NASA@ My Library: A National STEM Program Building Connections Between NASA Science Missions and Public Libraries (NNX16AE30A)

PoPNet Phase II Evaluation Findings

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Executive Summary

As part of the NASA@ My Library program, EDC evaluated Phase II of the Portal to the Public Network (PoPNet) effort between October 2018 and May 2019. The PoPNet leadership team at Pacific Science Center supported six PoPNet sites as they recruited and trained scientists to present virtually at *NASA@ My Library* libraries in their region. This model was originally piloted at two PoPNet sites that completed activities in May 2018. In the second phase, five PoPNet sites each prepared four or five scientists (for a total of 22 scientists) and arranged 29 programs at 15 different *NASA@ My Library* partner libraries. One PoPNet sites experienced challenges recruiting scientists and scheduling programs with libraries and decided to terminate their contract early.

Evaluation activities included surveys of PoPNet site representatives, scientists, librarians, and patrons as well as "virtual" site visits (where an evaluator joined the online meeting to observe six programs), interviews with a sample of librarians, and review of other project documents.

Experience of PoPNet Sites

- PoPNet sites had been interested in offering virtual programming as part of their outreach efforts.
- Most representatives were satisfied with the support offered by the PoPNet hub at Pacific Science Center.
- Recruiting NASA-affiliated scientists to participate was challenging for PoPNet sites. Two representatives thought their training of scientists was only "Slightly successful."
- PoPNet representatives had mixed success in scheduling programs with librarians, a challenge that was increased due to the short timeframe of the project, with the original timeline asking PoPNet sites to complete activities within six months. (Libraries often plan programs up to six months in advance.)
- Almost all PoPNet representatives indicated they were very likely to continue to do the work they began under this project—especially continuing to work with libraries. A PoPNet representative reported that the project allowed the informal science institution to try virtual programming and increase their reach, and they are already considering how to expand on these efforts.

Feedback from Scientists

- Twelve out of thirteen scientists who completed the follow-up survey agreed or strongly agreed they were satisfied with the training they received from their PoPNet site.
- The assistance and practice on how to talk about their work in an accessible, engaging way was especially valuable, and all scientists agreed that they felt prepared to talk to a public audience about their job. In addition, librarians all agreed that the scientists seemed well prepared and that the content of the presentation was appropriate for both the format and the audience.
- Topics of presentations included identifying new planets, categorizing galaxies, turning waste into energy, phytoplankton and nano-particles. While most scientists were able to successfully

integrate hands-on activities that were connected to their work, a few used kit activities that were not closely related or activities that were not as engaging for the audience.

- Twelve out of thirteen scientists who completed the follow-up survey were interested in doing more public outreach and to continue to develop skills for engaging an audience in STEM and eleven scientists would like to participate in future *NASA@ My Library* programs.

Experience of Librarians

- All ten library staff who responded to the survey were satisfied with the level of control that they had in planning their programs, even though it was usually fairly minimal. Librarians appreciated that PoPNet was responsible for finding and training scientists. Librarians were more than willing to put in the time to set up and test the virtual connection and to market the program to their patrons.
- Many librarians would like the programs to be scheduled further in advance. They also wanted to have more detailed information about the program to help them advertise and feel prepared to help facilitate any activities.
- Librarians who were able to connect with the scientist prior to the program felt it was useful for both parties: librarians furthered their understanding of the program and the scientist gained insight into the potential audience and could share tips for how the librarian could help facilitate the activity.
- Three out of ten librarians indicated they used *NASA@ My Library* resources, activities, or materials and that they had a positive experience.
- Librarians appreciated having an expert presenter who could explain the content and address patrons' questions.
- All librarians agreed that working with PoPNet was a positive experience and that they would recommend that other *NASA@ My Library* project libraries work with PoPNet sites.
- Librarians all agreed that they felt more comfortable offering STEM programming, were more aware of how to include a scientist in a program, and felt more comfortable offering programs with a virtual connection to a scientist.

Patron Engagement and Outcomes

- Known attendance at programs ranged from four to 30 people, with an average of 13. Six out of ten librarians were not satisfied with the number of attendees at their recent NaML PoPNet program. Future strategies to help boost attendance included scheduling further in advance to allow more time to advertise the program, clarifying responsibilities for marketing efforts, and receiving assistance from PoPNet or the scientist on framing the presentation.
- Patrons attending the programs were most commonly in Grade 6-8 (37%) or Grade K-5 (29%), white (55%), and female (59%) (according to patron survey responses).
- Librarians felt the content of the PoPNet program was a good fit for the patrons who attended.
- Patrons almost all agreed that the PoPNet programs were interesting and engaging (only 1% indicated "Disagree").
- The majority of librarians and scientists agreed there was a connection between the scientist and the audience despite not being in the same physical space.

- 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."
- Over 90% of patrons indicated they learned a lot at their NaML PoPNet program and that the program made them want to learn more about Earth science, space science, or engineering. Eighty-three percent of patrons agreed that the program made them want to look for more information about NASA science or careers.

Overall

- There was a high level of agreement among librarians, PoPNet representatives, and scientists that the programs were successful.
- Scientists were particularly satisfied with the high level of engagement of the audience, with that being the most common response to an open-ended item on what worked well; all 13 survey respondents indicated that the audience engagement was "Moderately successful" or "Very successful."
- Most librarians praised the programs for the hands-on and more interactive portions, including how they effectively engaged different age groups.
- Programs used a variety of formats, including a live stream of an in-person presentation by scientists and programs featuring multiple virtual connections to scientists leading activities.
- Benefits to the virtual presentations, according to scientists and librarians, were reaching a broader audience (usually more rural populations) without travel time or funding, more flexibility in scheduling, and more scientists available to "visit" their library. Scientists were not necessarily willing or able to travel, so they also appreciated being able to reach an audience that was not frequently exposed to scientists.
- Many librarians had not been able to arrange a visit by a scientist to their library, so even though most felt that in-person visits by scientists would be preferable, they also all strongly felt that a virtual visit was much better than no visit at all. A few librarians felt the audience may have been more hesitant to ask questions or interact with the scientist over the virtual connection.
- Technical difficulties were commonly experienced during the NaML PoPNet programs (identified by 10 out of 13 scientists), though to various degrees: poor or intermittent audio or video connections interfered more with the program, but other difficulties such as having a poor internet connection, poor video quality, inadequate lighting, or poor audio also diluted the quality of the programs.

Recommendations and Summary

Overall, the PoPNet model of connecting NaML partner libraries to trained scientists who provided virtual learning experiences for library patrons was a positive experience for PoPNet sites, scientists, librarians, and patrons.

The report includes suggestions based on the data gathered for this evaluation, including allowing more time for the project implementation (especially more time to schedule programs with libraries), more standardization of programs based on what is found to be working (including specifications for technology equipment), and providing assistance to librarians to help market the programs.

The report also highlights the successes and benefits of these programs, including well-regarded trainings of the scientists by PoPNet sites, gains by librarians in their comfort offering similar programming with a scientist and with virtual connections, and the high engagement and positive feedback from patrons on their experiences at NaML PoPNet programs.

Contents

Acronyms

EDC	Education Development Center
NaML	*NASA@ My Library*
NASA	National Aeronautics and Space Administration
Phase II	The second phase of PoPNet involvement in *NASA@ My Library*, from May 2018-May 2019
PoPNet	Portal to the Public Network
SME	Subject Matter Expert, or a scientist

Introduction

This report summarizes the results of data collected related to Phase II of the PoPNet component of the *NASA@ My Library* project; data were collected between October 2018 and May 2019. This report follows the July 2018 evaluation report regarding the pilot phase of the PoPNet effort.

The Phase II evaluation continued to explore the virtual programs by scientists at libraries, and, in particular, the preparation of scientists[1] and librarians for conducting such programs; patron attendance, engagement and outcomes; the role of PoPNet in connecting the scientists to libraries; and how such activities and relationships might be sustained past the project.

Summary of the Project

Led by the Pacific Science Center, the Portal to the Public Network's role in the *NASA@ My Library* project is to help link NASA-funded scientists with public libraries and their communities. To do so, PoPNet identified regional PoPNet sites that recruit and train NASA-funded subject matter experts to present virtually at NaML participating libraries. This model was piloted at two PoPNet member sites during Years 2 and 3 of the NaML project, between September 2017 and May 2018.

Phase II of the PoPNet component operated from May 2018 to April 2019 and is the focus of this report. During this second phase, the PoPNet leadership team at Pacific Science Center supported six PoPNet sites as they prepared scientists to present virtually at *NASA@ My Library* libraries in their region. One PoPNet site was unable to implement the project and terminated their contract early.[2] Each PoPNet site recruited and trained four or five scientists (all scientist trainings except one were held in-person).

The PoPNet sites communicated with *NASA@ My Library* partner libraries in their area to gauge their interest in hosting a program with a virtual connection to a scientist who would present and facilitate an activity. The PoPNet representative brokered the connection between the librarian and the scientist, communicating the topic, format, and audience to the librarian and planning and testing the virtual connection with the library.

[1] Scientists or other experts on earth and space science are also known as Subject Matter Experts for *NASA@ My Library.*
[2] The situation and experience of the PoPNet site that terminated their contract are described in the report.

The PoPNet sites were asked to use project grant awards to:

1. Promote learning about NASA science
2. Provide engaging learning experiences in libraries to persons of diverse backgrounds
3. Deliver scientist training and collaborate with select Partner Libraries to implement virtual programing
4. Develop long-lasting partnerships with public libraries

Evaluation Methods

A mixed-method approach was used to investigate the PoPNet component of the *NASA@ My Library* project, including surveys, observations, and interviews. Data collection activities and participation are summarized in Table 1 and covered in more detail in Appendix A.

Table 1. Data Collection and Participation

Data Collection Activity	Timeline/Administration Details	Participation/Response Rate
Patron Survey	Administered by librarian after each PoPNet program, online or on paper, October 2018-April 2019[3]	276 total respondents; 14 out of 28 total programs at 9 different libraries, organized by 5 different PoPNet sites
"Virtual" Site Visits	Evaluators joined a sample of virtual programs October 2018-April 2019	Observed 6 programs from 5 different PoPNet sites[4]
Scientist/Subject Matter Expert (scientist) Survey	Available immediately after their final NaML presentation or administered to all scientists, 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
NaML/PoPNet Librarian Survey	March-April 2019	10 librarians responded out of 15 invited librarians (one per library), a 67% response rate.
PoPNet site representative survey	March-April 2019	8 responses out of 9 potential respondents, 89% response rate; respondents from all 6 PoPNet sites[5]

[3] A slight variation of the standard of *NASA@ My Library* patron survey was created for PoPNet programs, and asked what patrons liked and didn't like about the virtual connection to a scientist.
[4] Two observations were done at one PoPNet site as one of the programs used a distinctive format with multiple scientists, who each spoke to the whole group, then led an associated activity in a corner of a room.
[5] One PoPNet site did not train scientists or hold programs, but the representative completed the survey based on their experience recruiting scientists and trying to plan implementation.

Considerations for Understanding the Data

The number of PoPNet sites (five implementing sites) and libraries (15 total that hosted programs) are fairly small. With patron surveys from only half of the Phase II PoPNet programs, the findings from that instrument should be read with additional caution. The response rates of librarians and scientists were also fairly low and we are not sure how representative those responding are of all the participants.

Additionally, there was high variance in how each site implemented the project components: the nature and content of the training for the scientist differed at each PoPNet site, the programs offered by the scientists were structured very differently (in terms of presentation time and how/whether a hands-on activity was facilitated), and other aspects of the programs differed by design or in reality: some featured multiple scientists versus one scientist; some library patrons viewed a live stream of a video of scientists presenting in-person at a site (and were able to send in questions), and others experienced audio or video issues with the virtual connection and had to adapt. It is therefore difficult to draw clear conclusions of such different experiences by scientists, librarians, and patrons.

Summary of all Data

Participation and Planning

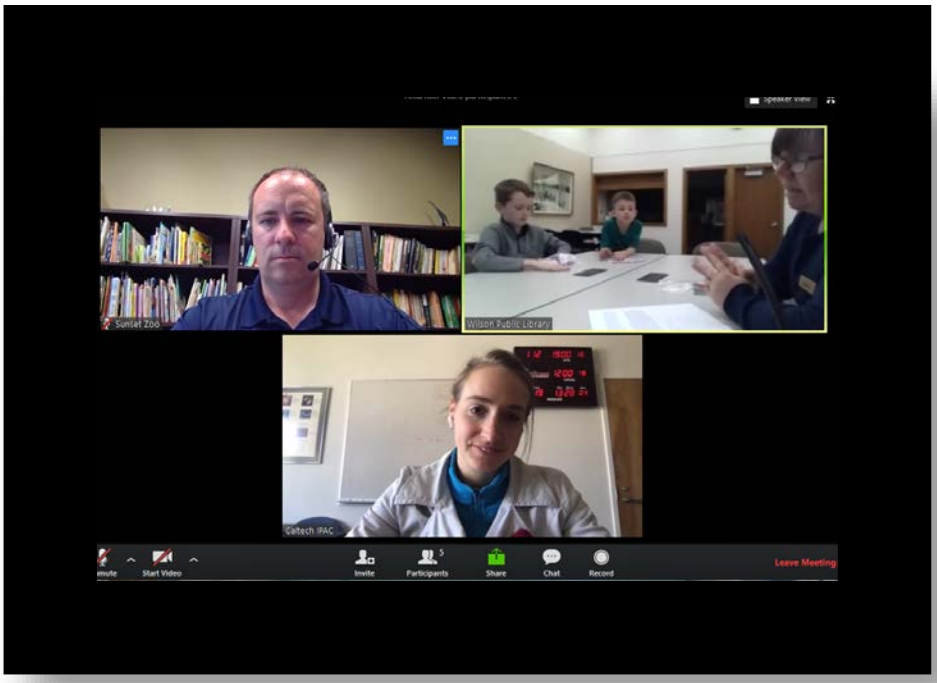
PoPNet Sites: Why Participate?

The majority of Portal to the Public (PoPNet) sites chose to participate in the *NASA@ My Library* project because they were interested in virtual programming and expanding their reach. PoPNet site representatives saw virtual programing as helpful for reaching a large geographic area, and saw the project as an opportunity to try virtual programming and learn from their experience as well as the experience of other PoPNet sites.

> "We were excited about: Working with more space and NASA-themed scientists; Making connections with library partners in locations near and far; Learning to do virtual programming."
>
> *-PoPNet Representative*

Two respondents mentioned the connection to NASA as a reason behind their participation: one site was interested in expanding partnerships with NASA scientists and another wanted to highlight research done by NASA-funded scientists in their state.

PoPNet representatives were mostly satisfied with the support offered by the PoPNet hub at Pacific Science Center. PoPNet hub staff were called "supportive and responsive" and the monthly check-in calls helped PoPNet site representatives see where other sites were in the process. One site praised the support they received from PoPNet in recruiting scientists. However, one site felt the group webinars felt repetitive or sometimes felt too specifically-focused on one site.



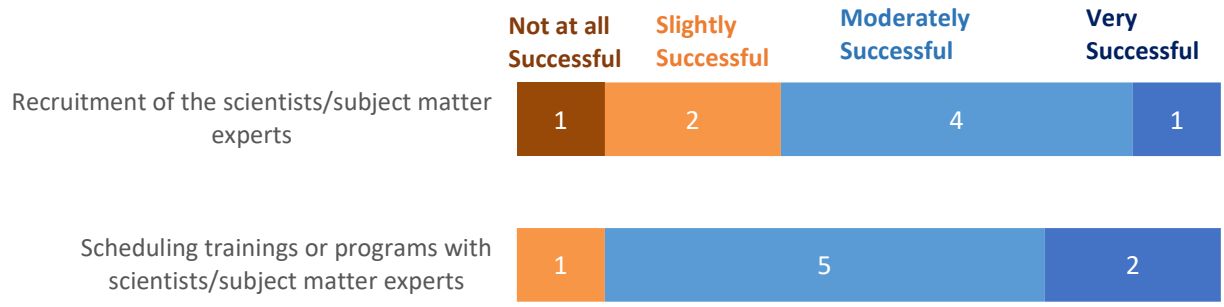
ABOVE: A webinar connects the PoPNet representative (upper left), a scientist (bottom), and a librarian sitting with two young patrons at a PoPNet NaML library event.

Recruiting and Training scientists

PoPNet sites had varying levels of success recruiting scientists, with three out of eight representatives indicating they felt "Not at all successful" or "Slightly successful." Four representatives indicated they were "Moderately successful" and just one representative marked "Very successful." Of all of the components of implementation by PoPNet, recruiting scientists was the most challenging to sites. Sites felt more successful scheduling trainings and programs with the scientists, with seven out of eight representatives indicating their site was "Moderately" or "Very successful."

> "Overall, I think this program is an amazing way to engage with a wider audience than the people locally available. This provides important interaction on both the side of the scientist and the public in a low stress situation. I think this program is incredibly valuable."
>
> *- SME Survey Respondent*

Some PoPNet sites did not feel very successful recruiting scientists.



Source: PoPNet Representative Survey (n=8)

A PoPNet representative that said they were successful in recruiting scientists commented that it was still a big challenge. The PoPNet site allowed graduate students to participate as scientists and shortened the training in order to get enough scientists.

Another site that found it difficult to recruit NASA-funded scientists wondered whether NASA has fewer requirements for outreach compared with the National Science Foundation and guessed that restrictions on receiving stipends might have also limited their ability to engage NASA scientists.

> "The biggest challenge was finding NASA-funded scientists to participate in the workshop. We have a long list of NSF-funded researchers that want to participate in the training, but finding NASA-funded ones posed a challenge. We think this has to do with the funding situation. While NSF requires well planned outreach activities and broader impacts, this is not a focus for NASA-funded scientist. We all know how busy researchers are and they are not willing to spend additional time in workshops that don't have a tangible merit."
>
> "It was challenging to connect with NASA scientists beyond our existing programming, given NASA employees can't receive or be attracted with stipends[6]."
>
> *-PoPNet Representatives*

[6] While true of employees, this is not true for all scientists receiving NASA grants.

Most of the PoPNet site representatives reported that training the scientists for the virtual programs was successful, though two representatives indicated the training scientists was only "Slightly successful."

