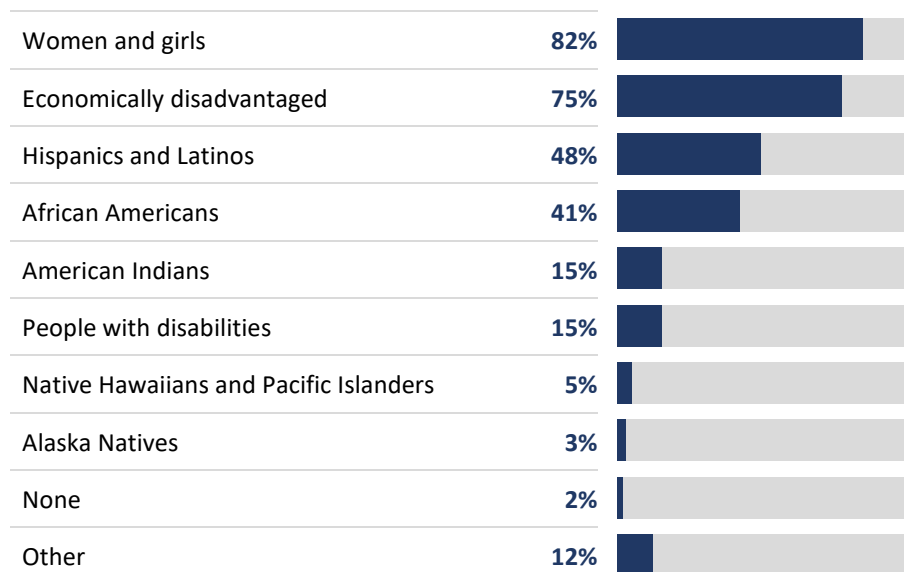
Reaching Underserved Audiences

One of the goals of *NASA@ My Library* was to reach audiences who are underserved or underrepresented in STEM, including women and girls, low-income communities, and people of color. Evaluation data suggest that *NASA@ My Library* helped libraries engage new—and often underserved or underrepresented—audiences.

➢ Strengths/Highlights

The evaluation team used several data sources to evaluate the project's success in reaching underserved audiences. These included data from libraries describing which specific audiences they targeted *NASA@ My Library* programming over the course of the project; the self-reported race/ethnicity of patrons who attended *NASA@ My Library* programs and used the circulating backpacks; and the role of the project's *Community Dialogues* strategy in reaching community audiences.

According to post-survey responses, the majority of libraries said they had targeted women and girls (82%) and people who were economically disadvantaged (75%). On the final post-survey, over two-thirds of libraries (69%) felt they had been *mostly* or *very successful* at reaching underserved audiences with *NASA@ My Library* activities and resources.

Figure 10. NASA@ *My Library* partner libraries most commonly reported targeting women and girls and people who are economically disadvantaged.

Women and girls	**82%**
Economically disadvantaged	**75%**
Hispanics and Latinos	**48%**
African Americans	**41%**
American Indians	**15%**
People with disabilities	**15%**
Native Hawaiians and Pacific Islanders	**5%**
Alaska Natives	**3%**
None	**2%**
Other	**12%**

Source: Library Staff Post-Survey (n = 61)

Partner libraries were asked to report which audiences they recruited for each *NASA@ My Library* program they offered.[4] Over the first three years libraries were involved the project, partner libraries reported recruiting several underserved audiences to programs more frequently, including African American and Latinx audiences, women and girls, people with disabilities, and economically disadvantaged community members. In fact, libraries reported increasing recruitment of underserved audiences for programming for every category except Native Hawaiians and Pacific Islanders and Alaska Natives. The largest gains in recruitment (from the first to the third year of libraries' involvement in the project) were for African Americans (increasing from being recruited for 30% of programs in the first year to 43% in the third year), women and girls (increasing from 58% in the first year to 68% in the third year), and people with disabilities (increasing from 19% in the first year to 27% in the third year). Only about 10% of the programs libraries reported on each year were not specifically targeted at any undeserved audiences.

In addition to using the *Community Dialogues* (described in the following section of this report), most libraries reported that they reached out to underserved audiences by promoting *NASA@ My Library* programs directly to these audiences (87%) and holding events specifically targeted to these audiences either at or outside the library (84%).

Library staff noted the importance of making personal connections in the community and looking for public events or other venues that target audiences are already frequenting so that the program could be taken to them. Working with partner organizations in the community helped support these engagement opportunities. For example, one library partnered with a local tribal library and provided the librarian there with promotional materials and kit activities. Library staff felt that this was more successful than asking the Native American community to attend their library. Library staff commented on the post-survey:

> *"It seemed the most successful way of reaching a racial/ethnic underserved group was working with a community organization that was already serving that group. We were able to connect with some schools in economically disadvantaged neighborhoods."*

> *"We had the foundations of partnerships that helped us reach girls, youth with disabilities and from economically disadvantaged households.* NASA@ My Library *gave us the resources and cachet to deepen those relationships and demonstrate that we were a valuable partner."*

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[4] It is important to note that libraries reported which groups they *recruited* to participate, not the *actual* attendance by those groups since it would be inappropriate for library staff to make assumptions about attendees' gender, race/ethnicity, income, or ability status.