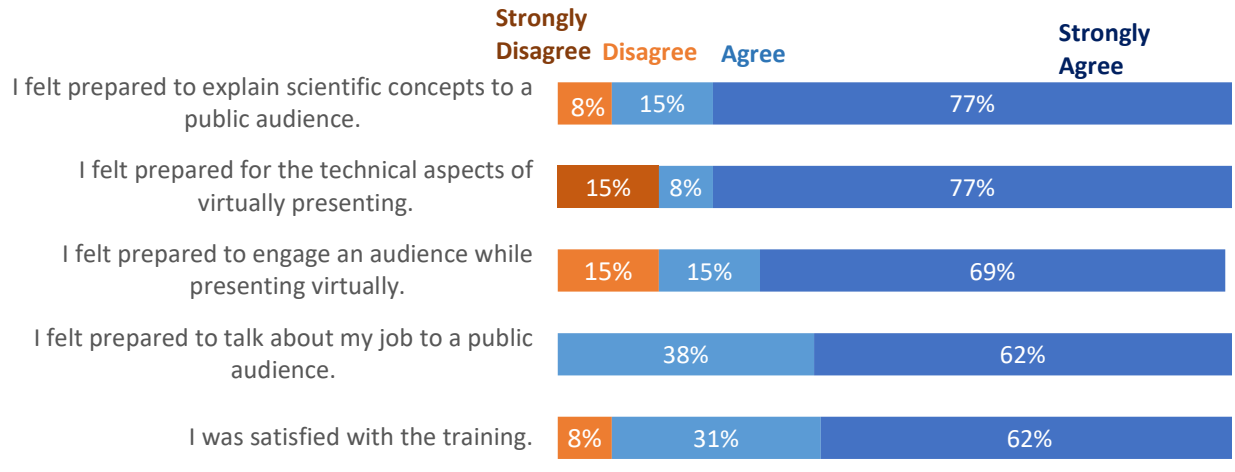
Most PoPNet sites felt successful training the scientists.

Source: PoPNet Representative Survey (n=8)

> "Honestly, the support from the staff at [our PoPNet site] has been amazing. They have worked so hard to prepare me for the *NASA@ My Library* program and continue to make sure that we have all of the support and guidance we need. It has been so helpful to learn along with them as one of the first cohorts of this program. Through this experience, I have gained invaluable experience in participating in outreach and public interaction with science."
>
> *-SME Survey Respondent*

Scientists were overall very satisfied with the training they received for their role in this project. While they felt highly prepared for the technical aspects of virtually presenting, two respondents disagreed that they felt prepared to engage an audience while presenting virtually.

Scientists had very positive ratings of the training and support they received for this project.
No respondents selected "Strongly Disagree."



Source: NaML PoPNet Scientist Survey (n=13)

Six out of 12 scientists thought the most helpful aspect of the training and support they received was learning how to talk about their work in an accessible way that engages a diverse audience, including

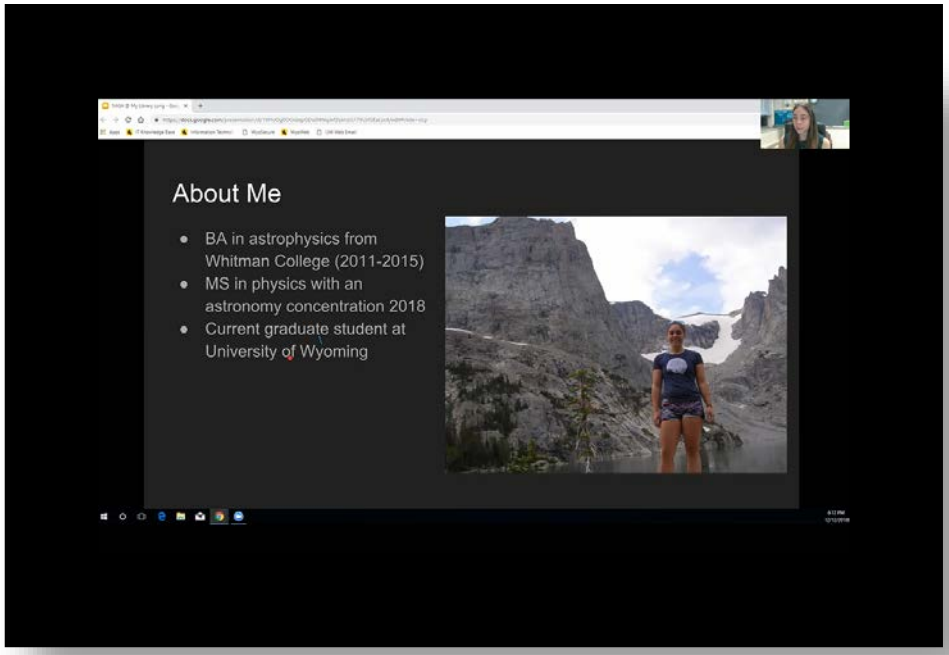
kids. During the trainings, scientists learned how to convey science concepts from their work in different levels of detail and with appropriate vocabulary, and practiced presenting in front of each other. Scientists' responses about the most helpful aspects of the training included:

> "Activities where we were asked to explain our research in varying levels of detail."
>
> "They had us spend time thinking about how to present to diverse audiences and practice. We got a lot of great feedback from practicing in front of our peers at training."
>
> "I learned how to talk and engage kids which is the hardest audience in my opinion."
>
> "Language skills for science communication."
>
> *-Scientist Survey Respondents*

One scientist specifically mentioned one exercise helped them frame their research in an understandable way.

> "The 'Why' exercise—a series of 'why is that important?' questions to each response, which really got to the heart of why I am studying what I am studying, allowing me to get a better idea of how to explain and engage non-scientific audiences."
>
> *-Scientist Survey Respondent*

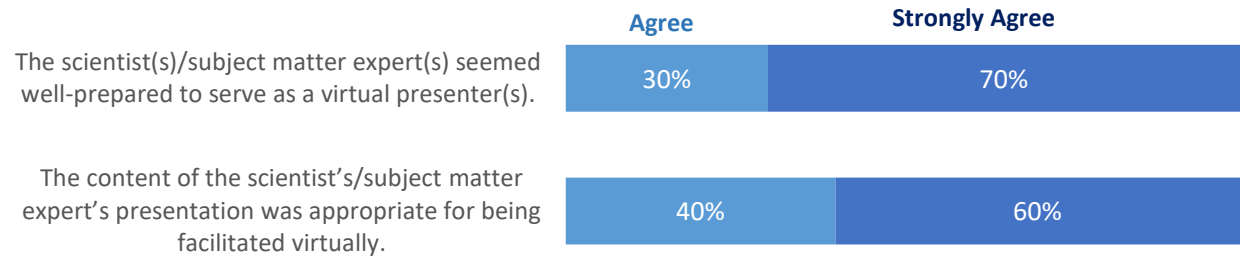
Librarians all agreed or strongly agreed that the scientists seemed well-prepared to serve as a virtual presenter and that their content was appropriate for virtual facilitation.



ABOVE: A webinar slide provides a visual aid as a scientist (upper right) presents to a library in a PoPNet NaML library program.

Librarians felt scientists were prepared for virtual presentations, with appropriate content.

No respondents selected "Disagree" or "Strongly Disagree."



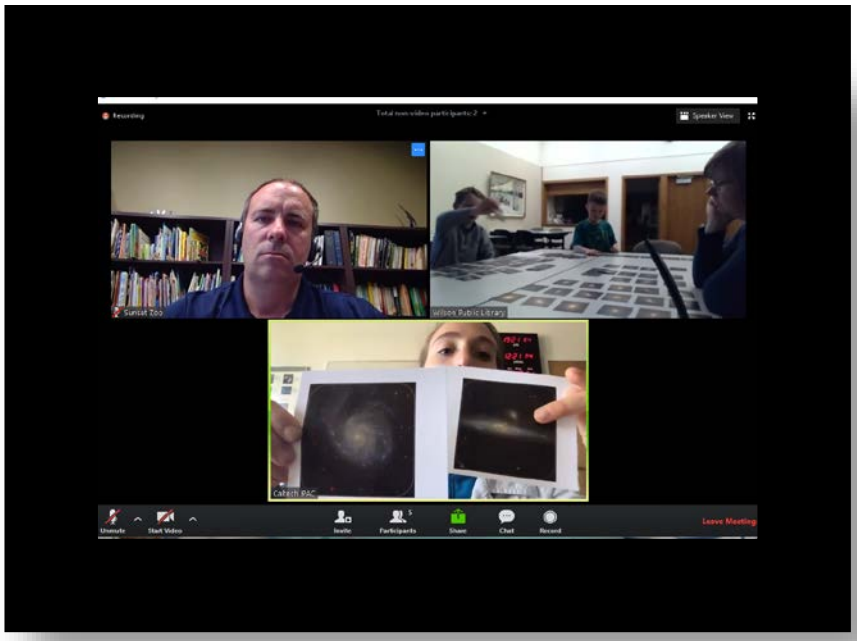
Source: Librarian Survey (n=10)

To improve the training to scientists, one scientist would have liked more clear expectations of their role and the timeline:

> "It was a little hard to figure out what to expect or what was expected of us. I know these training activities are intentionally kept vague sometimes, but some sort of more clearly defined calendar or list of dates/requirements/expectations would have been very helpful, along with earlier communication."
>
> - *Scientist Survey Respondent*

More practice with technology would have been useful to scientists, and one person commented that specific recommendations from PoPNet or the library may have helped reduce technology challenges:

> "I was surprised that the organizers hadn't made specific plans about what technology would be used for the presentations. I felt very poorly prepared for the virtual presentation because I didn't feel like we tested any of that or made any progress for preparing for that."
>
> - *Scientist Survey Respondent*



ABOVE: A scientist (bottom) shows two different types of galaxies as young patrons organize an array of galaxy photos at a PoPNet NaML library program.

Librarians' Roles in Planning *NASA@ My Library* PoPNet Programs

PoPNet representatives felt less successful scheduling programs with librarians than scheduling with scientists[7]. Three out of eight PoPNet representatives indicated they felt "Slightly successful." The PoPNet site that did not finish their contracted role to deliver virtual programming to libraries was able to navigate challenges recruiting scientists and find time to get them changed. A program was scheduled with a library, but it ended up getting canceled due to the government shutdown. Rescheduling proved to be too difficult as the scientist's schedule had changed and the libraries had limited availability.

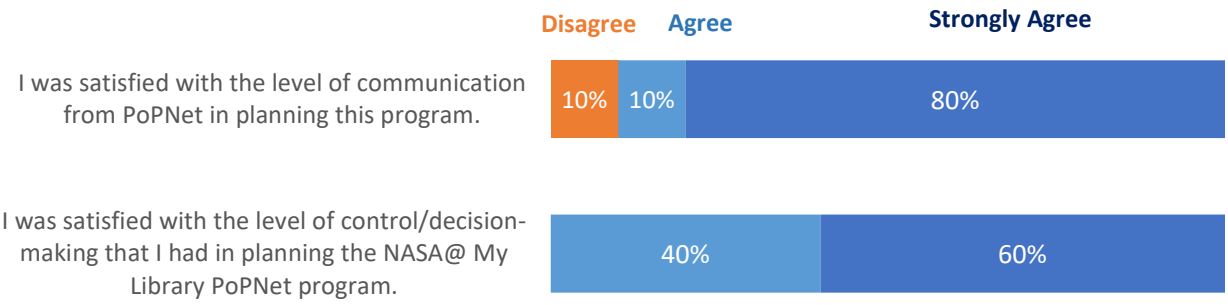
PoPNet representatives had mixed experiences scheduling programs with librarians.
No respondents selected "Not successful."

Source: PoPNet Representative Survey (n=8)

[7] See page 8 of this report.

Almost all librarians were satisfied with the level of communication from PoPNet in planning the program (only one of ten librarians disagreed with the statement). All librarians agreed they were satisfied with the level of control or decision-making they had when planning the program.

Librarians were satisfied with the communication and decision-making process for PoPNet programs.
No respondents selected "Strongly Disagree"



Source: Librarian Survey (n=10)

Three librarians (out of ten) appreciated that they had a backseat role in planning the programs, naming that as the most helpful aspect of working with PoPNet. One librarian wrote:

> "The fact that the programs came as a complete package (presenter, activity, materials) was extremely nice. The only work we had to do was to ensure the tech worked (and that was a challenge, on our end) and that our marketing and promotional materials were well-distributed."
>
> *-Librarian Survey Respondent*

One librarian praised the support from PoPNet in making sure they had what they needed for the program:

> "The staff arranging the virtual visit were very helpful in answering questions and checking to make sure that we had the materials necessary for the scientist to do the presentation."
>
> *-Librarian Survey Respondent*

A librarian who was so appreciative of the role of PoPNet in connecting them to a scientist for a program at their library, they were willing to put in more time or effort to help arrange the program.

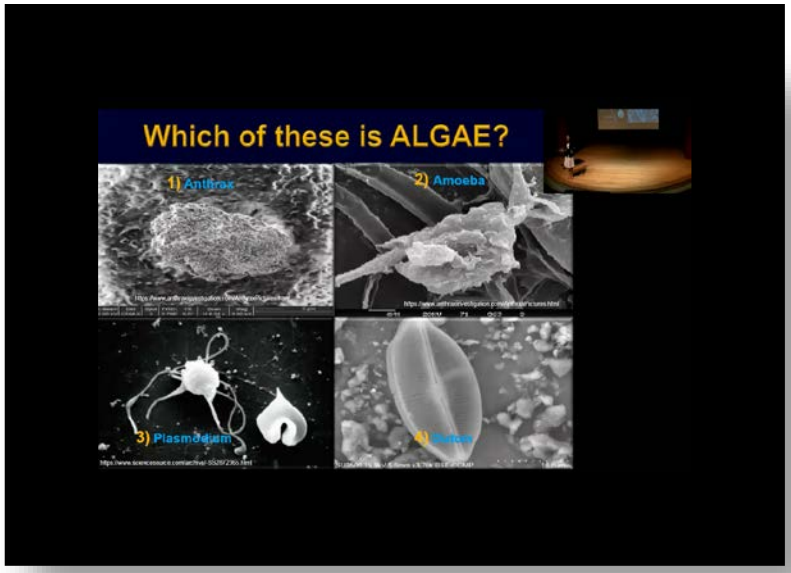
> "I am willing to do whatever it takes to have these programs. If someone says I have a NASA scientist here, I'd be all over it. I think there's so much more information out there than I even thought possible. To have someone to direct you through it [is so helpful.]"
>
> *-Librarian Interviewee*

Librarian suggestions regarding PoPNet communication mostly involved allowing more time for planning and preparation. Library staff suggested:

- Reaching out earlier to schedule and plan the program (to allow more time for marketing)
- Sending a picture of the speaker and a short biography as soon as possible (for more effective marketing materials)
- Mailing materials for the presentation earlier so librarians can be sure they will be available for the program and have time to get familiar with the materials
- Following up emails with phone calls to ensure emails were not missed, that the information is clear, and to address any questions
- More information on the technical requirements, including equipment.

> "I would have really appreciated more basic guidance on the technical 'how to' of a virtual visit. On the library end, we did not have the appropriate equipment and were unsure of what we should have purchased if funds had been available (our NASA programming funds weren't available to us at the time)… We would still appreciate more information on the appropriate webcam and microphone."
>
> *- Librarian Survey Respondent*

One librarian made the point that the virtual programs take more planning than other programs (such as requiring a rehearsal and the time for technology set-up. However, the librarian also commented that it would have taken even longer to do a virtual program on their own without PoPNet's assistance.



ABOVE: A scientist at a PoPNet NaML library program asks participants to use their cell phones to respond to a poll and vote for which of the shown photos are of algae.

Communication Between Scientists and Librarians

Many librarians did not meet with the scientist before their program, but the few who did meet felt it was helpful. Two librarians who were able to have a meeting with the scientist before the program appreciated getting a better idea of the activity they were going to lead:

> "Having the opportunity to meet with the scientist before the event to ask questions, go over the activity, or having the activity pre-prepped so we know what the final product will be were all very valuable preparation experiences."
>
> -*Librarian Survey Respondent*

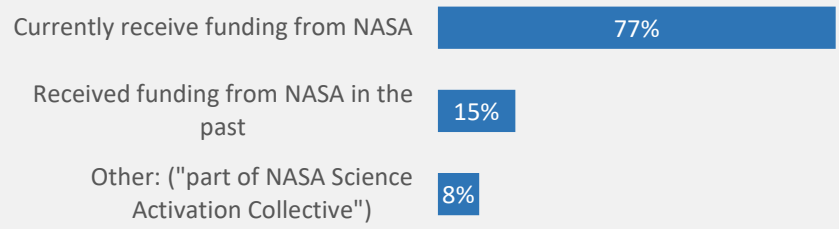
One librarian asked for a meeting with the scientist to make sure that the scientist could put her topic into plain words for the patrons who were expected to attend. A conversation between the librarian and scientist was also helpful to the scientist, as in one case where the librarian shared with the scientist information about their audience and their town so the scientist had a better understanding of who they would be speaking to.

In an interview, a librarian suggested that more detail on the scientist's presentation and activities would have been useful.

About the SMEs Participating in PoPNet Phase II

Of the SMEs responding to the post-survey, 10 out of 13 were currently funded by NASA, two SMEs had been funded by NASA in the past.

PoPNet-trained SMEs were all affiliated with NASA



Source: SME Survey (n=10)

Four out of 12 SMEs had previous experience presenting or facilitating activities virtually and three out of 13 had previously presented or conducted outreach at a public library.

Hands-on Activities

While half of the PoPNet representatives responding to the survey felt the hands-on aspect of presentations were "Very successful," three of the eight respondents indicated it was "Not at all successful" or "Slightly successful" at their site.

PoPNet sites had varying levels of success including engaging hands-on activities in programs.

PoPNet Representative Survey (n=8)

PoPNet representatives who rated the hands-on aspect as more successful indicated that their scientists had already been trained on creating a hands-on activity before participating in an additional training on doing programs virtually. One site planned to hold two separate scientist trainings in the future, with one session focused on presenting their work and developing a hands-on activity, and a second session for working virtually. Having two sessions might prevent the scientists' training from being too long or confusing.

> "The scientists doing virtual presentations participated in the Portal to the Public Science Communication training; thus, they also did a face-to-face presentation. Due to time constraints, we blended the two in that the scientists were preparing for both a face-to-face and a virtual presentation simultaneously. This seemed to bring confusion, as preparing for the face-to-face presentation is different than a virtual presentation. Also, the scientists were not sure on which they should focus in developing. Although the scientific information is the same, the way [it was] presented, and needing to have more activity for the virtual [aspects], made it a bit challenging to understand."
>
> *-PoPNet Representative*

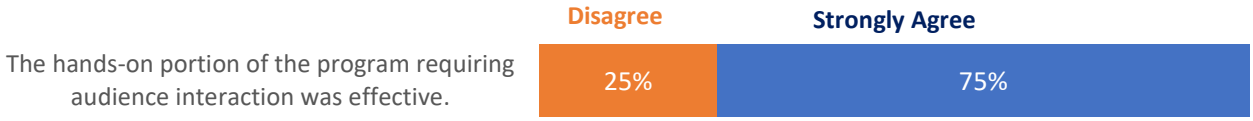
Another PoPNet representative felt the hands-on aspect was successful because they spent a lot of time creating, practicing, and refining the activities during the scientist training.

> "It [hands-on activities in presentations] went well because we spent a fair amount of time in our training focusing on them developing those experiences. We had them present a prototype, where they received feedback, then they presented them in a face-to-face situation, and then we practiced them using the technology platform."
>
> *-PoPNet Representative*

Most, but not all, scientists and librarians felt the hands-on portions were successful or effective.
No scientists selected "Not Successful."

Source: scientist Survey (n=13)

(2 librarians selected "N/A"; No respondents selected "Strongly Disagree" or "Agree")



Source: Librarian Survey (n=10)

According to one librarian who disagreed that the hands-on portion was effective, the hands-on portion they did during the virtual scientist program was too simple compared to their usual STEM programs.

> "The hands-on portion was less of an experiment than we usually do. It mostly consisted of passing around material for the participants to look at and having them help move some items for the presenter."
>
> *-Librarian Survey Respondent*

In most cases, the scientist embedded a hands-on activity or more interactive portion in their presentation, but in a few cases, the librarian helped the scientist identify a good activity (often using *NASA@ My Library* or other NASA resources or activity kits).

In one program, the librarian had come up with activities using the NaML kits, but found it was not a great fit with the topics covered by the scientist. She also commented that the program was longer than they typically would offer to the type of audience (the virtual program was 90 minutes while she suggested one-hour total).

Most librarians praised the programs for their hands-on and more interactive portions, including how they effectively engaged different age groups. Time for Questions & Answers with the scientist was popular with audience members. (As described in the "Patron Experience" section, many patrons named the opportunity to interact directly with the scientist as something they liked about having a virtual visit from a scientist.)

NASA@ My Library Resources Used in PoPNet Programs

Three librarians (out of 10 survey respondents) indicated that *NASA@ My Library* resources, activities, or materials were used in their most recent *NASA@ My Library* PoPNet program, including:

- Strange New Planet
- Magnet kit; Braille books; digital microscope
- Far Sides, Near Sides of the Moon puzzle
- *STAR Net*'s Moon Mythbusters activity

Almost all of the feedback about the *NASA@ My Library* resources was positive. Librarians wrote,

> "They were engaging and encouraged open exploration. Also, the activities generated interesting conversations that allowed everyone—from experts to experimenters—to share what they knew and observed."
>
> "The kids were really engaged. There was plenty of movement and the activity itself was 'hands-on.'"
>
> *-Librarian Survey Respondents*

One librarian wrote that using the *NASA@ My Library* resources can be challenging with a group larger than 25 people as they tend to be designed for smaller groups.

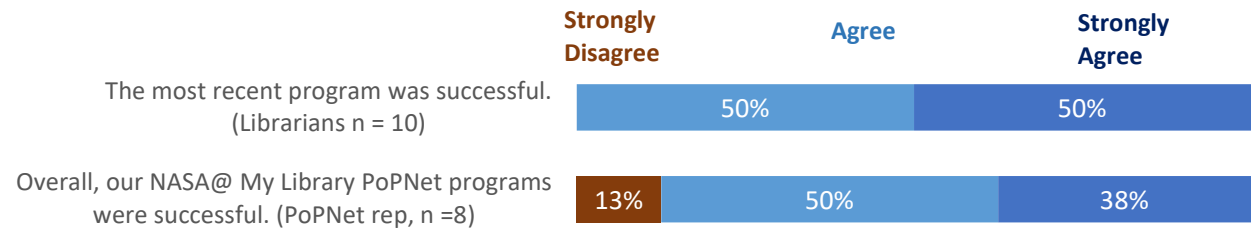
Implementation of the *NASA@ My Library* PoPNet Virtual Programs

Programs Were Rated as Successful

There was a high level of agreement among librarians, PoPNet representatives, and scientists that the programs were successful. All ten librarians completing the survey agreed that the most recent PoPNet program at their library was successful. Similarly, all but one PoPNet representative "Agreed" or "Strongly agreed" that their programs were successful. scientists all indicated that their most-recent program was "Moderately" or "Very successful."

The PoPNet programs were successful, according to all librarians and almost all PoPNet representatives.

No respondents selected "Disagree."



Sources: Librarian Survey and PoPNet Representative Survey

In terms of what worked well in their programs, scientists named:

- An engaged audience (7 respondents)
- Q&A or 1-1 interactions (3 respondents)
- Help facilitating activities (from PoPNet or the librarian) (3 respondents)
- Hands-on activities (2 respondents)
- Having a small audience to enable more direct individual interactions (2 respondents)
- Reaching a large audience (2 respondents)

Audiences were Engaged

PoPNet representatives commented on meeting their overall goal of engaging the audience in the programs.

> "The library audiences seemed to really enjoy the presentations and each program had a great Q&A session at the end of the presentation."
>
> "We had great participating scientists who were very engaging. Their presentations and activities were very well received."

-PoPNet Representatives

In addition, seven scientists (out of 13) mentioned that the audience was engaged when asked for successful aspects of their presentation. One scientist wrote:

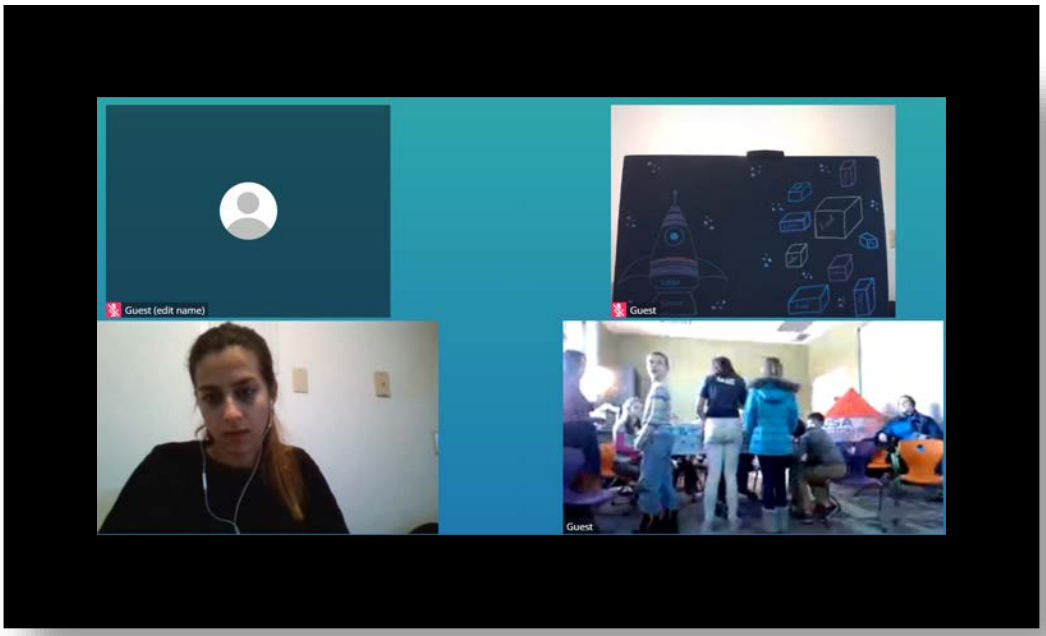
> "There was quite a large crowd, which was exciting to see. The audience (many children) were very excited and had lots of questions for me, and wanted to keep talking!"

-Scientist Survey Respondent

All scientists felt the audience was successfully engaged in their program.
No respondents selected "Not successful" or "Slightly successful."

Source: Scientist Survey (n=13)

In contrast to the experience of most librarians, a librarian who had the "Science Fair" program, with a live stream of presentations by two scientists, felt their audience did not connect well with the scientist and that a one-on-one connection would have been better.

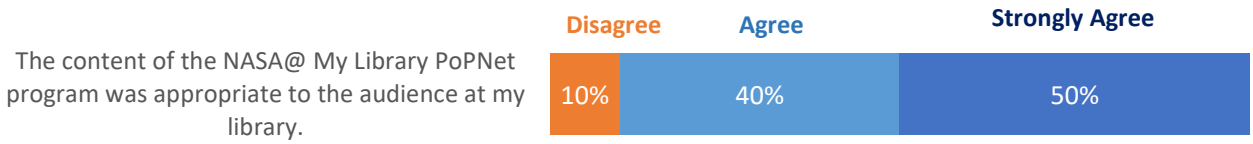


ABOVE: A webinar connects the PoPNet representative (upper left), a scientist (lower left), a webcam view of the scientist's posters (upper right), and a library room of elementary and middle-school youth at a PoPNet NaML library event.

Topics were a Good Fit

Almost all librarians indicated that the content of their most recent PoPNet program was a good fit for patrons who attended.

Almost all librarians felt the content of the PoPNet programs was appropriate to the audience.
No respondents selected "Strongly Disagree."



Source: Librarian Survey

The scientists were praised for their ability to communicate their research to a lay audience. One librarian said:

> "[Our scientist] was an excellent presenter and pretty effectively communicated her research to the audience… She was good at talking about herself and what drew her to science. I thought that was special."
>
> *-Librarian Interview*

Benefits of Virtual Presentations

Scientists identified two main benefits of doing presentations virtually rather than in-person: nine out of 12 respondents mentioned the ability to reach a broader audience and half of respondents wrote about saving on travel time and resources.[8]

According to librarians, benefits also included more flexible scheduling, a larger pool of scientists available to them (including those who are too far away or too busy to travel). They also appreciated the cost efficiency, especially considering many did not have the funds to be able to cover an in-person program.

> "I think absolutely in-person visits are better, but I also know that I am a small town in the middle of [state]. Getting an expert to come here in-person is virtually impossible with the size of my programming budget. Having the ability to connect virtually, even with the drawbacks, is such a better option for our library, and the kids seem to be really excited about it!"
>
> *-Librarian Survey Respondent*

One librarian also mentioned that the virtual program could show a location, materials or equipment that the scientist may not be able to travel with:

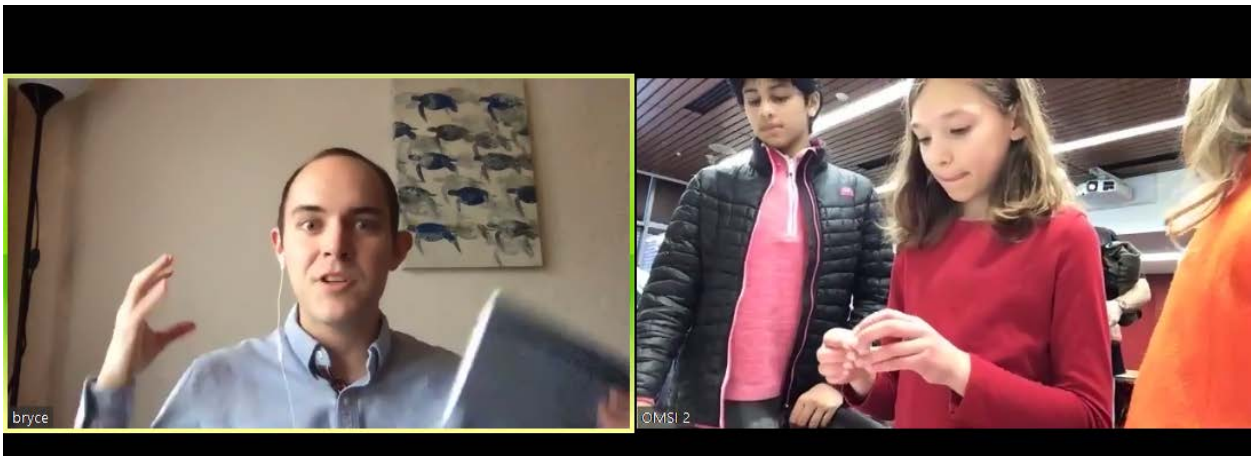
> "[For virtual programs, there is] no limit to geographic location of the scientist (time and expense of travel) for someone to do the program. The presenter may be able to use a specialized set-up or tools that might not travel well for a demonstration."
>
> *-Librarian Survey Respondent*

One scientist and one librarian noted that they thought in-person presentations were always better, but the virtual component often made it possible to have a connection to a scientist at all as in-person was not usually feasible. Seeing the scientist connect with the audience despite technical difficulties made it special and successful, according to a librarian.

> "Even with the [technical] hiccups, it was a really good program. Being able to connect to experts in fields…We don't have that scientist in this area, so doing it this way is ideal. Otherwise, we don't have access."
>
> *-Librarian Interviewee*

> "If it got a scientist in the room, it was worth it. To have the folks come here… we can't afford that. We would have to pay travel and lodging. It was a real treat. We couldn't have had this… We would rather do it in-person, but this is an option if you can't."
>
> *-Librarian Interviewee*

[8] Three respondents mentioned both benefits—reaching a broader audience and saving time on travel.



ABOVE: A scientist speaks to a girl at a PoPNet NaML library event as she engages with the materials at her library.

Reaching a Broad Audience through Virtual Programs

One of the benefits of presenting virtually versus in-person was being able to efficiently reach audiences who are underserved in STEM. Nine of out twelve scientists mentioned that virtual presentations allowed them to talk with hard-to-reach audiences about their work in an open-ended question on the benefits of presenting virtually. Scientists' comments included:

> "Broader dissemination or reaching audience that are otherwise hard to reach."
>
> "I think the biggest benefit of engaging in these activities virtually is that we are able to reach so many people that do not have the direct access that living in a major city affords people. One of the events I participated in was [far away] and it was so amazing to be able to share my science with them... Virtual outreach presents so many unique opportunities for us to talk to people we would never have the chance to otherwise."
>
> *-Scientist Survey Respondents*

One scientist said they were surprised by the broad age range reflected in the audience attending the programs:

> "I think the most surprising thing about the *NASA@ My Library* project was the diversity of the audiences! One event was composed entirely of children under the age of 10 while another was composed of adults over the age of 50. These differences really make the event so special in my opinion. It's so inspiring to see interest in science span generations."
>
> *-Scientist Survey Respondent*

ABOVE: A scientist (lower left) guides, virtually, the patrons at a library work on planning their mission to Mars at a PoPNet NaML library event.

Technical Difficulties

Although six out of eight PoPNet representatives felt "Moderately" or "Very successful" setting up technical aspects of the virtual visits, in an open-ended question on challenges, six out of ten librarians mentioned technical challenges as a drawback to the virtual programs. Comments included:

> "Faulty equipment/connection/lighting."
>
> "Technical challenges. Our connection was spotty at times, which caused interruptions during the presentation and inconsistent audio."
>
> *-Librarian Survey Respondents*

A librarian described how the technical breakdowns affected the quality of the program and the patrons' experience:

> "Technical issues can make an otherwise stellar presentation have less of an impact—our first virtual scientist did a fantastic job, but the sound kept fading out on him so it was hard for people sitting more than two chairs away from the speaker system to hear him at certain points. Also, with web cameras, the range of what both the scientist and audience can see is limited. It's harder for the scientist to see if the audience is getting what the explanation is or what exactly the participants were doing when they try the experiment, AND it's hard for the audience to see some actions/props because of distance to the items and the limits of the screen/camera."
>
> *-Librarian Survey Respondent*

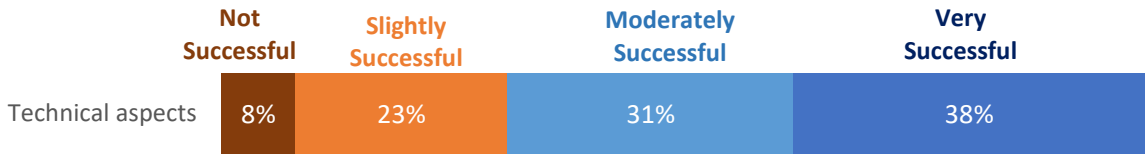
One librarian felt patrons attending a program with technical difficulties were unlikely to attend another virtual program.

Similarly, ten out of 13 scientists wrote about experiencing technical challenges, including not having a video feed from the library, poor audio, and a connection that intermittently froze.

Technical Difficulties Experienced by Scientists

Technical Challenge	Number of Scientists	Examples
Difficulties seeing the audience	6	"Live technical issues with slides interrupted the rhythm and flow of the presentation. I would have preferred to have a large screen in front of me that shows a live feed video of the remote participation audience." "They were frozen, so I couldn't see what it was going on and end up talking to the librarian a lot to make sure everybody was listening or were done with their activity before I resumed my presentation. I wanted to be able to see their face [and] talk to them but it didn't happen." "I could not see the audience, so I could not gauge their reaction to the activity." "The technology was tested the day of the event, but 5 hours later for the actual event the technology didn't work and I couldn't see the audience while I presented." "Virtual presentation is a bit difficult due to technical problems." "They were frozen, so I couldn't see what it was going on and end up talking to the librarian a lot to make sure everybody was listening or were done with their activity before I resume my presentation. I wanted to be able to see their face talk to them but it didn't happen."
Poor audio	2	"Perhaps the most challenging aspect of this program has been overcoming some technical difficulties. For example, when I called into one of the events, we lost the speaker about halfway through the presentation. While this was difficult, I worked with the staff to figure out a way to continue the event (I actually called someone on the phone and used speaker phone to continue while having the video through the online program). Similarly, the microphone system in another event made it hard to hear individuals because the speakers would pick up most of the sound in the room." "Audio at remote location could have been better."
Bad connection	2	"The internet went out at the library in the beginning part of the program." "I participated in one virtual presentation where the audio and video repeatedly cut out. I participated in another where they couldn't get anything to work. I ended up conference calling it in."

Many scientists experienced technical difficulties.