Table 1. SLAs and public libraries employed various strategies to reach underserved audiences

SLAs…	Public Libraries…
• Personally contacted specific libraries directly (e.g., by phone) or indirectly (e.g., targeted listservs) • Provided training in specific locations (e.g., rural areas) • Included items for specific underserved audiences • Demonstrated how the kits can be used with different audiences • Reserved a subset of kits for or gave priority to targeted communities	• Used their usual, broad promotional strategies (e.g., newsletter, radio, flyers) since many have underserved groups in their community • Promoted to/through community groups (e.g., Boys and Girls Clubs, Girl Scouts), including those that serve underserved audiences • Translated promotional materials • Specifically highlighted female scientists and astronauts in promotion • Cross-promoted at programs (e.g., girls-only coding class, bilingual story time)

About 43% of patrons who completed surveys identified themselves as a person of color. Just over half (52%) identified as white, while 16% of patrons selected *prefer not to say* or did not respond to the race/ethnicity question. Similarly, 42% of patrons who checked out a Circulating Backpack and returned a survey identified as a person of color, including 25% of patrons who identified as Hispanic/Latinx. The distribution of race/ethnicity across each year of the project was generally similar.

Table 2. About 43% of patrons who completed surveys following *NASA@ My Library* programs self-identified as a person of color.

	Year 1 (n = 7,626)	Year 2 (n = 4,160)	Year 3 (n = 4,097)	Year 4 (n = 591)	Combined Y1-4 (n = 16,474)
American Indian or Alaska Native	2%	3%	3%	1%	2%
Asian	4%	4%	5%	3%	4%
Black, African or African American	9%	9%	8%	19%*	9%
Hispanic/Latinx	17%	11%	8%	7%	13%
Native Hawaiian or Other Pacific Islander	0%	1%	<1%	0.8%	<1%
White	51%	53%	56%	38%	52%
More than one race/ethnicity	4%	6%	5%	13%	5%
Other	2%	3%	2%	2%	2%
No response or prefer not to say	11%	11%	14%	16%	12%

*The vast majority of surveys (89%) from patrons who identified as Black, African or African American in Year 4 were from a single library that also provided the majority of patron surveys in Year 4.

Source: Patron Surveys

Table 3 shows the percentage of patron survey respondents who had not been to a science program at the library before by race/ethnicity for each year of the project. In most years, the majority of patrons who identified as Black/African/African American or Hispanic/Latinx reported that the *NASA@ My Library* program they attended was the first science event they had attended at their library. These results suggest that libraries were successful in attracting patrons from audiences who are underrepresented in STEM by offering *NASA@ My Library* programs. Furthermore, the percentage of patrons who indicated that they had not been to a science event at their library before declined from Year 1 to Year 3 for most races/ethnicities (i.e., fewer patrons said they had never been to a science event in Year 3 than in Year 1). Patrons were not asked to provide their names or other uniquely identifying information on the surveys that would have allowed us to track their participation in *NASA@ My Library* programs over time. However, the decline in patrons who were "first-time science program attendees" is suggestive, and could indicate that these patrons returned to subsequent science programs at their libraries.

Table 3. Patrons who identified as Black or Latinx were the most likely to report that a *NASA@ My Library* program was the first science program they had attended at their library.

% of survey respondents who had not been to a science event at the library before	**Year 1** **(n = 7,626)**	**Year 2** **(n = 4,160)**	**Year 3** **(n = 4,097)**	Year 4* (n = 591)	**Combined Y1-4** **(n = 16,474)**
American Indian or Alaska Native	50%	50%	50%	46%	50%
Asian	73%	67%	45%	52%	63%
Black/African/African American	81%	69%	36%	74%	68%
Hispanic/Latinx	84%	72%	65%	62%	78%
Native Hawaiian or Other Pacific Islander	50%	60%	47%	50%	57%
White	71%	57%	43%	52%	59%
All Respondents	**72%**	**59%**	**46%**	**59%**	**59%**

* The percentages for Year 4 are shown in a lighter font for multiple reasons. Libraries were forced to at least temporarily close their facilities for several months due to the COVID-19 pandemic which began in Year 4. Libraries shifted to offering virtual programming, but offered fewer programs than originally planned and sometimes with lower attendance than in-person programming. It was also more challenging to obtain survey responses from patrons who attended virtual programs versus in-person programs where library staff could hand patrons a one-page survey and ask them to complete it.