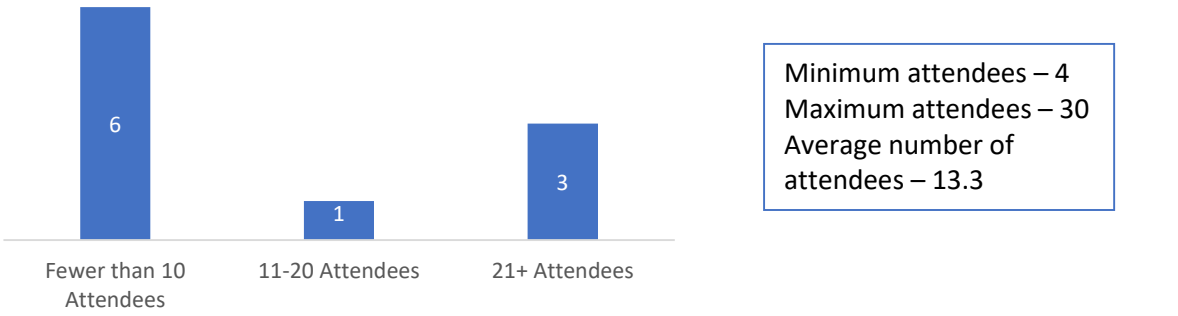
Source: Scientist Survey (n=13)

A librarian commented that the scientist would have benefited if she could see the audience more.

Attendance

Many of the programs had lower attendance than desired. According to responses from 10 librarians to the post-survey (reporting on their most recent program), programs had between 4 and 40 attendees, with an average of about 13 attendees.

Many programs had a low number of attendees.



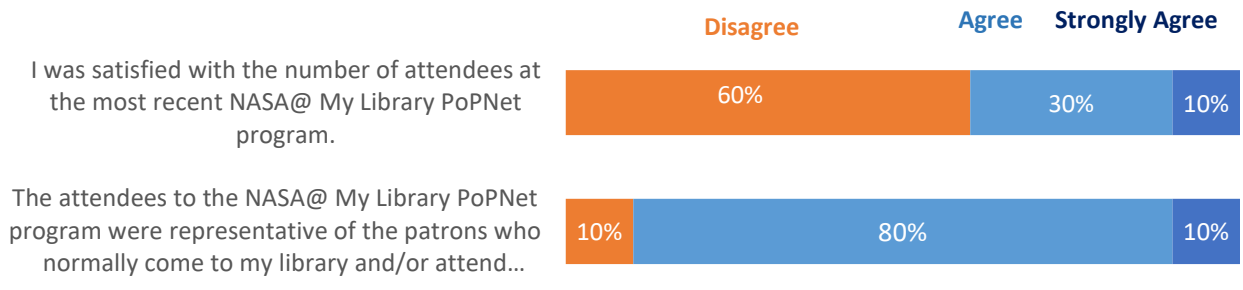
Source: Librarian Survey

The number of patron surveys provides a sense of how many attendees were at each program.[9] Eleven out of 18 programs that submitted patron surveys had fewer than 10 completed patron surveys. Six programs had between 10 and 20 completed patron surveys and one program was a major outlier, with 153 total respondents.

[9] Patron survey data was received from 18/33 PoPNet programs, but not all patrons at any program completed a survey, so the count of surveys underestimates the number of attendees.

Six out of ten librarians were not satisfied with the number of attendees at their recent NaML PoPNet program.

No respondents selected "Strongly Disagree."

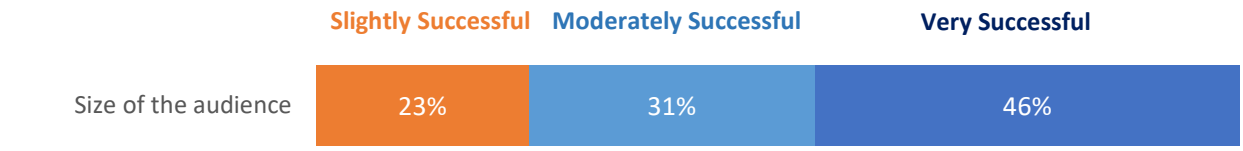


Source: Librarian Survey (n=10)

Similarly, almost a quarter of scientists rated the size of the audience as "Slightly successful."

Almost a quarter of scientists rated the size of the audience as "Slightly Successful."

No respondents selected "Not Successful."



Source: Scientist Survey (n=13)

Contributing factors to the low attendance may have included:

- The short timeline, restricting the time for publicizing the program
- Restrictions in scheduling, given the varying schedules of the scientist and PoPNet site, plus the short timeline may not have left very many options
- Lack of information regarding the program, content, and target audience, making it difficult for librarians to market the program to patrons
- Lack of clarity on who was responsible for marketing (e.g., whether the PoPNet team or scientist would be sending the librarian flyers or text to use)

It was a challenge for scientists to plan a presentation when they did not have a great sense of who would attend at the different libraries. As one scientist wrote:

> "I didn't feel like I knew what to expect from the two different presentations I did. They were for very different audiences and very different types of events. I think it would have been good to explain all that earlier. I feel like I spent all my effort preparing for a 5-minute conversation with a young (5 year-old) child and then when I had to do the virtual presentations they were for high school students."

-Scientist Survey Respondent

In one example, the librarian had the date for the program a month or so in advance and advertised a program to "meet a NASA scientist" after communicating with the PoPNet site to confirm it was her

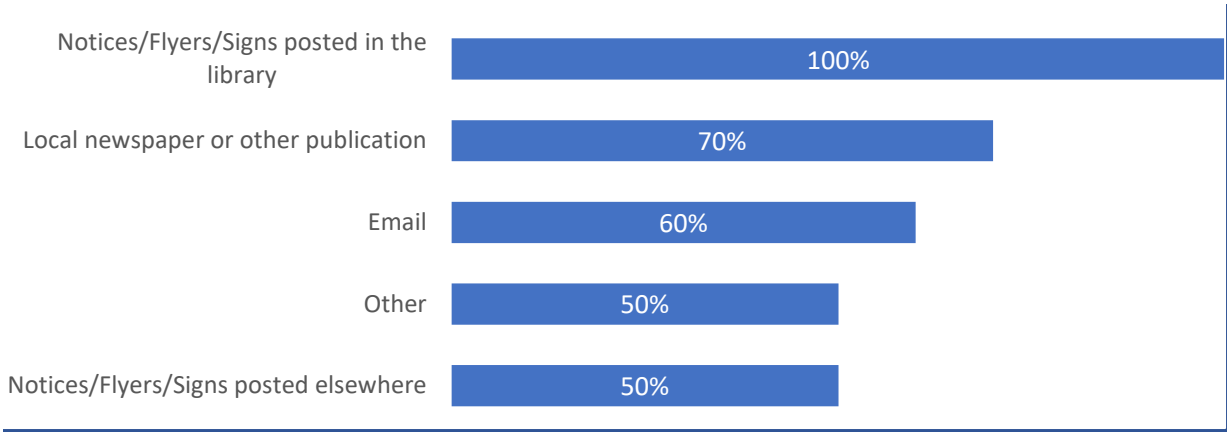
responsibility to create a flyer. When she learned the details of the program (the scientist's name and content, plus information on the hands-on activity) two weeks before the program, she updated the flyer and was able to share those details with patrons who might be interested.

A PoPNet representative thought that improved marketing could increase attendance and suggested that PoPNet and/or the scientist assist librarians:

> "The main challenge was that the libraries had very small audiences during the presentation. I think some of our scientists were disappointed to have put so much time into their presentations and then only have four or five people in the audience. I'm not sure if this is due to a lack of advertising by libraries, or advertising the presentation in a way that didn't sound fun/engaging, not advertising early enough, or just due to the timing of it being around the holidays. One suggestion I have is to have one-page sheets about each scientist that provide headshots, bio, a one-sentence and a short paragraph description of their research, and a one-sentence and short paragraph description of their hands-on activity. This would hopefully give the librarians all the information they need to advertise the program in a way that gets a larger audience in the door. This is something we could do in the NaML training session."
>
> *-PoPNet Representative*

Librarians used a number of methods to market the programs, including flyers, information in a local newspaper, email, radio and social media.

Libraries used multiple media to market the NaML PoPNet programs.
Respondents selected all that applied.



Source: Librarian Survey (n = 10)

In order to have a higher attendance, librarians would like more time and information to market the program. The weather also may have restricted attendance—two programs occurred when there was snow on the ground and one was booked on an uncommonly nice day. One librarian commented that having a scientist there in-person would increase the number of attendees.

One librarian would like to try to schedule the next program at a different time to see if that increases attendance. As one librarian wrote, “We had done a lot of publicity, so it was disheartening to have a low (for us) attendance.”

Another idea, raised by a librarian in an interview, was to charge for attendance and/or create a registration and set a limit on the number of attendees. The librarian thought these would impose a sense of a higher value to the program rather than one that is just free and open to all patrons.

Factors Related to Attendance at a Sample of Programs

Librarian Marketing Efforts	Types of Attendees	Other Details	Quote
Example 3: 2 attendees			
• Posted on Facebook • Sent out to parents via the local school text system • Posted on school Facebook and Twitter accounts • Sent press release, but didn't see it published in the local paper • Personal emails to science teachers for grades 2-12, saying 'Here's an opportunity to meet NASA scientists.'	Open to general public, but targeted upper elementary and middle school students	On the event's Facebook page, 3 people replied as "Going" to the program and 23 people were "Interested"	"I sent the press release to the local paper. If something came from NASA, it would have been front page news." "I need more time to market and more warning."
Example 5: 8 attendees			
• Sent announcements to all area schools • Sent media releases to local TV and radio • Sent flyers out • Flyers at the library • Posted on library website. • Shared with 13 public libraries	1 or 2 middle schoolers and the rest were adults The library reaches underserved, including economically disadvantaged, women/girls, and people with disabilities	Targeted middle school through adult.	"Our typical programs attract families, but this would have been beyond them."
Example 4: 15-20 attendees			
• The program was held during a time when library regularly offers a STEM activity • Tried to expand reach beyond the patrons typically attending the regular STEM programming, which was unsuccessful at one location and more successful at another	Families, with activities targeted for K-5	Library ran out of chairs, so it was full.	"The parents were in the room and got really into it."
Example 1: 24 attendees			
• Advertised at a program the month before • Posted it online • Advertised it in the library • Asked a volunteer from the Astronomical Society to disseminate information • Social Media	Advertised it as "All Ages;" attendees ranged from 8 years told to seniors	At least one attendee did not realize it was a virtual program	"For a new program, 24 [attendees] is pretty decent for us. We thought it was a nice array of ages. The audience stayed the whole time. There was a desire for this sort of thing."
Example 2: 43 attendees			
• Passed out flyers at a program about a week before the PoPNet program • Gave flyers to local schools Advertised it as "All Ages," but pushed for older elementary students	Many attendees, especially families with younger kids, left before the second 20-minute presentation by a scientist. A librarian led hands-on activities during a 40-minute break between presentations. About 15 people stayed for the second presentation.	The librarian only learned what the topic would be two weeks in advance (they had the date saved, but no other information).	"It was a little last minute; we only had two weeks. It was lucky I had an event before and I passed out flyers." "The publicity part was hard as we didn't know the subject matter. We knew the date first, but we couldn't advertise."

Source: Librarian Interviews

Role of Scientists during the Program

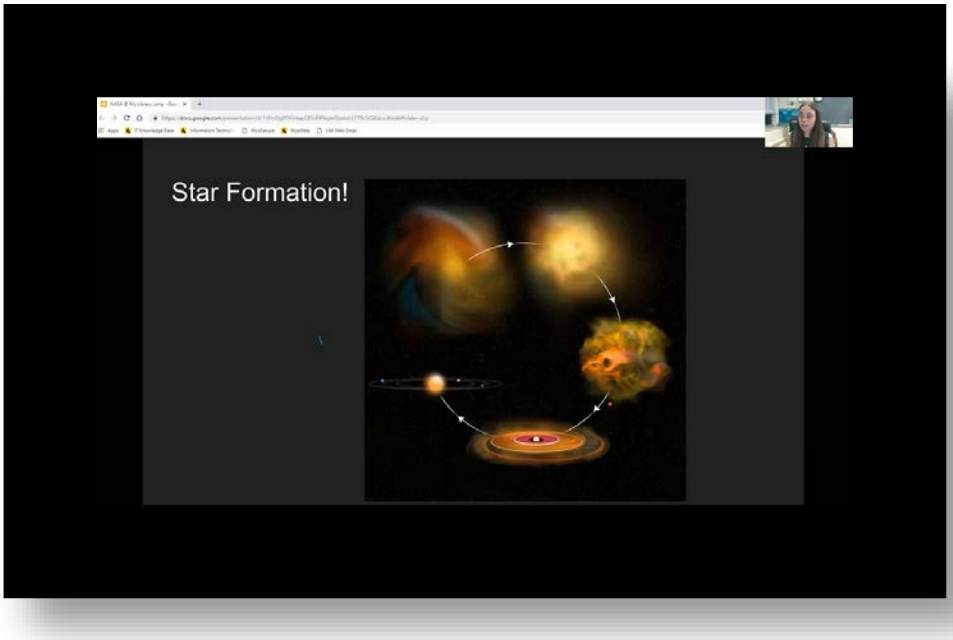
One scientist described the most challenging part of their presentation as facilitating a complicated hands-on activity from a virtual connection, but the librarian was able to step in to help. One scientist had a different experience, being unable to connect with the librarian prior to the program and then finding it challenging to work with the librarian during the program.

> "Since I didn't have a chance to talk with the librarian ahead of time and discuss how we were going to do the facilitation, some of that was done more on the fly and not quite how I would have liked."
>
> *-Scientist Survey Respondent*

The scientists were able to make connections between their research and the activity, making it more interesting to the patrons.

> "The scientists did a great job of highlighting the connection between the activity and their research. Their 'real life' applications definitely increased the interest in the activity."
>
> *-Librarian Survey Respondent*

In one case, the librarian used a *NASA@ My Library* activity that ended up not being well-tied to the scientist's presentation.



ABOVE: A scientist, upper right, shares her slides and presents via an online meeting room with a library at a PoPNet NaML library program.

Role of Librarians during the Program

Librarians typically set-up the virtual connection with the PoPNet representative and scientist, introduced the scientist, and helped facilitate the activities as well as opportunities for interaction with

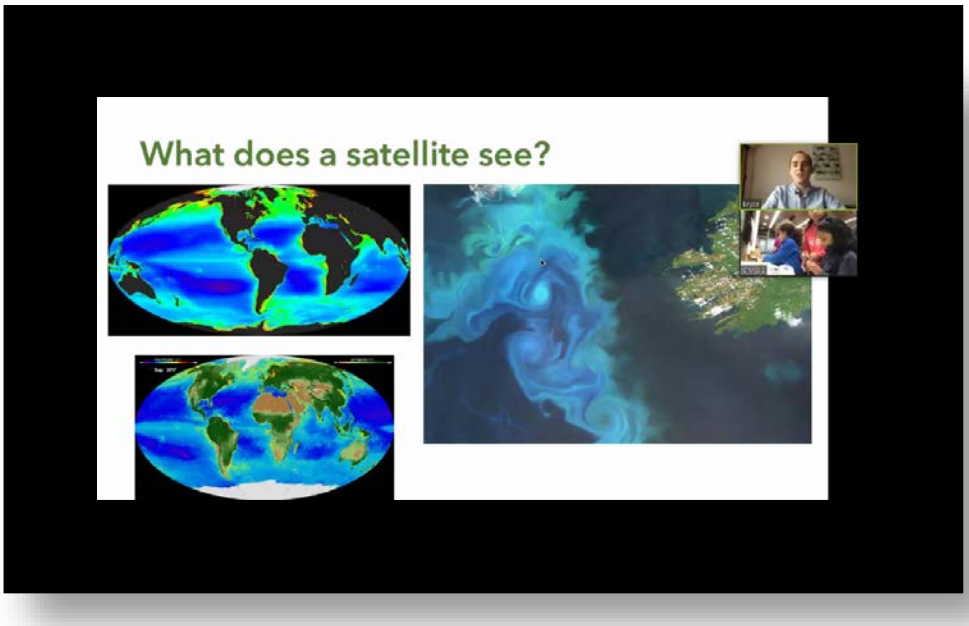
the scientist (such as time for questions or for patrons to show scientists their work on an activity). There were some programs where a PoPNet representative attended in-person at the library and helped with some or all of these aspects.

Scientists relied on the librarians to keep them appraised of any issues they could not see in the room, including when patrons were having trouble, when there was a question, or when they were finished with a certain part of the activity.

Librarians set up the room for the program, but at least one would have appreciated more tips and how-tos on what technology would be best. After the program, she realized that a wide-angle camera and a separate microphone would have improved the experience for the scientist and the patrons.

Librarians really appreciated that they did not need to be an expert leading patrons through science activities and attempting to answer their questions.

> "I see science as amazing, but daunting. If I have to do a science program for adults, they are going to see that I don't know what I'm talking about. It is a huge bonus of virtually connecting to a scientist. I could have done the 'Strange New Planet' activity, but [the scientist's] knowledge… kids were asking all sorts of questions I couldn't have answered. I was asking the scientist questions. She did a fantastic job explaining it… she did a phenomenal job explaining the kits at their level.
>
> -*Librarian interviewee*



ABOVE: A scientist, upper right, shares slides and presents via an online meeting room, to a young audience at a library at a PoPNet NaML program.

Role of PoPNet during the Program

PoPNet representatives completing the survey were asked, in an open-ended item, to compare the experiences of facilitating a program in-person at the library versus facilitating virtually. Their responses were coded and categorized, below.

Benefits of PoPNet representatives attending in-person	Benefits of PoPNet representatives attending virtually
➢ Could help set up equipment and trouble-shoot any issues ➢ Could help facilitate the activity, especially when it is complex ➢ Takes less planning and coordination prior to the event	➢ Could test the connection with scientists and libraries ➢ No time spent traveling ➢ Sufficient for hands-on activities that were super easy to explain to librarians and did not need a lot of facilitation

Examples of Programs

There were approximately 15[10] unique presentations developed as part of the Phase II NaML PoPNet component. The topics included:

- Nano particles
- Phytoplankton
- Dark Matter
- Night Sky Viewing
- The Scales of the Universe - From the Everyday to the Literally Astronomical
- Space radiation on memory
- Using microbes to reduce solid waste and turn it into power source.