Source: Patron Surveys

➢ Weaknesses/Challenges

A few library staff members mentioned that they had difficulty reaching target audiences due to scheduling or transportation challenges or a lack of translation services. For example, on the post-survey, librarians wrote:

> *"One of our biggest challenges is that we wanted to reach our Spanish-speaking audiences but we only had one full-time bilingual person. While we tried to reach out, we couldn't offer high quality programming we had initially set out to do."*

> *"We tried to spread our advertising to as many groups as possible. However, sometimes it was unclear who we should let know about certain programs. Also depending on the location, it might have been difficult for underserved audiences to come to the library when a program was occurring."*

➢ Recommendations/Areas of Consideration

❖ Employ a deliberate strategy to recruit libraries that serve underrepresented audiences, including marketing/outreach to libraries, the application materials, and the rubric used to select libraries.

❖ Resources featuring diverse SMEs would help libraries reach and engage underserved audiences. Provide more information during in-person training and follow-up webinars about how libraries can engage underrepresented audiences of various kinds.

❖ Partner with national and local STEM organizations that have expertise and serve specific audiences who are underrepresented in STEM.

Community Dialogue Strategy

One of the specific strategies that the project team developed to help libraries engage underrepresented audiences in library communities was Community Dialogues. The Community Dialogue strategy involves informal conversations between library staff and community members to gather information about community needs, including ways the library can work with individuals and organizations in the community to help address these needs. The purpose of the *Dialogues* is for library staff to increase their understanding of how to better serve underserved populations, especially those who may not be using the library or who may not feel comfortable using all its services. For the *NASA@ My Library* project, partner libraries were required to conduct at least one Community Dialogue. The project provided supports around conducting Dialogues, including training during the in-person workshop and via follow-up webinars. A *Community Dialogue Guide* was also produced which, in addition to general information and guidance, included supporting materials such as template invitations, timelines, tips and suggestions.[5]

Overall, public libraries found Community Dialogues to be most useful for identifying potential community partners, strengthening existing partnerships, and learning about the needs of their

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[5] For more information on *Community Dialogues*, see http://www.starnetlibraries.org/resources/community-dialogues/

community. The main challenges library staff faced were difficulty attracting attendees, especially from their target audience, and the time it took to plan the dialogues.

➢ Strengths/Highlights

Community Dialogues helped libraries create or strengthen partnerships with individuals and organizations in their community. Library staff described how the Dialogues provided a venue for networking and learning about organizations that they might work with, or strengthening ties to existing collaborators in order to support and enhance their programming. On their final survey, library staff reported that partners identified through Dialogues most often helped publicize library events and resources (61%) or facilitated or co-facilitated programs at the library (56%).

Community Dialogues also helped libraries learn more about the needs of specific audiences and informed the development of or changes to library programming, services, and structures. For example, after learning about the STEM-related fields in their local area, one library started planning career-based programs related to jobs that are represented in their community. Another librarian said:

> *"[Community Dialogues] were an opportunity to further develop our partnerships and to give us the platform in our community to say the library is more than just books and story times. That we have a voice and can change the direction of community planning too."*

Following their Community Dialogue, library staff at one library reflected on what they had learned. Attendees highlighted that the library had not been reaching the Latinx community through their existing publicity efforts. In response, the library developed a new social media plan. They also now translate their promotional materials more frequently and partner with community organizations to better disseminate information about their programs to Latinx audiences. There are structural changes within the library as well, with the library hiring more bilingual staff, some specifically from communities they are trying to reach. This is one example of how Community Dialogues helped a *NASA@ My Library* partner library better understand and serve their community.

Source: Partner Library Interviews/Focus Groups

➢ Weaknesses/Challenges

Based on results from their final survey, the majority of libraries (61%) only hosted one Community Dialogue. Additionally, a substantial portion of libraries (44%) reported they were only "somewhat likely" to conduct additional Community Dialogues in the future.

Library staff sometimes found it difficult to attract attendees, especially from their target audience. Some library staff noted that there was not a lot of interest in the Dialogues from their community or library, and that other methods or formats (e.g., one-on-one communication, Q&A format) were preferred. They also noted that it can be difficult to draw people to the library who are not already using the library. Some people might be reluctant to attend an event in a government-funded organization such as a public library. A number of library staff noted that better communication about the purpose of

the Dialogue from library staff to their community may help bring in more attendees. They felt the Dialogues could be reframed and promoted in a way that empowers stakeholders to come to the table by clearly describing how their participation in the Dialogue will benefit them and their community.

Some library staff also noted that the Community Dialogue was difficult to plan (e.g., took a lot of time, scheduling challenges). They noted that Dialogues can be time consuming to organize, especially if library staff are not confident in their abilities, work at a small library with limited staff, and need to add planning the Dialogue on top of the other roles and responsibilities that they have on their plates.

➢ Recommendations/Areas of Consideration:
   ❖ Consider how the Community Dialogues are being framed for library staff and community members so as to highlight the process and intended outcomes and benefits to the community.
   ❖ Consider how the format of the Dialogues could be modified or complemented by other engagement strategies that may be more comfortable for certain communities (e.g., one-on-one communication and feedback, hosting smaller focus groups with community partners prior to hosting larger Dialogue events).

The Impacts of the COVID-19 Pandemic

The COVID-19 pandemic had a large impact on how libraries were able to offer programs to their patrons. Libraries needed to adjust quickly, figuring out how to continue to provide library services to their patrons even when they were unable to access the building.

With libraries closed to the public, many libraries relied on virtual programs and curbside pickup of materials to engage their patrons. Library staff appreciated the webinars and check-ins that the *NASA@ My Library* project team provided during the pandemic because it connected them with other library staff and they learned about ways they could engage their patrons. Some libraries were able to make their *NASA@ My Library* circulating backpacks available for curbside pickup. Many utilized the Take & Make activities provided by the project team and/or created similar take-home activities themselves. A few library staff mentioned that they accessed the project's *STEAM Ahead@ Home* website for ideas. They noted that any "ready-made" program or activity was greatly appreciated because of all the demands placed on library staff during the pandemic.

A number of libraries were able to hold virtual interactive programs, including some that utilized their *NASA@ My Library* kits. For example, one library used kit materials to hold a virtual STEAM club. A number of libraries also utilized SMEs to help provide virtual programming. Although some libraries found success with these programs, others noted that they had fewer attendees at virtual programs than they had hoped. A few library staff members also raised the question of access. One library staff member noted that they can't assume patrons have access at home to supplies needed to do virtual activities. Another noted that, even if they do supply materials, some patrons still face a digital divide and may not have access to a digital device or Wi-Fi. Take-home activities that could be done un-facilitated (e.g., the Take & Make activities) were one way libraries attempted to address this challenge, but they noted that it takes a lot of resources for a library to create these kits on their own.

Conclusion and Recommendations

Summative data reveal that *NASA@ My Library* experienced many successes.

Library staff from partner libraries increased their confidence and ability to facilitate library programming related to Earth, space, and engineering.

Library staff reported that *NASA@ My Library's* professional development (in-person workshop, webinars), materials (facilitation kits, activity guides), and other supports (informal check-in calls) provided them with the information they needed to feel more confident and comfortable facilitating Earth and space-science related programming.

The majority of partner libraries (71%) increased the amount of STEM-related programming they offered because they participated in *NASA@ My Library*.

The 75 partner libraries facilitated a total of almost 2,300 *NASA@ My Library* programs from 2017-2020 (an average of 10 programs per library per year). Almost all participating library staff (92%) said they planned to continue to use their kits after their formal relationship with *NASA@ My Library* ended, including 51% who expected they would continue to use the kits from *NASA@ My Library* at least once per month.

Similarly, almost all the library staff (96%) who attended one of the NASA STEM workshops and who have a responsibility for planning programming reported that they had used activities they learned in the months after the workshop.

Engaging NASA-affiliated scientists was a challenge for many libraries.

About two thirds of the partner libraries (63%) were able to engage at least one NASA-affiliated SME to support their programming, most often a Solar System Ambassador or Night Sky Network volunteer. Libraries reported challenges identifying, reaching, and/or hearing back from NASA SMEs. Partner libraries had greater success engaging non-NASA affiliated earth and space science SMEs (e.g., professors, amateur astronomers, planetarium or museum staff, researchers, or other professional scientists) for library programming, with the vast majority (92%) doing so.

Engaging SMEs was also a challenge for SLAs. While SLAs shared SME resources with public libraries in their state, they rarely made strong connections on behalf of public libraries. Only about one in ten programs that public libraries offered using a *NASA@ My Library* SLA facilitation kit involved an SME (who was typically not affiliated with NASA).

Despite the challenges, library staff see the value of engaging NASA-affiliated SMEs. They see them as experts who can share knowledge with patrons and serve as role models providing a personal connection to science. Nearly all library staff (97%) would like to work with NASA-affiliated SMEs in the future.

The SLA model of distributing facilitation kits was largely successful, although many SLAs struggled with determining how to reach communities with underserved audiences.

Most SLA staff agreed that they received enough training and support from the *NASA@ My Library* team to implement the project. On a final survey, all SLA staff participating in the project reported feeling more confident, knowledgeable, and interested in supporting earth and space science-related programming.