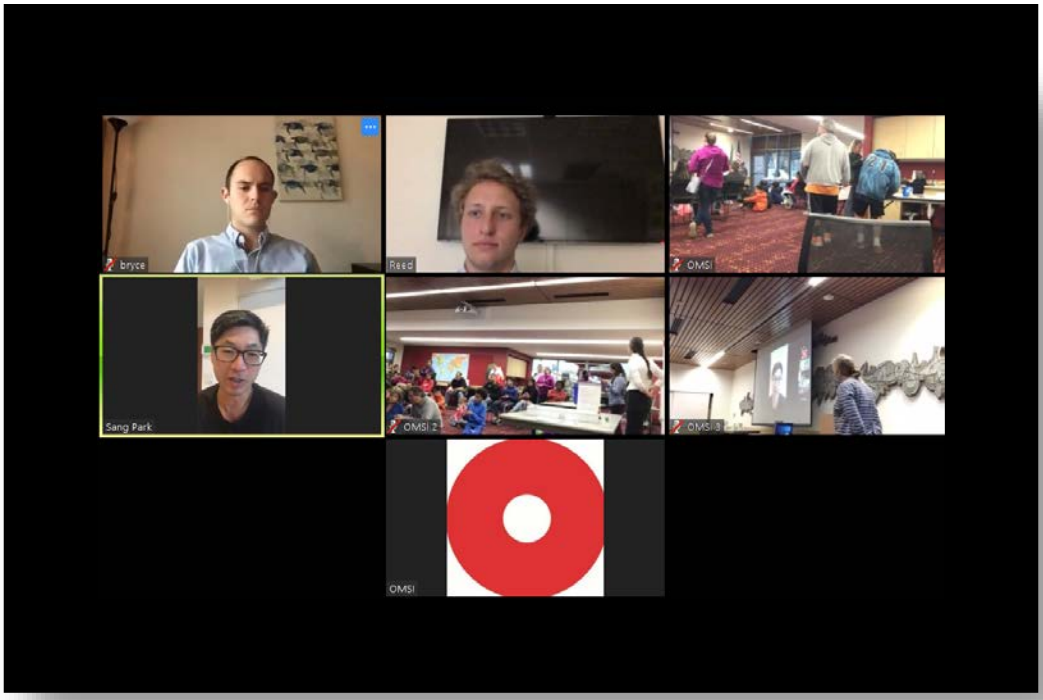
The complete list of Phase II PoPNet NaML program locations and titles is available in Appendix J.

A common program format featured a scientist providing a brief presentation on their work (often with slides or other visual aids), then a hands-on portion where the patrons did some type of activity. Typically, the audience would go over what they experienced in the hands-on portion and have time to ask questions of the scientist during or after the hands-on portion.

However, not all programs followed that common format, such as the Science Fair program described earlier. Another PoPNet site experimented with having multiple scientists at one event. Two different programs were held that each featured three scientists, in different places, virtually connected to a room with patrons at a library. Each scientist gave a short introduction to their work to the whole group. Next, each scientist hosted a "break-out room" using the webinar software which was connected to a computer in a different corner of the room. Patrons circulated and could do a hands-on activity at each table and hear more about the scientist's work and how it related to the activity and/or ask the scientist

[10] Many SMEs held their programs multiple times (each time at a different library), for a total of 29 different programs.

questions. There was also an in-person facilitator physically at each of those break-out locations to help pass out materials, help patrons connect with the scientist and make sure the scientist had a good audio and visual connection.



ABOVE: At a PoPNet NaML library event, three scientists virtually connect to a library room (with three web cameras providing different perspectives) to talk to patrons about their work and then lead hands-on activities.

A sample of PoPNet Phase II programs included:

1) A SME used the *STAR Net Clearinghouse* activity "Strange New Planet" since it was relevant to her area of expertise, studying new planets outside of our solar system. Attendees "observed" two planets concocted by the librarian from different perspectives, including from earth, from space, from an orbiter and then close up where they could touch the planets. Patrons asked the scientist different questions about what they learned.

2) The librarian used river sludge (dredged from the bottom of a nearby river) and the scientist talked through, demonstrated, and led patrons in how to use this "waste" to power different things.

3) A scientist talked about how viruses are changing and how that affects life on earth. The scientist guides the audiences through viral infections, how DNA is encoded and copied.

4) A scientist led the participants in different hands-on activities to show the scale they were trying to work with to use nanotechnology. Attendees got an idea of how tiny nanoscience is and how it can be applied.

Patron Experience

About Patrons Attending Phase II PoPNet Programs

A small percentage of patrons (14% of those who completed a patron survey) had not been to the library before attending this program. About a third, 32%, had been to a program about Earth science, space science, or engineering prior to attending the NaML PoPNet program.

According to responses from the patron survey,

- More than half of patrons completing a survey were white (56%)
- Other ethnic/racial groups that were more represented included Asian (13%); Black, African or African American (12%); and Hispanic/Latino/Latina (12%)
- A little over half of the respondents (59%) were female
- Most patrons self-identified as a child/student (71%)
- Most respondents were in Grade 6-8 (37%) or Grade K-5 (29%)

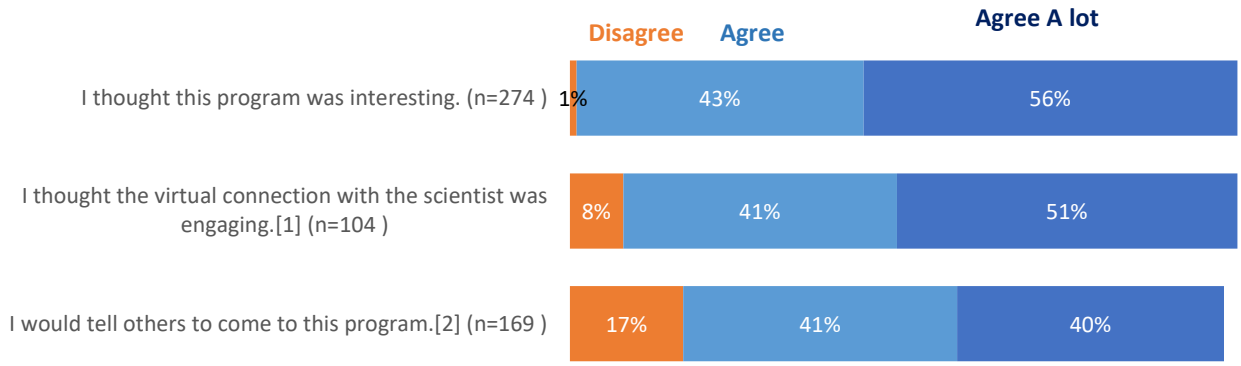
Source: Patron Survey
See Appendix J for more details

Audiences Generally Felt Connected to the Scientist Despite the Virtual Format

As noted in a previous section, audiences were mostly highly engaged in the programs. Nearly all (99%) patrons indicated that the programs were interesting and 98% agreed the virtual connection with the scientist was engaging, with 29% selecting "Agree" and 69% selecting "Agree a lot."

Patrons almost all agreed that the PoPNet programs were interesting and engaging.

No respondents selected "Disagree A Lot"

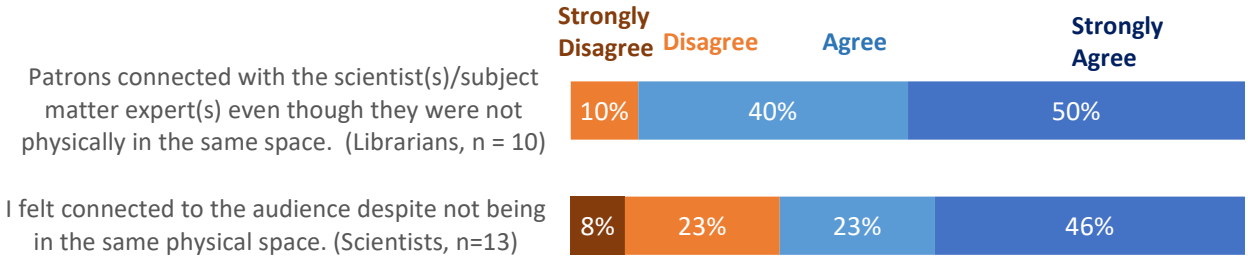


Source: Patron Survey
[1] Item was only asked on the PoPNet Patron Survey version.
[2] Item was only asked on the NASA@ My Library Patron Survey version.

The majority of librarians and scientists agreed there was a connection between the scientist and the audience despite their not being in the same physical space.

> "The kids were comfortable; they were comfortable with me and I could help them feel comfortable with the scientist. It helped that the scientists were young."
>
> *-Librarian interviewee*

Librarians and scientists mostly agreed that the audience felt connected to the scientist despite not meeting in-person.



Sources: Librarian Survey (n=10) and Scientist Survey (n=13)

Scientists were more likely than librarians to disagree that they felt connected to the audience, with 23% of scientists selecting "Disagree" and another 8% selecting "Strongly Disagree." As one scientist

wrote, “It is difficult to feel connected to an audience that I am speaking to virtually. Not being in the same room makes it difficult to read the body language and respond accordingly.”

What Patrons Liked about the Virtual Program

Patrons were asked an open-ended question about what they liked about connecting virtually with a scientist. Twenty-two percent of patrons shared that they enjoyed being able to ask questions of scientists. Other patrons liked learning about science concepts, mentioning planets, exoplanets, and galaxies. Twelve respondents enjoyed meeting a scientist and learn about their work and 11 others mentioned being able to have access to a scientist via technology whom they would not otherwise be able to connect with.

Top categories of responses from 98 patrons on what they liked about the virtual program were:

- Opportunity to ask questions/talk to a scientist (22 respondents)
- I got to learn (14 respondents)
- Meet/Talk to a Scientist (12 respondents)
- Accessing Scientist from Afar (11 respondents)
- Scientist Was Knowledgeable (7 respondents)

> “They [the patrons] really enjoyed it…It really made them start thinking of … different ways to look at planets and our solar system. The other scientist, talking about millions of galaxies, our minds were blown. None of us knew we were on a collision course with Andromeda and that it wouldn’t be the end of the Earth. It wasn’t that they learned a quantitative amount of learning, but qualitatively, realizing that there is so much more out there. Their interest was piqued more and more.”
>
> *-Librarian interviewee*

Examples of patron comments about what they liked included:

- “Being able to ask questions of an expert.”
- “Being able to meet with a professional in our small town.”
- “Connecting virtually allows other scientists to teach and present from around the world without having to be there.”
- “Deeper insight into a scientist life and what happens out in the field.”
- “Seeing and hearing her physical devotion and enthusiasm for her study.”
- “It was beneficial to be able to engage and see the scientist.”
- “It gave me a chance to answer my questions personally.”
- “He could answer questions our librarian couldn’t have.”
- “So knowledgeable.”
- “I learnt something that I didn’t even know existed.”
- “It was very interactive.”
- “Seeing and hearing her physical devotion and enthusiasm for her study.”
- “Cool to see the person on the screen.”

Source: Patron Survey

When asked about what they did not like about connecting virtually with a scientist, many patrons mentioned both audio and visual technology challenges. A handful of patrons shared that they felt the virtual program was impersonal and that they would have preferred in-face meetings. Twelve respondents could not think of anything they disliked about the programs.

Top categories of 84 responses from patrons on what they did not like about the virtual program were:

- Technology issues – sound (23 respondents)
- Technology issues – other (9 respondents)
- Technology issues – visual (8 respondents)
- Would prefer to see live (5 respondents)
- Format/content (4 respondents)

Examples of patron responses regarding what they did not liked included:

- "It was hard to hear and would have been better if the scientists were here in person."
- "The audio was intermittent."
- It was a noisy room [at the library]. Audio was difficult at times. Overall not too bad.
- "They [the scientist] couldn't always see the kids clearly."
- "Hard to see them [the scientist]."
- "Hard to ask questions."
- "Technological difficulties made it a bit difficult to have a more engaging program."

Source: Patron Survey

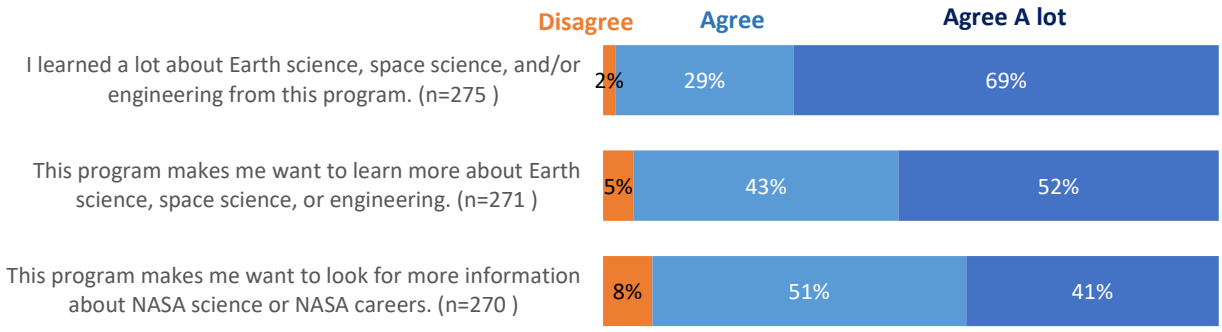
ABOVE: A scientist talks to a young girl at a PoPNet NaML library event to explain the connection between his work and the hands-on activity at that table.

Impact on Patrons

Over 90% of patrons indicated they learned a lot at their NaML PoPNet program and that the program made them want to learn more about Earth science, space science, or engineering. Patrons were slightly less likely to agree that the program made them want to look for more information about NASA science or careers, though 83% of respondents agreed with that statement

Patrons were very likely to learn a lot and want to learn more about Earth science, space science or engineering.

No respondents indicated "Strongly Disagree"

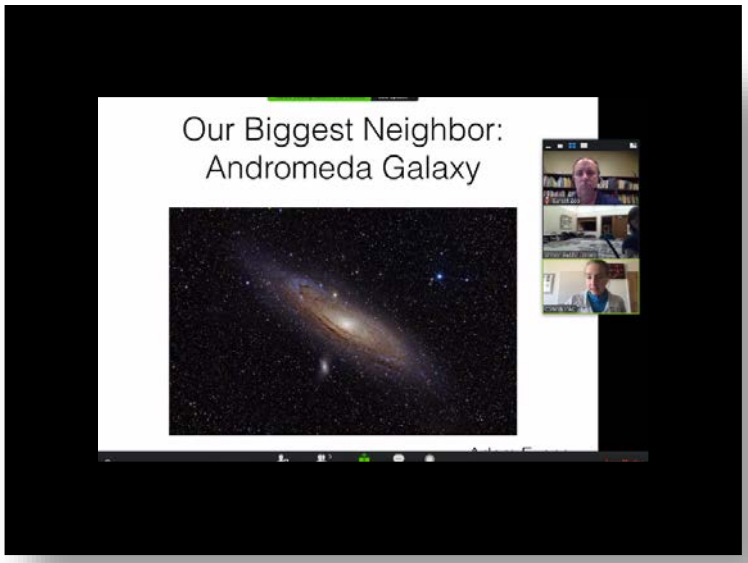


Source: Patron Survey

A librarian described how the opportunity for patrons to meet a scientist was a rare event, and one that could show them different careers that were accessible:

> "[The patrons] got contact with scientists that they wouldn't normally get. It's pretty rare to have scientists come to an afternoon program. To see it in action, that you can do this as a career. The topics weren't any we had expertise on, so somebody to talk about [these topics] was different."

-Librarian Interviewee



ABOVE: A slide show introduces the next topic of a scientist (bottom of the right video stack) as she virtually presents to a small group at a library (middle) at a PoPNet NaML library event. The PoPNet representative (top video) connected the trained scientist to the library and is hosting the online meeting.

The Effect of the Virtual Connection on Patron Experience

When asked about the drawbacks of a virtual connection, three librarians wrote that it may have caused the audience to feel more hesitant about interacting with the scientist:

> "I have noticed that our patrons are not sure about the virtual and think they would not be able to ask questions."
>
> "Students need more encouragement to engage with the scientist because it is a bit more awkward."
>
> "[It's] harder for the audience to interact with the scientist, though they could still ask questions via chat box."
>
> *-Librarian Survey Respondents*

The opportunity to socialize and chat with a scientist after the program was over was lost in at least one virtual program, and the librarian commented that those informal conversations can be 'pretty magical.' A few libraries offered a program featuring a live stream of a scientist on stage doing a presentation.

At the Science Fair program, they had no audio connection back to the scientist. Although questions could be typed into the chat box, the librarian felt the reliance on technology was a barrier to feeling connected to the scientist and that logging on to a presentation that was happening elsewhere lacked a feeling of community:

> "A virtual visit lacks that feeling of community. In the one program we did the scientist was speaking in front of a live audience—we were just something on the sidelines."
>
> *-Librarian Survey Respondent*

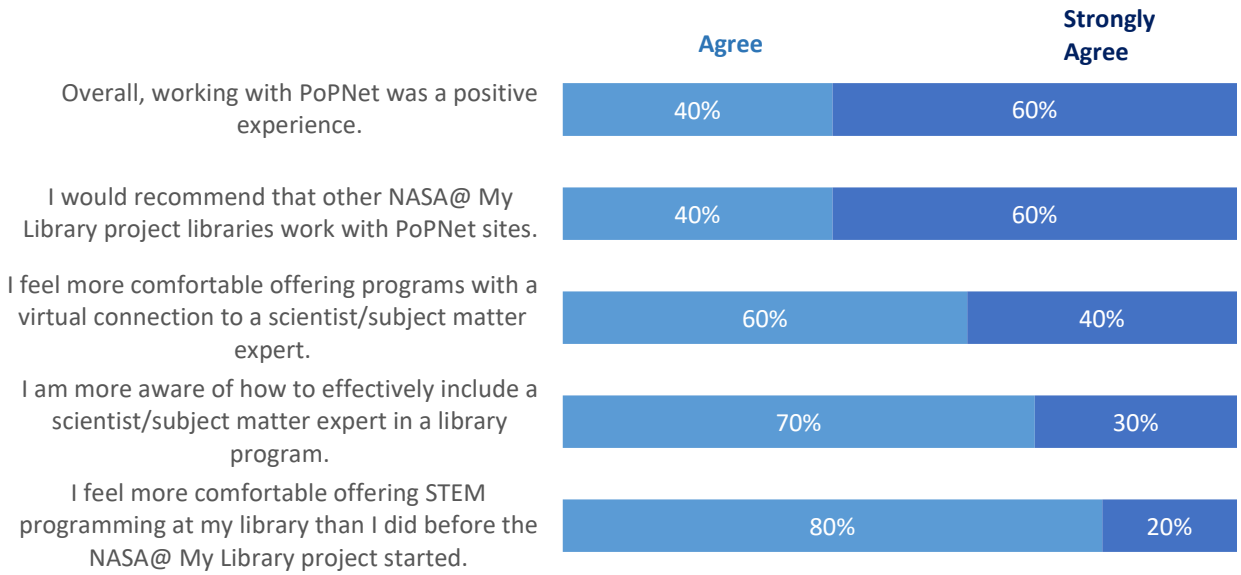
Two librarians commented that they did not see a difference on the effects on patrons between virtual programs and in-person programs.