A total of 672 public libraries received SLA kits and >16,000 patrons were reached with kit programming in approximately one year. On kit evaluation forms completed by public libraries, most public library staff reported that they were *very* or *extremely* satisfied with the support they received from their SLA (90%) and the majority (89%) would be interested in similar kits in the future. Most SLA staff (89%) plan to continue circulating their existing *NASA@ My Library* kits and many (61%) plan to create and circulate additional kits with new materials.

While SLAs were successful in reaching rural communities with the kits, many SLAs noted that they faced challenges determining what underserved groups to focus on and coming up with strategies to reach these groups. They would have appreciated more information and suggestions about reaching underserved populations, especially from other SLAs who have experience doing so.

Patrons overwhelmingly reported that they enjoyed the *NASA@ My Library* programs they attended and that they learned about NASA science; a substantial majority of patrons said they were interested in learning more about earth science, space science, or engineering.

Libraries reported that more than 225,000 library patrons attended *NASA@ My Library* Programs from 2017-2020. The vast majority of patrons (98%) who completed post-program surveys said they found the programs interesting, learned a lot about earth science, space science, and/or engineering (93%). A substantial majority (85%) of patrons said that the program made them interested in looking for more information about NASA science or NASA careers.

NASA@ My Library **helped libraries engage new—and often underserved or underrepresented— audiences.**

As the project progressed, partner libraries reported recruiting several underserved audiences to programs more frequently, including African American and Latinx audiences, women and girls, people with disabilities, and economically disadvantaged community members. About 43% of patrons who completed surveys identified themselves as a person of color. Patrons who identified as Black or Latinx were the most likely to report that a *NASA@ My Library* program was the first science program they had attended at their library. On the final post-survey, over two-thirds of libraries (69%) felt they had been *mostly* or *very successful* at reaching underserved audiences with *NASA@ My Library* activities and resources.

Overall, public libraries found Community Dialogues to be most useful for identifying potential community partners, strengthening existing partnerships, and learning about the needs of their community. However, based on results from their final survey, the majority of libraries (61%) only

hosted one Community Dialogue. Additionally, a substantial portion of libraries (44%) reported they were only "somewhat likely" to conduct additional Community Dialogues in the future. The main challenges library staff faced were difficulty attracting attendees, especially from their target audience, and the time it took to plan the dialogues.

The COVID-19 pandemic had a large impact on how libraries were able to offer programs to their patrons during the final year of *NASA@ My Library* 1.0.

When libraries were forced to close to the public, many libraries relied on virtual programs and curbside pickup of materials to engage their patrons. Regional barriers to virtual program participation were removed which enabled library participants to attend—and SMEs to facilitate—virtual programs they might not have been able to attend in person.

Based on these findings, several overall recommendations emerged:

- Many participating librarians wanted more opportunities to connect with and learn from one another. Provide ways for libraries to connect to one another in small groups around shared interests, such as through affinity groups. Recruit some *NASA@ My Library* 1.0 partner libraries to serve as mentor libraries and share their past experiences to support new libraries.

- The in-person workshop was amongst the most highly rated components of *NASA@ My Library* 1.0, but the continued COVID-19 pandemic (and shorter duration of *NASA@ My Library* 2.0) mean that the next cohort of *NASA@ My Library* partner libraries will not be able to be participate in in-person workshops. Consider other ways to build excitement, camaraderie, and connection between libraries and with the project team, and to build library staff's confidence and skills in facilitating hands-on STEM activities.

- Provide Library staff would like *NASA@ My Library* to help libraries connect with NASA-affiliated SMEs. Offer more virtual programs with SMEs due to the high interest in online programs with SMEs. Libraries would especially like connections to a diverse group of NASA scientists (in terms of gender, race and ethnicity).

- Employ a deliberate strategy to recruit libraries that serve underrepresented audiences, including outreach to libraries, the application materials, and the rubric used to select libraries. Provide more information during in-person training and follow-up webinars about how libraries can engage underrepresented audiences of various kinds.