ABOVE: The view from the webcam at a PoPNet NaML library event, showing library patrons watching the projected view of the online meeting, with the scientist speaking to the room.

Impact on Librarians

All librarians agreed that working with PoPNet was a positive experience and that they would recommend that other *NASA@ My Library* project libraries work with PoPNet sites. Further, librarians all agreed that they felt more comfortable offering STEM programming, were more aware of how to include a scientist in a program, and felt more comfortable offering programs with a virtual connection to a scientist.

Librarians increased their comfort in offering STEM programming and working with scientists.
No respondents chose "Strongly Disagree" or "Disagree."



Source: PoPNet Librarian Survey (n=10)

A librarian asked for a list of scientists who would lead virtual presentations so s/he could pursue scheduling more of these programs.

Librarians' Prior Experience with scientists

To help determine the 'value-added' of the PoPNet component, evaluators asked librarians about their prior experience working with scientists as part of the *NASA@ My Library* project.

The librarians responding to the survey had differing levels of experience reaching out to scientists as part of their involvement in *NASA@ My Library*. Only one librarian had not reached out to scientists, noting that there were no NASA scientists/subject matter experts in their area.

Others described their efforts, such as communicating with scientists over email and pricing out the cost of having them visit, and reaching out to nearby observatories, local schools and STEM organizations. One librarian described a multi-pronged approach:

"Email (taken from organizational websites) asking for program availability, phone calls, direct conversations with local people knowledgeable about science to see if they had connections to a scientist that would fit into *NASA@ My Library*."

-Librarian Survey Respondent

One librarian was not able to schedule a scientist to visit without additional funding,

"I tried to contact various organizations with no luck unless I had funding to pay for programs. Having a subject matter expert that is willing to present as part of the *NASA@ My Library* grant has been a great help."

-Librarian Survey Respondent

Four out of ten librarians mentioned successfully scheduling scientist visits or programs prior to the PoPNet programs, including working with a science center, astronomy clubs, and university science students. A librarian described, in an interview, a very well attended event with a Physics Club from a nearby university helping out, but they were unable to get a NASA scientist to join.

Librarians' Appreciated the Help in Reaching Out to Scientists

Prior to working with PoPNet, librarians experienced challenges in reaching out to scientists, including limited or no budget (four librarians), geographic isolation (two librarians), and scheduling difficulties (two librarians). One librarian also cited the lack of response from suggested NASA-affiliated organizations (Night Sky Network, Solar Ambassadors, etc.). S/he also felt the online databases of NASA-affiliated organizations did not seem to be updated regularly with current contact information.

In an interview, one librarian said, "Our librarian [working on NaML] has had lots of trouble. She can't find anybody or they can't come in."

Two librarians were not sure they had the right knowledge to reach out or that they could judge whether a scientist had the skills appropriate to our audience.

One librarian stated that finding a scientist was their biggest barrier to offering this type of program on their own, and that she could not imagine approaching a NASA scientist with a cold call introducing herself as a librarian from a rural area and asking them to present.

"It is a fantastic opportunity for your audience. It was not particularly complicated. If you have the opportunity to connect the public with actual experts in the field, you can't turn those down."

-Librarian Interview

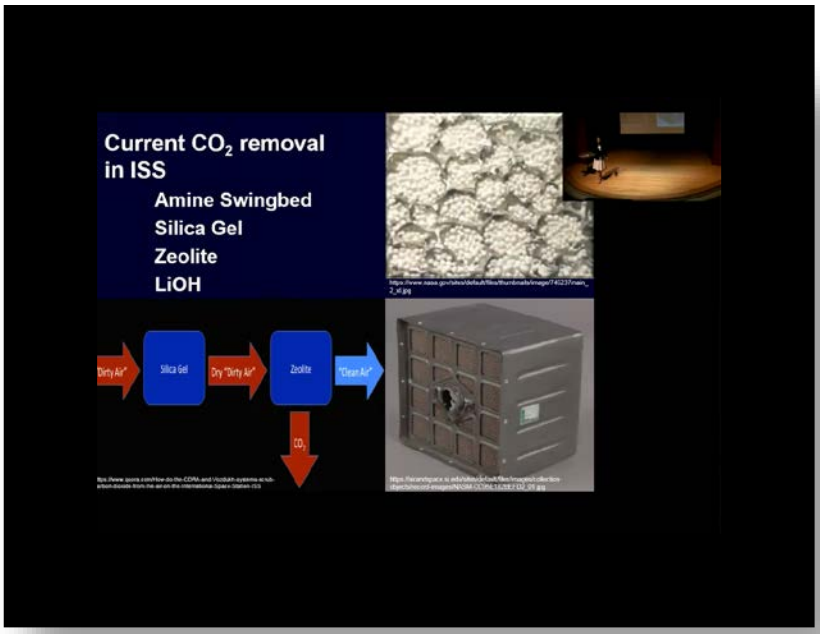
Librarians Appreciated Having an Expert Presenter

Having a scientist at the program (virtually) was a benefit to the librarian. As one wrote, s/he could not have answered all of the patron's questions.

> "It was so great that the kids could ask their questions to the scientists and they could answer them immediately and without hesitation. Since my background is not science, the answer wouldn't have been immediate nor without hesitation!"
>
> *-Librarian Survey Respondent*

Another librarian similarly iterated that s/he is not an expert, so it was nice to have someone who really knew the content.

ABOVE: The live stream of a scientist's presentation (upper right) and presentation slide. A webinar connected to two other libraries as PoPNet NaML library events to the presentation. The presenter asked in-person and online attendees to respond to polls throughout the presentation.

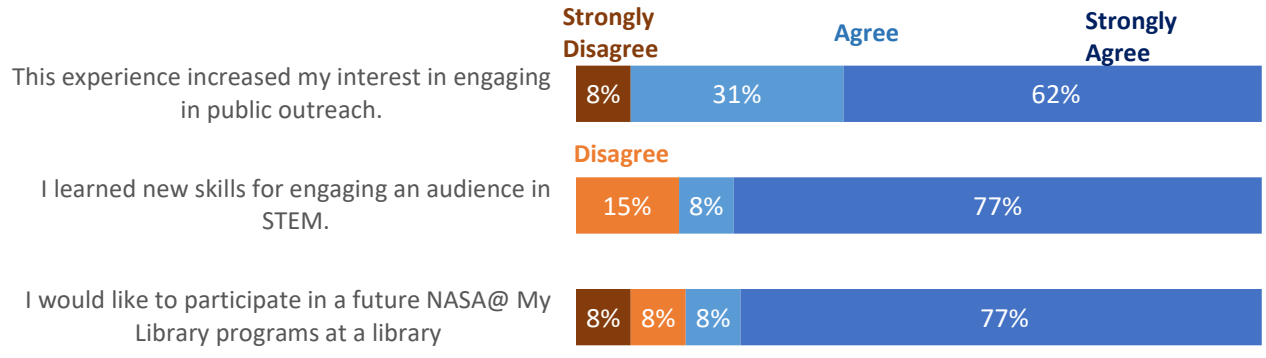


ABOVE: The live stream of a scientist's presentation (upper right) and presentation slide. A webinar connected to two other libraries as PoPNet NaML library events to the presentation. The slide shows how carbon dioxide is removed from the International Space Station.

Impact on Scientists

Most participating scientists were interested in doing more public outreach and building their skills for engaging an audience in STEM. Eleven out of 13 scientists would like to participate in future *NASA@ My Library* programs.

Scientists were more interested and able to do future outreach efforts.



Source: Scientist Survey (n=13)

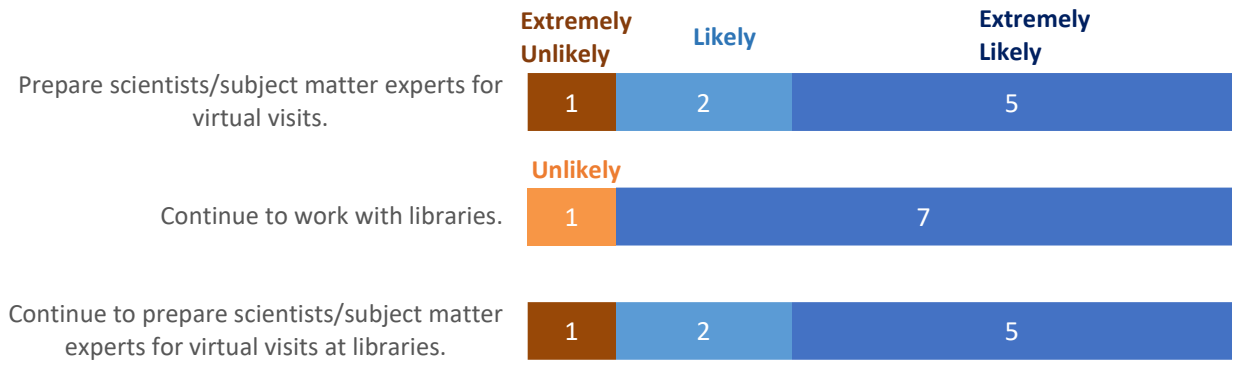
Impact on PoPNet Sites

All but one PoPNet representative agreed or strongly agreed that they would recommend that other PoPNet sites participate in this component of *NASA@ My Library.*

Almost all PoPNet representatives indicated they were very likely to continue to do the work they began under this project—especially continuing to work with libraries. There was one respondent indicating their site was "Extremely unlikely" to continue to prepare scientists for virtual visits, instead preferring to host in-person events with scientists.

> "We definitely learned a lot from doing virtual programs, including training scientists on virtual programs. I think this is a promising direction for our organization moving forward, although we'll have to figure out how to incorporate it into our outreach work. We also loved getting to work with more NASA-themed scientists! We plan to do a number of space-themed events at the museum with these scientists for the 50th anniversary of the moon landing this summer."
>
> *-PoPNet Representative*

PoPNet representatives were likely to continue working with libraries and training scientists for virtual visits.



Source: PoPNet Representative Survey (n=8)

A PoPNet representative wrote about how their participation allowed them to try virtual programming and increase their reach, and they are already considering how to expand on these efforts:

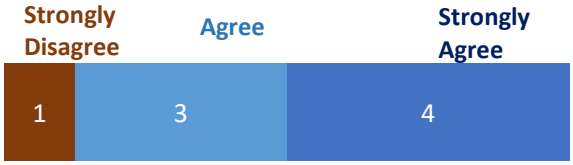
> "This provided an avenue for us to explore virtual programming in more depth than we had before and provided an avenue for us to connect our researchers with the public, which was great. We live in a very rural state and being able to connect with students and the public all across the state has been a goal of ours for some time. Participating in this program has gotten us to think more about how we can incorporate virtual programming into more of our outreach programs."
>
> *-PoPNet Representative*

All but one PoPNet representative would recommend that other PoPNet sites participate in *NASA@ My Library.*

Seven out of eight PoPNet representatives recommend participating in *NASA@ My Library* to other PoPNet sites.

No respondents selected "Disagree."

I would recommend that other PoPNet sites participate in this component of NASA@ My Library (working with scientists/subject matter experts to do virtual visits).



Source: PoPNet Representative Survey (n=8)

Recommendations

The suggestions included in this section were articulated by stakeholders in the project (PoPNet representatives, librarians, or scientists) or are based on analyses of the data collected for this project.

Suggestions Related to PoPNet's Role:

- Provide more recruiting assistance to PoPNet sites for new scientists to train for the virtual programs, especially to help them find more scientists from groups underrepresented in science, such as women and people of color.
- Allow the participation of scientists who are not funded by NASA in order to broaden the pool of available scientists.
- Schedule a longer timeframe for the work of PoPNet sites, including more time for recruiting and training scientists, but especially for scheduling and offering programs at libraries.
- Arrange test runs with libraries or other organizations before the actual program to help minimize technical difficulties.
- Encourage PoPNet sites to stay in regular contact with scientists and libraries; when working remotely, regular communication is especially important to help everyone stay engaged.
- Decide on a preferred webinar platform and have a list of tips on how to best use that platform for PoPNet sites to share with scientists and librarians.
- Ask PoPNet representatives to share marketing information with the librarian, such as the details about the scientist presenting, the topic, and the hands-on activity. Sharing such information as soon as possible will allow librarians more time to market the programs.

Suggestions Related to the Librarian's Role:

- Provide librarians with a list (and funding to support the purchase) of technology equipment that would boost the quality of the online meeting, such as a wide-view web camera and a separate microphone, as well as a list of technology to avoid, such as using an iPad.
- Encourage librarians to have a backup plan when using technology, just in case something does not work quite as planned.

- Suggest that librarians and the scientists schedule a planning meeting to exchange information regarding the program. Librarians might share what technology they will be using in their online meeting room and provide an overview of the patrons who might attend the program, while scientists could go over the outline of their presentation and review the hands-on activity and the role librarians might have in the room.
- Ask librarians to start marketing the programs as soon as possible and to consider any opportunities to have a built-in audience in order to increase attendance.
- Further build librarians' capacity to schedule programs with scientists, virtually or in-person, such as by directly linking library staff to other scientists who might be interested in presenting or having PoPNet sites share information with librarians on how to make sure a presentation by a scientist is a good fit for a general audience.

Other Suggestions:

- Consider other formats to enable scientists to connect with more libraries, such as a recorded presentation by a scientist and then a web meeting with the same scientist with time for questions and answers.
- Prioritize program formats that feature more direct, individual connections to scientists, eliminating the live-streamed programs to multiple audiences.

Summary

All Phase II PoPNet sites experienced success in some areas and challenges in other areas, though there was not a common experience across all sites. More successful aspects included the scheduling of trainings with scientists, training the scientists for virtual programs, and setting up technical aspects of the virtual visit. Areas more commonly indicated as challenging were recruiting scientists, including an engaging hands-on aspect in virtual presentations, and scheduling programs with librarians.

Librarians were grateful for PoPNet's role in connecting their patrons with not just a NASA-affiliated scientist, but NASA-affiliated scientists who had attended trainings on how to talk about their work in an engaging and accessible way. Being able to expose patrons to a scientist, even though it was a through a virtual connection rather than in-person, was of high interest to librarians, and was something many had found challenging to arrange. Even with the activities and kits available to librarians, having a scientist available to inspire patrons, explain confusing concepts, and answer advanced questions was invaluable.

Many of the NaML PoPNet programs had technical difficulties and a portion had lower attendance than desired. Other struggles included scheduling the programs with libraries, as their schedules are planned far in advance.

Overall, PoPNet sites, scientists and librarians felt positively about the programs and especially successful in engaging their patrons. All groups experienced benefits from the programs: PoPNet sites gained knowledge about how to prepare scientists for virtual programs; scientists were able to conduct

outreach activities without the time and funds required to travel and learned how to engage an audience from a virtual connection; librarians became more comfortable offering STEM programming and more aware of how to include a scientist in programs; and, finally, patrons gained inspiration and knowledge from these virtual programs and indicated they wanted to learn more about Earth science, space science, or engineering.

With the transfer of Portal to the Public Network from Pacific Science Center to the Institute for Learning Innovation (ILI) and the contracted role in NaML completed, the project will need to consider whether and how to continue to offer partner libraries a link to trained scientists and/or opportunities for virtual programs.

> "I hope it [access to virtual programs] is offered again and this continues so more libraries can join. With our programs, we want to give our patrons an experience they can't get from other places. So why would people come? A virtual scientist visit—that's something you don't get every day. "
>
> *- Librarian Interviewee*

Appendix A

List of NaML PoPNet Phase II Programs

NASA@ My Library PoPNet Phase II Programs

PoPNet Site	Library	Program Title
OMSI	Juneau Public Libraries	Space radiation on memory
OMSI	King County Library Systems	Space radiation, phytoplankton, exoplanets
OMSI	King County Library Systems	Viruses in extreme environments
OMSI	North Lake County Public Library District	Viruses in extreme environments
OMSI	North Lake County Public Library District	Phytoplankton populations from satellite data
OMSI	Salem Public Library	Multi-Scientist Event
OMSI	Thelma Parker Memorial Public Library	Phytoplankton populations from satellite data
OMSI	Thelma Parker Memorial Public Library	Viruses in extreme environments (DNA)
Orlando Science Center	Broward County Public Library	Science Fair Readiness Program- Small Bodies, Big Impact & Exploring Space Made Easy with Algae
Orlando Science Center	Broward County Public Library	Asteroids: The Future of Space Travel
Orlando Science Center	Gwinnett County Public Library	Outta This World Space Talk- Small Bodies, Big Impact
Orlando Science Center	Gwinnett County Public Library	Outta This World Space Talk-Exploring Space Made Easy with Algae
Orlando Science Center	Kershaw County Public Library	The Scales of the Universe - From the Everyday to the Literally Astronomical
SD Discovery Center	Ely Public Library	Dark Matter
SD Discovery Center	Ely Public Library	Nano particles/technology
SD Discovery Center	Siouxland Libraries	Nano particles/technology
SD Discovery Center	Siouxland Libraries	Using microbes to reduce solid waste and turn it into power source
SD Discovery Center	Yankton Community Library	Using microbes to reduce solid waste and turn it into power source
SD Discovery Center	Yankton Community Library	Combinatorial game series and Graphing Theory
Sunset Zoo	Wilson Public Library	Space Telescope Science Institute and JPL Scientists Presenting
Sunset Zoo	Wilson Public Library	New planet
Sunset Zoo	Wilson Public Library	Galaxies
WYSTEM - WY NASA Space Grant	Red Feathers Lake Public Library	New Discoveries in the New Year
WYSTEM - WY NASA Space Grant	Red Feathers Lake Public Library	Astronomy Night Sky Viewing

PoPNet Site	Library	Program Title
WYSTEM - WY NASA Space Grant	Rio Rancho Public Library	Astronomy Follow-Up Webinar
WYSTEM - WY NASA Space Grant	Rio Rancho Public Library	Meet an Astronomer Webinar
WYSTEM - WY NASA Space Grant	Show Low Public Library	Engineering Week Challenges
WYSTEM - WY NASA Space Grant	Show Low Public Library	New Discoveries in the New Year

Appendix B

PoPNet Representative Survey

***NASA@ My Library* & PoPNet**
PoPNet Site Representative Survey

Add embedded data: Name, PoPNet Site

Send to all team

Introduction:

This survey is being administered by Education Development Center (EDC), evaluators of the *NASA@ My Library* project. We are surveying representatives from PoPNet sites who helped coordinate virtual programs by scientists (also known in this project as Subject Matter Experts) at libraries to help us understand more about the project.