Appendix A: Logic Model

Inputs	Activities	Outputs	Outcomes (during first 5 years of project)	Long-term Outcomes (after 5 years)
NASA • Funding and resources • NASA CAN grantees • NASA education infrastructure Partners • Space Science Institute • American Library Association (ALA) • Cornerstones of Science (CoS) • Pacific Science Center (PSC) • Amanda Durik, Researcher • Lunar & Planetary Institute (LPI) Advisors & Collaborators *(partial list)* COSLA, ARSL,	Stakeholder Engagement • Recruit and support public library partners • Select and support state library agency partners • Prepare NASA stakeholders (SMEs) to facilitate activities through virtual programs • Provide event support at libraries • Support libraries in implementing Community Dialogues Professional Development • Conduct workshops, webinars, conference sessions • Expand *STAR Net* CoP (website) Resource and Experience Development	Recruit and Support Libraries • Prototype kits, resources, events with 3 libraries • 75 libraries that serve underserved audiences receive *NASA@ My Library* kits, training and support • 80 library professionals participate in in-person workshop • 7,500 library professionals view "open" webinars for partner and non-partner libraries (including eclipse events) • 1,000 library professionals participate in presentations at conferences • Online *STAR Net* CoP and resources developed Select and Support State Library Partners • 18 state library agencies (SLA) receive 2 SLA *NASA@ My Library* kits and resources to disseminate within their states Engage NASA Stakeholders • 30+ NASA-funded researchers prepared to work with public libraries on virtual programs for the public • Facilitate collaboration between NASA volunteer networks and partner and non-partner libraries, resulting in 500+ collaborative programs • Produce guide for PoPnet sites to prepare NASA SMEs to deliver virtual programs in public libraries Events • 3-5 NASA, Earth, celestial, and library events targeted/year • Additional, non-partner libraries throughout U.S. host NASA-related programs around these events (e.g., solar eclipse, 2019 Collaborative Summer Learning Program on "space") STEM Activities • NASA portfolio inventoried for each targeted event • Kits for library staff and patrons (4 STEM Facilitation Kits and 1 Circulating Kit) • SciAct materials are disseminated to partner and non-partner libraries Digital Learning • Tablet with NASA SMD content that engages learners Patron Experience Case Study • Conduct research and pilot test the effectiveness of strategies for supporting situational interest development at 3 NASA partner libraries • Publish results in professional journals, *STAR Net* and SMDEPO.org Community Dialogue Strategy	*NASA@ My Library* program stakeholders (including public and state library staff, members of the SciAct community, SMEs, and participating PoPNet sites): • Enhance and/or develop ongoing collaborations that directly benefit library patrons, including underserved STEM audiences • View libraries as venues for learning about NASA science • Advocate for the inclusion of earth and space science- and engineering-related content and skills in public library resources and services SMEs who partner with *NASA@ My Library* libraries are more interested in, knowledgeable about, and confident in co-facilitating earth and space science library programming Participating staff at 75 partner public libraries: • Increase their knowledge about earth and space science and engineering • Are more interested in, knowledgeable about, and confident in developing and facilitating earth and space science library programming • Leverage resources from the library, local community, *NASA@ My Library*, and online community of practice for their programming Participating staff at state library agencies: • Are more interested in, knowledgeable about, and confident in promoting earth and space science programming to their public libraries • Leverage resources from their own state library, public libraries in their states, and *NASA@ My Library* for use in public library programming • Encourage public libraries in their state to offer earth and space science programs and services, working especially with underserved STEM audiences • Develop connections with and disseminate information about 2-3 SME organizations that support programming at public libraries in their state	Public and state library agency staff, the NASA earth and space science education community, SMEs, and informal science educators increase the quality and quantity of library collaborations used to deliver high-visibility NASA, Earth, celestial, and library events Library staff have increased capacity to utilize collaborations and SMD assets to provide authentic, accessible SMD-focused learning experiences Library patrons (especially youth and lifelong learners in rural and other underserved communities) experience increased and

Inputs	Activities	Outputs	Outcomes (during first 5 years of project)	Long-term Outcomes (after 5 years)
ASP, ASU, GSFC, IGES, JPL, Exploratorium, PoPNet, NSO/AURA, Science Museum of Minnesota, STScI Evaluation Education Development Center (EDC)	• Inventory, modify, and develop SMD activities • Develop and test NASA STEM kits • Develop digital learning tools • Develop materials to prepare NASA stakeholders for virtual engagement • Conduct Patron Experience pilot	• 78 Community Dialogue events hosted by 78 pilot and partner libraries to identify ways to engage community (esp. underserved audiences) • Disseminate Community Dialogue Guide and resources to 75 NASA partner libraries and via *STAR Net* CoP Additional Dissemination of Resources and Results • Through *STAR Net's* CoP, STEM Activity Clearinghouse, COSLA, ALA, PLA, PoPNet, NASA/SMD, social media	The earth and space science community at NASA, informal science educators, and public libraries are better able to effectively serve and engage underserved STEM library audiences *NASA@ My Library* public library patrons who access SMD-related content and SMEs through their libraries: • Demonstrate greater interest and engagement in the earth and space sciences and engineering • Have increased awareness about NASA SMD missions	sustained access to exciting SMD-focused learning opportunities that result in them becoming more interested in, and engaged in earth and space science and engineering

Appendix B: Methodology

Table X. *NASA@ My Library* Instruments and Timeline for Administration

Instrument	Purpose	When Administered	Responses Received	Internal Reports Provided to Project Team (if applicable)
Library Staff from Partner Libraries				
Librarian Pre-Survey	Collect baseline data about partner libraries' and library staff members' prior experience with STEM programming	May 2017	336 responses from 75 partner libraries (94% response rate); at least one response was received from each of 75 partner libraries	Pre-Survey Data Summary June 2017
Post-Webinar Survey	Collect feedback from host library staff regarding May 2017 project orientation and two webinars about Sun-Earth-Moon Kit	June - July 2017	267 responses (74% response rate) ; at least one response was received from each of 75 partner libraries	Post Webinar Data Summary August 2017
Post In-Person Workshop Survey	Collect feedback about in-person workshop held in late Feb./early March 2018	March 2018	77 responses (92% response rate)	Post-Workshop Survey Findings April 2018
Site visits to 6 partner libraries	Observe programming & interview library staff	March to July of 2018	Observed 6 programs Interviewed 18 library staff	Site Visit Summary March 2019
Circulating Backpack Needs Assessment Survey	Collect information about partner libraries' circulation of items other than books and interest in circulating STEM kits	October 2018	67 responses (86% response rate)	Circulating Kits Needs Kit Assessment Survey Findings December 2018
Librarian Post-Survey	Collect feedback about library staff members' experiences with the project and its impact on them, their libraries, and library patrons	September 2020	61 responses from 75 partner libraries (92% response rate)	Post-Survey, Interview and Focus Group Findings December 2020
Library Staff Interviews	Individual interviews focused on gathering general feedback from	October - November 2020	Interviewed 7 library staff	Post-Survey, Interview and Focus Group Findings December 2020

Instrument	Purpose	When Administered	Responses Received	Internal Reports Provided to Project Team (if applicable)
	library staff on all aspects of their NASA@ My Library experience			
Library Staff Focus Groups	Gather feedback on three topics: (1) Community Dialogues and reaching underserved audiences (2 focus groups), (2) resources and support (2 focus groups), and (3) engaging virtual SMEs (1 focus group)	October - November 2020	5 focus groups with total of 14 project directors	Post-Survey, Interview and Focus Group Findings December 2020
Annual Report Form	Collect information about programming	ALA administered annually in Oct 2017, 2018, 2019, 2020	75 reports in Year 1 75 reports in Year 2 67 reports in Year 3 67 reports in Year 4	Evaluation Summary of Data from the American Library Association Annual Report, Year 1 October 2018 Evaluation Summary of Data from the American Library Association Annual Report, Year 2 February 2019 Evaluation Summary of Data from the American Library Association Annual Report, Year 3 January 2020

Instrument	Purpose	When Administered	Responses Received	Internal Reports Provided to Project Team (if applicable)
State Library Agencies				
Pilot SLA Interviews	Understand pilot SLA representatives' goals for joining the project, personal experience participating in the project, and how they are engaging public libraries in their state	November 2018	Interviewed 4 representatives from al 4 pilot SLAs	Pilot State Library Agency (SLA) Interview Summary December 2018
SLA Representative Survey	Collect feedback about library staff members' experiences with the project and its impact on their organization and staff	October 2019	All 18 SLAs	State Library Agency Summative Report January 2020
SLA Focus Groups	Collect feedback about library staff members' experiences with the project and its impact on their organization and staff	December 2019	15 SLAs participated in focus groups; 2 SLAs submitted answers to focus group questions in writing	
Post-Program Survey for public libraries that received SLA Kits	Gather information about programs (e.g., target audience, materials used) and feedback on the public library's experience with reserving and using the kit and associated resources	Completed following each program that used *NASA@ My Library* Kit	Survey responses were received from a total of 203 libraries for Kit 1 and 102 libraries for Kit 2, for an overall response rate of 45%	
NASA State STEM Workshops				
Follow-up Survey	Gather feedback about the workshop and its impact on participants' knowledge, confidence and practice in facilitating hands-on space science activities	September 2019 (4-11 months after participants had attended workshop)	268 responses (74% response rate); there were at least ten respondents from each of the 12 workshop sites	NASA STEM Workshop Follow-Up Survey Summary November 2019

Instrument	Purpose	When Administered	Responses Received	Internal Reports Provided to Project Team (if applicable)
Library Patrons				
Library Patron Survey for Programming	Collect information about the impact of *NASA@ My Library* programs on patrons' knowledge and interest in NASA science; patrons' demographic information was also collected	Library staff were asked to administer a one-page paper survey to patrons at the end of each *NASA@ My Library* program (available in both English and Spanish); an online survey version was also available in English and Spanish	16,474 total surveys • 7,626 surveys from 282 programs held by 65 libraries between May and October 2017 • 4,160 surveys from 418 programs held by 66 libraries between November 1, 2017 and October 31, 2018 • 4,097 surveys from 374 programs held by 56 libraries between November 1, 2018 and October 31, 2019 • 591 surveys from programs held by 28 libraries between November 1, 2019 and October 31, 2020	Year 1 Patron Survey Findings February 2018 Year 2 Patron Survey Findings February 2019 Year 3 Patron Survey Findings March 2020
Circulating Backpack Surveys	Collect data about which items patrons used from the backpacks, how long they used the materials, and how the activities affected their interest in NASA science; patrons' demographic information was also collected	June 2019 – January 2020	109 surveys from 24 out of 67 participating libraries	Evaluation Summary of Circulating Backpack Kit Surveys February 2020