The survey should take about 15-20 minutes. Your responses will be summarized and shared with the *NASA@ My Library* project team. We keep responses anonymous and will not use your name in any reports. Thanks for your time!

Introductory Questions

1. **Why did you or your PoPNet site choose to participate in the *NASA@ My Library* project?**

The Programs

2. **Please rate the following aspects of your site's implementation of *NASA@ My Library*.**

Recruitment of the scientists/subject matter experts Scheduling trainings or programs with scientists/subject matter experts Training of the scientists/subject matter experts for virtual programs Scheduling programs with librarians Setting up technical aspects of the virtual visit Including an engaging hands-on aspect in presentations	Not successful Slightly successful Moderately successful Very successful

3. **Looking at the areas of work listed in the question above, what did your PoPNet site do particularly well? Explain how/why it went well:**

4. **What were the one or two biggest challenges in participating in the *NASA@ My Library* project? Did you learn any strategies to help overcome these challenges, or do you have any suggestions to help ameliorate these challenges?**

5. **How could your PoPNet site be better supported by PoPNet at Pacific Science Center or *NASA@ My Library?***

6. **If you helped to facilitate a NASA@ My Library program <u>in-person</u> at the library AND ALSO helped to facilitate at a NASA@ My Library program <u>virtually</u> (i.e., you were remote), please compare and contrast those experiences. If not, proceed to the next question.**

Wrap-up

7. **Please indicate your level of agreement with the following statements.**

Overall, our *NASA@ My Library* PoPNet programs were successful. I would recommend that other PoPNet sites participate in this component of *NASA@ My Library* (working with scientists/subject matter experts to do virtual visits).	Strongly Disagree Disagree Agree Strongly Agree

8. **Please indicate how likely your PoPNet site is to do the following in the future.**

Prepare scientists/subject matter experts for virtual visits. Continue to work with libraries. Continue to prepare scientists/subject matter experts for virtual visits at libraries.	Extremely Unlikely Unlikely Likely Extremely Likely

9. **Please add any explanation regarding your responses in the table above, especially if you responded "Unlikely" or "Extremely Unlikely" to either of the statement.**

10. **How did this experience impact your outreach work or other educational efforts?**

11. **How, if at all, did this experience impact your ongoing Portal to the Public efforts?**

12. **How do you think the virtual visits affect the impact the program had on patrons (compared with the potential impact of in-person visits during programs)?**

13. **Do you have any advice for other informal science learning organizations who might participate in the future (not otherwise shared in final reports or monthly reflections)?**

14. **Please add any final comments or suggestions that you have for ways to improve the PoPNet experience:**

Appendix C

Librarian Survey

NASA@ My Library & PoPNet
Library Staff Survey

Embedded data: library, location, PoPNet site
Note: One contact per library

Introduction:

Thanks for your time completing this survey! Education Development Center (EDC) is evaluating the NASA-funded *NASA@ My Library* project. As part of the evaluation, we are surveying library staff to understand how the project is being implemented, collect suggestions, and learn about the project's impacts at your library.

The survey should take about 15 minutes. Your honest feedback will help shape *NASA@ My Library* so the project team can make it as rewarding as possible for participating libraries and their patrons. Your responses will be summarized and shared with the *NASA@ My Library* project team. We will not use your name or your library's name in anything that we share with the project team.

Most Recent *NASA@ My Library* PoPNet Program

We're interested to hear about your experience working with PoPNet and about how the program(s) with scientists (also known in this project as Subject Matter Experts) virtual presentations have gone.

1. **Please indicate your level of agreement with the following statements regarding your most recent *NASA@ My Library* PoPNet program.**

The most recent program was successful. The content of the *NASA@ My Library* PoPNet program was appropriate to the audience at my library. The hands-on portion of the program requiring audience interaction was effective. The scientist(s)/subject matter expert(s) seemed well-prepared to serve as a virtual presenter(s). Patrons connected with the scientist(s)/subject matter expert(s) even though they were not physically in the same space. The content of the scientist's/subject matter expert's presentation was appropriate for being facilitated virtually. I was satisfied with the level of communication from PoPNet in planning this program. I was satisfied with the level of control/decision-making that I had in planning the *NASA@ My Library* PoPNet program.	Strongly Disagree Disagree Agree Strongly Agree Not applicable

2. **Please add any explanation regarding your responses in the table above, especially if you responded "Disagree" or "Strongly disagree" with any of the statements.**

3. **Did your *NASA@ My Library* PoPNet program(s) use any *NASA@ My Library* resources, activities, or materials?**

   Yes No Not sure

   a. If yes: What did you use?
   b. If yes: What worked well about the *NASA@ My Library* resource, activity or material?
   c. All: What were challenges to using *NASA@ My Library* resources, activity or materials, or how would you improve the *NASA@ My Library* resource, activity, or materials?
   d. All: How did the virtual connection to the scientist influence the use of the resource, activity or materials?

4. **Prior to your PoPNet involvement, how had you reached out to NASA scientists/subject matter experts, NASA-affiliated organizations, or other individuals or organizations because of your involvement in the *NASA@ My Library* project?**
   a. If yes, what were challenges or barriers to reaching out to scientists?

<u>Program Attendees</u>

Please consider the most recent *NASA@ My Library* PoPNet program as you answer the items below.

1. **How was the *NASA@ My Library* PoPNet program promoted?** *(Check all that apply)*
   a. Email
   b. Posted on the library website/On the library calendar
   c. Notices/Flyers/Signs posted in the library
   d. Notices/Flyers/Signs posted elsewhere
   e. Local newspaper or other publication
   f. Other, please specify: _____

2. **How many attendees were at the most recent *NASA@ My Library* PoPNet program: ___**

3. **I was satisfied with the number of attendees at the most recent *NASA@ My Library* PoPNet program.**

   Strongly Disagree
   Disagree
   Agree
   Strongly Agree

   b. *If Disagree or Strongly Disagree:* Please explain your response:

4. **The attendees to the *NASA@ My Library* PoPNet program were representative of the patrons who normally come to my library and/or attend programs.**
   Strongly Disagree
   Disagree
   Agree
   Strongly Agree

   3b. If Disagree or Strongly Disagree: **Please explain how the attendees differed from the usual patrons of your library.**

Final Reflection

Please indicate your level of agreement with the following statements.

Overall, working with PoPNet was a positive experience. I feel more comfortable offering STEM programming at my library than I did before the *NASA@ My Library* project started. I am more aware of how to effectively include a scientist/subject matter expert in a library program. I feel more comfortable offering programs with a virtual connection to a scientist/subject matter expert. I would recommend that other *NASA@ My Library* project libraries work with PoPNet sites.	Strongly Disagree Disagree Agree Strongly Agree

5. **What was most helpful about the information or preparation you received from PoPNet regarding the program(s)?**

6. **How could your preparation or communication from PoPNet be improved?**

7. **From your experience, please identify one or two benefits and drawbacks to your library of a "virtual" visit by a scientist/subject matter expert, as opposed to an in-person visit.**
   a. Benefits of a "virtual" vs in-person scientist visit:

   b. Drawbacks of a "virtual" vs in-person scientist visit:

8. **How do you think the virtual visits affected the impact the program had on patrons (compared with the potential impact of in-person visits)?**

9. **Please add any final comments or suggestions that you have for ways to improve the PoPNet experience:**

Thank you so much for taking the time to share your feedback!

Appendix D

Librarian Interview Protocol

***NASA@ My Library* & PoPNet**
Librarian Interview Protocol

Introduction:

This interview is being conducted by Education Development Center (EDC), evaluators of the *NASA@ My Library* project. We are talking to a sample of librarians who participated in the PoPNet component (hosting programs with a virtual connection to a scientist) to help us understand more about the project.

The interview should take about 30-45 minutes. We will summarize what we learn in these interviews with the *NASA@ My Library* team to help inform the project. We keep response anonymous and will not use your name or your library's name in any reports. Thanks for your time!

With your permission, I'd like to audio record our interview. Is that ok? (if yes, start recording).

Introductory Questions

1. Did you or your library have any previous experience with scientists/subject matter experts presenting or leading activities at your library before participating in PoPNet-associated programs?
    a. If yes, please describe (and address whether affiliated with *NASA@ My Library* or not):
    b. If yes, did you have previous experience with hosting a program with a virtual connection to a scientist/subject matter expert or other professional?
        i. If yes, please describe
        No

2. Why did you decide to work with PoPNet and host a program with a virtual connection to a scientist?

The Program(s)

3. Tell me about the program(s) you did for *NASA@ My Library* with PoPNet. *(*How many, when they were held, topics, etc.)

4. We're interested in hearing about who was involved in helping to plan the virtual program(s) at your library. Please describe who was involved in the planning of the program and the roles or responsibilities of you/your library, your PoPNet site, and the scientist/subject matter expert.

5. How often and in what ways did you communicate with PoPNet?
    a. What worked well about the communication with PoPNet?
    b. What would you suggest to improve the communication with PoPNet?

6. How often and in what ways did you communicate with the scientists/subject matter experts?
    a. What worked well about the communication with the scientists/subject matter experts?
    b. What would you suggest to improve the communication with the scientists/subject matter experts?

7. Who was the intended audience of the program(s)? How was the intended audience determined?

8. Who actually came to the program(s)? (Was it the expected audience?)

9. We are interested in the experience of having a virtual connection to the scientist/subject matter expert.
    a. From your perspective, how effective was it to have a virtual connection to a scientist/subject matter expert?
    b. How do you think the experience of having a virtual connection to a scientist/subject matter expert compared (or might compare) to the experience of having a scientist/subject matter expert there in person?
    c. Is there anything you would do differently next time?

10. Did this program use any *NASA@ My Library* resources, activities, or materials?
    a. (if yes) What resources worked well and what did not work well?
    b. (if no) Why not? Did any challenges keep you from using NaML resources, activities, or materials?

11. What did you see the audience getting out of the program?
    a. How, if at all, do you think the virtual connection affected the impact of the program on the audience?

12. How, if at all, did the following factors make the program especially successful or challenging?

    a. The physical space or technology
    b. The program/presentation topic
    c. The length/content/format of the presentation or activities
    d. The scientist's/subject matter expert's ability to connect with the audience
    e. The audience/who came to the program

f. Any other factors

Closing Questions

13. Would you recommend that other librarians or libraries participate in the PoPNet component of *NASA@ My Library?* Why or why not?

14. What other recommendations or comments do you have to inform future iterations of virtual library programs with scientists/subject matter experts?

Appendix E

Scientist Survey

NASA@ My Library & PoPNet
Scientist/Subject Matter Expert Survey

Add embedded data: Scientist name, PoPNet Site; Titles and Institution/Company of SME(s)

Introduction:

This survey is being administered by Education Development Center (EDC), evaluators of the NASA-funded *NASA@ My Library* project, which your presentation was part of. To help us understand more about the project, we are surveying the scientists, also known in this project as subject matter experts, who worked with PoPNet sites.

The survey should take about 10 minutes. Your responses will be summarized and shared with the *NASA@ My Library* project team. We won't use your name in anything that we share with the project team.

Introductory Questions

1. Why did you choose to participate in PoPNet *NASA@ My Library*? *Please check all that apply.*
    a. To teach a public audience about my work/a specific project
    b. To teach a public audience about earth and space science concepts
    c. To increase public audience interest in science/earth and space science
    d. To advance my science communication or teaching skills
    e. To get feedback about my work
    f. To satisfy an outreach requirement
    g. Other, please explain:

2. Please rate the following items regarding the training and support you received for this project.

I was satisfied with the training. I felt prepared to talk about my job to a public audience. I felt prepared to explain scientific concepts to a public audience. I felt prepared for the technical aspects of virtually presenting. I felt prepared to engage an audience while presenting virtually.	Strongly Disagree Disagree Agree Strongly Agree

3. What was the most helpful aspect of the training or support you received from PoPNet or *NASA@ My Library*?

4. In your experience what are the benefits of presenting or facilitating activities virtually versus in person?

5. Before your involvement with this project, had you ever presented or conducted public outreach at a public library?
   Yes
   No

6. Before your involvement in this project, had you previously presented or facilitated activities virtually?
   Yes (please describe): _____
   No

7. Do you have any connection to NASA or NASA's Science Mission Directorate?
   No
   Currently receive funding from NASA
   Received funding from NASA in the past
   Currently work or previously worked for NASA
   Other; please describe:_____

The Program

8. Please rate the following aspects of your most recent PoPNet *NASA@ My Library* presentation or activity.

Size of the audience Technical aspects Engagement of the audience Hands-on aspects	● Very successful ● Moderately successful ● Slightly successful ● Not successful

9. What worked well in your most recent PoPNet *NASA@ My Library* program?

10. What were challenges overall in delivering your most recent PoPNet *NASA@ My Library* program?

Wrap-up

11. Please indicate your level of agreement to the following statements regarding the project.

I felt connected to the audience despite not being in the same physical space. This experience increased my interest in engaging in public outreach. I learned new skills for engaging an audience in STEM. I would like to participate in a future *NASA@ My Library* programs at a library.	Strongly Disagree Disagree Agree Strongly Agree

12. Please add any explanation regarding your responses in the table above, especially if you responded "Disagree" or "Strongly disagree" to any of the statements.

13. Was there anything surprising about your experience in this PoPNet *NASA@ My Library* project?

14. Please add any final comments or suggestions that you have for ways to improve the PoPNet *NASA@ My Library* experience:

Appendix F

Patron Survey – PoPNet Version

Patron Survey Instruction Sheet (Phase 2)

Dear Library Staff:

The evaluation of *NASA@ My Library* includes a patron survey to collect feedback from all attendees to three of the *NASA@ My Library* programs at your program. We would like to THANK YOU in advance for helping us collect this data. Below you will find information about the survey and its administration. Please feel free to contact us at NAML_eval@edc.org if you have any questions.

Thank you for your cooperation and support,
NASA@ My Library Evaluation Team
from Education Development Center

What the Patron Survey Includes:

PAGE 1: A cover sheet to be completed by library staff to collect programmatic information, including library contact information, program name and date, audience, content, and implementation.

PAGE 2: A short survey to be given to attendees including the date and name of the program, six questions about the program experience and optional demographic/characteristic questions.

How to Administer the Patron Survey:

- Library staff are required to administer the Patron Survey to everyone who attends the three *NASA@ My Library* programs libraries are required to have each year. If your library has more than three NASA@ My Library programs per year, administration of the Patron Survey at these additional programs is optional.
- We ask that library staff complete one cover page for each program. If you prefer, the cover sheet can be filled out online here: **https://go.edc.org/patronsurveycoversheet**.
- Please distribute copies of the Patron Survey to all attendees near the conclusion of the program, allow 5-10 minutes to complete, and collect when they are done. If you would like to administer the survey online, contact the evaluation team at NaML_eval@edc.org to receive a survey link.
- The Patron Survey is designed to be appropriate for ages 10 and older. If a program has children younger than 10 in the audience, please ask caregivers to complete the survey on their child's behalf.
- The Patron Survey is available in English and Spanish.

How to Submit Completed Patron Surveys:

When complete, please attach the cover sheet to any Patron Surveys collected after the program and either return hard copies by mail or scan and email them.

Option 1: Mail hard copies to: Education Development Center (c/o Tracy McMahon), 43 Foundry Ave, Waltham, MA 02453.

Option 2: Scan cover sheet and surveys and email to NAML_eval@edc.org.

Program/Activity Cover Sheet (Phase 2)

Dear Library Staff:
Please fill out the table below with details about your *NASA@ My Library* program or activity. If you have any questions, please contact us at NAML_eval@edc.org. When complete, please attach this cover sheet to any patron surveys collected after the program/activity and return to Education Development Center (c/o Tracy McMahon), 43 Foundry Ave, Waltham, MA 02453 or email scanned copies to NAML_eval@edc.org.
If you prefer, the cover sheet can be filled out online here: **https://go.edc.org/patronsurveycoversheet**.

Thank you,
NASA@ My Library Evaluation Team
from Education Development Center

1. Library Name *(include Branch if applicable)*	Name/Branch: _____
2. Library Contact Information	First and Last Name: _____ Email: _____
3. Date of Program/Activity	
4. Name of Program/Activity	
5. Who delivered this Program/Activity? (please check ✓all that apply)	❑ Library staff ❑ Professional(s) or other expert(s) related to the topic/Subject Matter Expert(s) (SME) ❑ Library volunteer(s) ❑ Other; please describe: _____
6. How long did it take YOU to plan this program/activity?	Total # of hours you spent planning: _____ hours
7. Did this program/activity require any accommodations for people with disabilities?	○ Yes; please describe: _____ _____ ○ No
8. Did you use materials from *NASA@ My Library*?	O **Yes**, this program used the following materials (please check ✓ all that apply): ❑ Activities from the *NASA@ My Library* binder(s) ❑ Activities from the *STAR_Net* STEM Activity Clearinghouse ❑ STEM tools and activity materials from *NASA@ My Library* Kit(s) ❑ Books from *NASA@ My Library* Kit(s) O **No**, this program did not use any materials shipped to us through the *NASA@ My Library* initiative
9. Materials Use	Please briefly describe what materials were used for this program, including any materials that did not come from *NASA@ My Library*:
10. Were you able to collect patron surveys?	○ Yes ○ No; if not, please describe why not: _____
11. Implementation	Please use the back of this sheet to describe any particular concerns or suggestions you have related to this program/activity.

NASA@ My Library Patron Survey

Thank you for attending this *NASA@ My Library* program!

We are interested in knowing what you thought about this library program/activity. Please help us by taking this short survey. When you are finished, please return your survey to library staff. Thank you!

1. Today's date: _____ Name of Today's Program: _____

2. What did you like about connecting virtually with a scientist?	3. What did you not like about connecting virtually with a scientist?

Please tell how much <u>you</u> agree or disagree with each of the following statements:	**How much do you agree or disagree?** (please check one response for each statement)			
	Disagree a lot ☹	Disagree	Agree	Agree a lot ☺
4. I thought **this program** was interesting.	O	O	O	O
5. I learned a lot about **earth science, space science, and/or engineering** from this program.	O	O	O	O
6. This program makes me want to learn more about **earth science, space science, or engineering**.	O	O	O	O
7. This program makes me want to look for more information about **NASA**.	O	O	O	O
8. I thought the virtual connection with the scientist was engaging.	O	O	O	O

9. Have you been to **this library** before today?	O Yes	O No
10. Have you been to any programs about **<u>earth science, space science, and/or engineering</u>** at this library before today?	O Yes	O No

OPTIONAL: Please tell us more about <u>you</u>. Please select responses that best characterize you.