Instrument	Purpose	When Administered	Responses Received	Internal Reports Provided to Project Team (if applicable)
PoPNet Programs with NASA SMEs (Pilot Phase I)				
Observations of SME programs	Understand implementation of SME programs	March - May 2018	2 in-person observations at libraries hosting a virtual PoPNet-trained SME 2 "virtual" observations of virtual PoPNet-trained SME visits	PoPNet Evaluation Summary of Virtual SME Visits June 2018
Library Patron Survey re: Virtual SME programs	Slight variation of standard *NASA@ My Library* patron survey was created for PoPNet programs, asking what patrons liked and didn't like about the virtual connection to a scientist	March – May 2018	72 surveys total, representing 4 different events, 3 different libraries and 2 PoPNet sites	
SME Interviews	Gather feedback from SMEs about the training, reasons for participating, and experience with program	March and May 2018	2 interviews	
Librarian Interviews	Gather feedback from library staff regarding their experience partnering with a PoPNet site and SME	March and May 2018	2 interviews	
PoPNet Site Representative Interviews	Gather feedback from PoPNet sites regarding their experience working with SMEs and libraries	May 2018	2 interviews	
PoPNet Programs with NASA SMEs (Phase 2)				
Patron Survey	Slight variation of standard *NASA@ My Library* patron survey was created for PoPNet programs, asking what patrons liked and didn't like about the virtual connection to a scientist	Administered by librarian after each PoPNet program, online or on paper, October 2018-April 2019	276 total respondents; 14 out of 28 total programs at 9 different libraries, organized by 5 different PoPNet sites	PoPNet Phase II Evaluation Findings May 2019

Instrument	Purpose	When Administered	Responses Received	Internal Reports Provided to Project Team (if applicable)
"Virtual" Site Visits	Understand implementation of SME programs	October 2018 – April 2019	Observed 6 programs from 5 different PoPNet sites	
SME Survey	Gather feedback from SMEs about their reasons for participating, preparation, and experience with program	March – April 2019	13 scientist/scientists responded out of out of 22 invited from 5 PoPNet sites (4 or 5 scientists/scientists per site) a 59% response rate	
Librarian Interviews	Individual structured interviews with librarians at libraries associated with the virtual site visits	March – April 2019	5 individual interviews with librarians from 5 different PoPNet sites	
Librarian Survey	Gather feedback from library staff regarding their most recent virtual SME program	March – April 2019	10 librarians responded out of 15 invited librarians (one per library), a 67% response rate.	
PoPNet site representative survey	Gather feedback from PoPNet sites regarding their experience working with SMEs and libraries	March – April 2019	8 responses out of 9 potential respondents, 89% response rate; respondents from all 6 PoPNet sites	
Virtual Programs with NASA SMEs				
Librarian Survey	Gather feedback from library staff regarding their most recent virtual SME program	August – October 2020	13 out of 15 responded (87%)	Virtual Programs with NASA Scientists Evaluation Summary January 2021
Librarian Interviews/Focus Group	Gather feedback on engaging virtual SMEs	August – October 2020	Individual interview with 1 librarian Focus group with 2 librarians	
SME Survey	Gather feedback from SMEs about their reasons for participating, preparation, and experience with program	November 2020	6 out of 8 responded (75%)	

Instrument	Purpose	When Administered	Responses Received	Internal Reports Provided to Project Team (if applicable)
Patron Pre- and Post-Program Poll Questions	Assess patrons' past experiences and interest in STEM, and their interest after attending virtual SME program	August – October 2020	42 responses from 6 different programs	
Patron Focus Groups	Obtain patrons' feedback about the virtual SME program	August – October 2020; evaluators asked any willing volunteers (aged 18 and over or a child attending with an adult) to stay after the program to answer a few questions; the LPI host, library staff, and SME departed the meeting link prior to the start of the	After 6 different programs with 14 individuals	
Patron Post-Survey	Slight variation of standard *NASA@ My Library* patron survey was created for PoPNet programs, asking what patrons liked and didn't like about the virtual connection to a scientist	August – October 2020	13 responses from 6 different programs	
Program observation	Also reviewed program attendance records and counted video views of recorded programs	August – October 2020	6 programs	