11. I am:	12. I identify as:	13. Race/ethnicity:	14. What grade are you in?
O A parent, grandparent, or caregiver *(attending with child/grandchild)* O A child/student O Other; please describe: _____	O Female O Male O Prefer not to say O Prefer to self-describe: _____	O American Indian or Alaska Native O Asian O Black, African or African American O Hispanic/Latinx O Native Hawaiian or Other Pacific Islander O White O More than one race O Prefer not to say O Other; please describe: _____	O Grade K-5 O Grade 6-8 O Grade 9-12 O I am not a K-12 student O Other; please describe: _____

Appendix G

PoPNet Representative Survey Summary

***NASA@ My Library* & PoPNet**
PoPNet Site Representative Survey

The survey for PoPNet Site Representatives was open for responses from March 20 to April 30, 2019. There were 8 respondents from all 6 different PoPNet sites, including two respondents each from two different sites and a respondent from a site that did not hold programs.

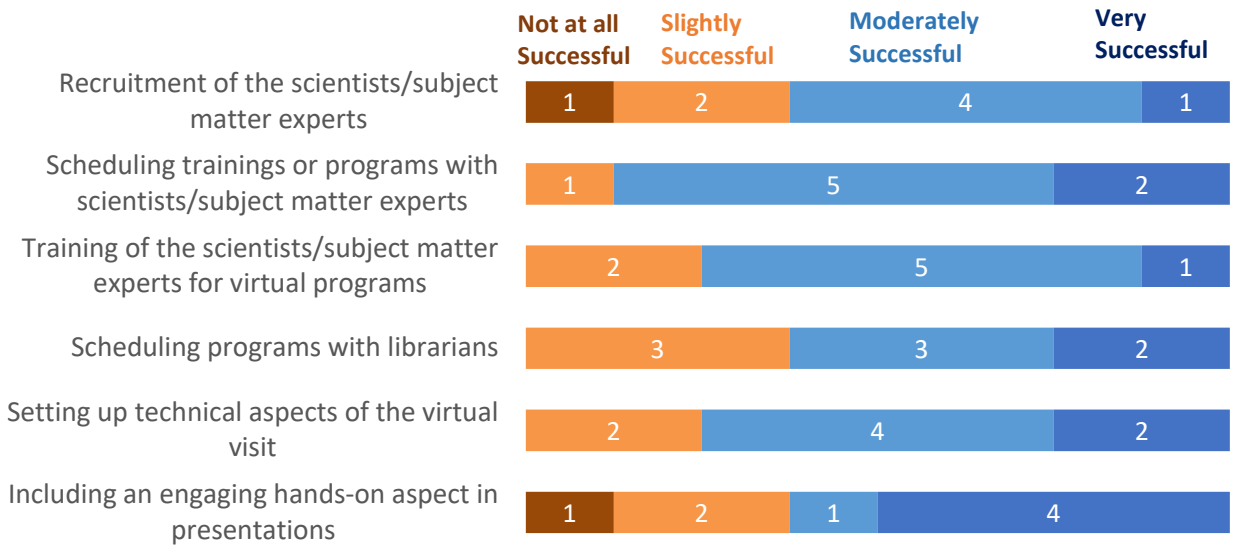
Site	Count	Percent
Adventure Science	1	12.5
OMSI	1	12.5
Orlando Science Center	1	12.5
South Dakota	1	12.5
South Dakota Discovery Center	1	12.5
Sunset Zoo	1	12.5
WYSTEM	2	25.0
Total	**8**	**100.0**

Introductory Questions

1. **Why did you or your PoPNet site choose to participate in the *NASA@ My Library* project?**
   - We are a very active Portal to the Public site and many of our fellows have voiced an interest in virtual programming. This project was a perfect opportunity to get involved and pilot a virtual training.
   - Following strong connections made during the 2017 Total Solar Eclipse and a successful relaunch of Scientists on Site at Adventure Science Center, we felt that the NASA @ My Library project was a promising opportunity to engage in distance learning experiences.
   - We were interested in expanding our partnerships with NASA scientists and building new interest in our portal to the public workshops.
   - Our program is funded by the NASA STEM Engagement Office, so this seemed like a perfect fit and a great way to highlight the research that our NASA-funded scientists are doing in [our state].
   - We are very interested in virtual programing as our program serves our entire (large) state. Getting more experience doing virtual programming and learning from others doing virtual programming was beneficial to us.
   - We were excited about: 1. Working with more space and NASA-themed SMEs 2. Making connections with Library partners in locations near and far 3. Learning to do virtual programming
   - [We] chose to participate in the NASA @ My Library project to pilot virtual programming with scientists. [My organization] and its partners have been discussing ways to expand our reach prior to the announcement of this opportunity.

The Programs

2. Please rate the following aspects of your site's implementation of *NASA@ My Library*. (n=8)



3. Looking at the areas of work listed in the question above, what did your PoPNet site do particularly well? Explain how/why it went well:

- All of our NASA@ MyLibrary fellows went through a traditional Portal to the Public training and developed a hands-on activity first, before completing the virtual training. This aspect of the workshop is well developed and successful.
- Relative to other sites, we were very successful in recruiting scientists/subject matter experts as we did get four, two of whom are graduate students. However, I put moderately successful because it was VERY challenging to recruit them (more below). It was successful because we opened it up to graduate students and condensed the training by two days, thus reducing the number of days they would be absent from teaching or attending class. The other part that I think we did particularly well is helping the scientists to develop engaging hands-on experiences for their presentation. It went well because we spent a fair amount of time in our training focusing on them developing those experiences. We had them present a prototype, where they received feedback, then they presented them in a face-to-face situation, and then we practiced them using the technology platform.
- We 3D Printed models that complemented the scientist's field of study and integrated additional demonstrations for onsite audiences.
- We were very successful in recruiting scientists and in engaging library audiences through research presentations by the scientists. The library audiences seemed to really enjoy the presentations and each program had a great Q&A session at the end of the presentation.
- We had great participating scientists who were very engaging. Their presentations and activities were very well received.
- I think the training of the SMEs and the development of the hands-on component worked well with most of our scientists. This led to really engaging presentations at the libraries.

- I was impressed with the hands-on aspect of the scientists' engagement. I don't have survey responses from the scientists, but I believe the way we presented the training helped the scientists plan for integrating their hands-on component.

4. **What were the one or two biggest challenges in participating in the *NASA@ My Library* project? Did you learn any strategies to help overcome these challenges, or do you have any suggestions to help ameliorate these challenges?**
   - The biggest challenge was finding NASA funded scientists to participate in the workshop. We have a long list of NSF funded researchers that want to participate in the training, but finding NASA funded ones posed a challenge. We think this has to do with the funding situation. While NSF requires well planned outreach activities and broader impacts, this is not a focus for NASA funded scientist. We all know how busy researchers are and they are not willing to spend additional time in workshops that don't have a tangible merit. The other challenge was trying to fit two trainings in one. For future programs, we are planning to separate the traditional PoP training from the virtual training and only offer the virtual training to successful PoP trained fellows.
   - The biggest challenge was the time constraint in which we were given to do this program. The short time frame for recruiting, training and programming proved to be very challenging, especially in recruiting and training. In addition to their research, these scientists also teach and have other professional obligations which require them to travel. The primary reason researchers turned down this opportunity is because they were not willing to miss teaching their class three times (initially it was four, but we combined the training) in one semester. This was especially true if they had other professional obligations that caused them to miss teaching a class. In essence, by the time we recruited the scientists and were able to start the training, they were traveling to Pierre every other week during September and October. This then affected the quality of training. The training was good; however, it could have been much better. I would highly recommend to provide a minimum of nine months to fully implement this program. The scientists doing virtual presentations participated in the Portal to the Public Science Communication training; thus they also did a face to face presentation. Due to time constraints, we blended the two in that the scientists were preparing for both a face to face and a virtual presentation simultaneously. This seemed to bring confusion, as preparing for the face to face presentation is different than a virtual presentation. Also, the scientists were not sure on which they should focus in developing. Although the scientific information is the same, the way presented and needing to have more activity for the virtual made it a bit challenging to understand. This really should be treated as two different trainings. It is important for them to go through the POP training for it definitely helps with the virtual presentation. The recommendation is to have the scientists fully complete the PoP training including the face to face presentation.
   - We found it challenging to find NASA-funded scientists - furthermore, it was challenging to connect with NASA scientists beyond our existing programming, given NASA employees can't receive or be attracted with stipends. The successful interactions we have experienced with scientists in the past have centered on hands-on engagement, and we found it difficult to attract them to the virtual format of this program.
   - Scheduling programs with libraries and initial recruitment of scientists. Having a longer implementation timeline for the program would help with both challenges.
   - Some of our challenges included scheduling programs with libraries, a few technical glitches, and incorporating hands-on activities into the programs. In the future, we will be more aware of

library schedules, busy times, etc. and try to plan programs months in advance to help mitigate this issue. Many of the technical glitches were able to be worked out with some new equipment we purchased (movable camera/speakers, etc.). One area we continue to work on is engaging library patrons in hands-on activities - we will try to focus on this over the summer.

- Scheduling and technology. More trials with technology and figuring out what is worth it to purchase. Also, overcoming the trepidation of the libraries (some didn't really seem to think virtual programing could work) was challenging, although we found that scheduling a short starting session (10-15 minutes) with a really dynamic scientist went a long way to ameliorating fears!
- In the second round of the project, the main challenge was that the libraries had very small audiences during the presentation. I think some of our SMEs were disappointed to have put so much time into their presentations and then only have 4 or 5 people in the audience. I'm not sure if this is due to a lack of advertising by libraries, or advertising the presentation in a way that didn't sound fun/engaging, not advertising early enough, or just due to the timing of it being around the holidays. One suggestion I have is to have one-page sheets about each scientist that provide headshots, bio, a one-sentence and a short paragraph description of their research, and a one-sentence and short paragraph description of their hands-on activity. This would hopefully give the librarians all the information they need to advertise the program in a way that gets a larger audience in the door. This is something we could do in the N@ML training session.
- Recruiting the SMEs was by far our biggest challenge. This was our first endeavor in recruiting specific SMEs. In part, I think the challenge was timing from the perspective of time of year and the amount of time we needed to build in-roads into this community of SMEs locally.

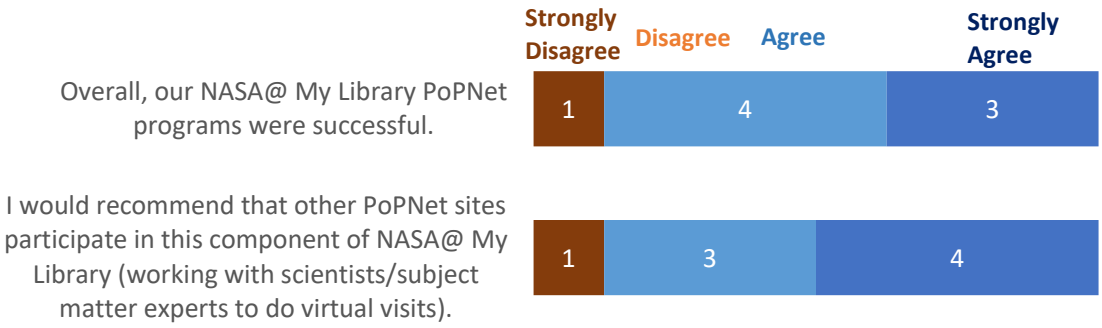
5. **How could your PoPNet site be better supported by PoPNet at Pacific Science Center or *NASA@ My Library?***
   - The pilot study was a great start, but I think the time frame was a little short. We would benefit from another round to benefit from our experiences and make adjustments. I would also like to have a meeting with all the sites involved to hear and learn from their experiences with this project. I am further hoping this project can be expanded to include non-NASA funded scientists.
   - I think overall the PoPNet at Pacific Science Center supported us quite well. It was good to have the monthly check-in calls. The responses to our questions via email or phone were fairly prompt and answered.
   - With the mix between group webinars and individual contact, communication at times felt circuitous (with various challenges being re-routed between group and individual contexts). Group webinars often felt repetitive or sometimes felt too specifically-focused on one site. Finally, given the multiple entities involved to coordinate programming with this format, we sometimes felt the end product wasn't necessarily the ideal program for scientists, libraries, or the science center.
   - Pacific Science Center was very helpful and the monthly check ins were nice to see where the other sites were in the process.
   - Both PoPNet and NASA@ My Library were very supportive and responsive. The only issue we ran into in terms of our participation was with timelines being pretty tight, but again both programs were fairly flexible in working with us on that, so we could accomplish our goals and the goals of the program.
   - I think helping facilitate initial contact with the library. This was challenging for us.

- The support from PSC and N@ML were great! We did need some help recruiting new scientists and I think they gave a lot of good suggestions.
- The Pacific Science Center pulled through in supporting [my organization] by connecting us with an SME who helped us recruit others. Without this support, [my organization] would not have been able to complete this project.

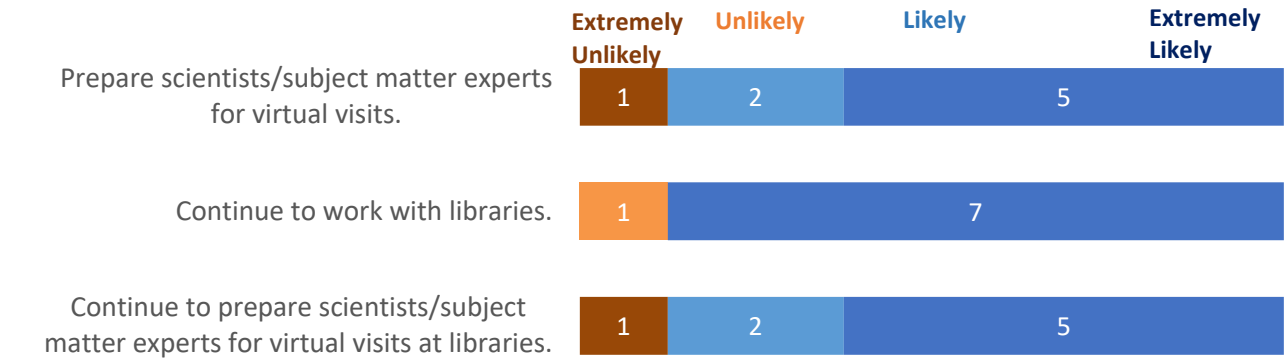
6. **If you helped to facilitate a NASA@ My Library program <u>in-person</u> at the library AND ALSO helped to facilitate at a NASA@ My Library program <u>virtually</u> (i.e., you were remote), please compare and contrast those experiences. If not, proceed to the next question.**
   - I was not present in-person at the Library, only virtually.
   - Whether I was at the library or virtual, when the program started, I basically took a back seat and resisted the urge to interrupt!
   - Our Program Coordinator, who is also an engineer herself helped to facilitate both an in-person and several virtual NASA@ My Library programs. I think there are benefits to both. For the in-person program, [our representative] traveled to the library to assist with nighttime telescope viewing and in connecting remotely with one of our scientists to give a tour of one of our large telescope in the mountains. Being there in person, she could help troubleshoot technical issues that came up during the virtual telescope tour and also facilitate the hands-on portion (night sky viewing). With the virtual programs, she was able to do several test runs with the libraries and with our scientists before the presentation, which was helpful. I think the main difference between the two was the benefit of having someone in-person to facilitate hands-on activities. This is an area we plan to work on over the summer, though - effectively engaging the public in hands-on activities virtually with assistance from librarians.
   - We did a combination of both with our closest partner library. In-person requires less pre-planning and coordination (but obviously the trade-off is travel). It actually worked really well for our first event to be a combination (so we had one of our presenters go to the library to set up telescopes and help set-up the video conference on the library end and another presenter was at our facility to do a virtual tour of the telescope). This took some of the tech burden off of the library and let our staff member and library staff troupe shoot together.
   - The first round of the program was mostly facilitated in person and the second round was mostly virtual. I think both worked- the in-person facilitation was really helpful for the more complex demos that needed a lot of facilitation during the activity. The virtual facilitation was sufficient for hands-on activities that were super easy to explain to librarians and didn't not need a lot of facilitation.

Wrap-up

7. Please indicate your level of agreement with the following statements.



8. Please indicate how likely your PoPNet site is to do the following in the future.



9. Please add any explanation regarding your responses in the table above, especially if you responded "Unlikely" or "Extremely Unlikely" to either of the statement.

Prepare scientists/ subject matter experts for virtual visits.	Continue to work with libraries.	Continue to prepare scientists/ subject matter experts for virtual visits at libraries.	Explanation
Extremely Likely	Extremely Likely	Extremely Likely	We already have Library partnerships in place and are extending our network.
Extremely Likely	Extremely Likely	Extremely Likely	From the start, one of the goals was to try to continue training scientists for virtual visits.
Extremely unlikely	Unlikely	Extremely unlikely	Our existing partnerships with libraries (e.g., summer reading programs, etc.) will be maintained; however, we will not be implementing any virtual programming with them. We will

			continue to host in-person, hands-on experiences with our Scientists on Site.
Likely	Extremely Likely	Likely	
Extremely Likely	Extremely Likely	Extremely Likely	We do plan to continue providing virtual programs using our NASA-funded scientists and will continue to work with not only the libraries from NASA@ My Library, but also other libraries in Wyoming and K-12 school groups.
Likely	Extremely Likely	Likely	
Extremely Likely	Extremely Likely	Extremely Likely	we definitely plan to do all three of these as we plan to continue with a third round of funded programs through SSI. If we did not have funding, I think it would be likely for the first 2 scenarios, and unlikely for the last one. It does not cost a ton to do these programs (especially once the scientists are trained and have a demo developed), but there is definitely a chunk of time involved to coordinate and we would probably not have the capacity to make it happen without some funding.
Extremely Likely	Extremely Likely	Extremely Likely	Outside of recruiting scientists, we felt this project was very successful. Thus, we are very interested in working with our Science Communication Fellows in providing similar programs.

10. How did this experience impact your outreach work or other educational efforts?

- I am really excited to expand on the virtual training and be able to offer it to all our fellows. I think this will allow us to reach more rural and tribal communities in our State and increase our outreach efforts. I am also very happy to see how excited our libraries are to participate and bring science into their communities.
- The summer program for the libraries across the state is space themed. We are strongly encouraging the libraries to use these scientists as a resource. At most of their trainings, we are hooking up with a scientist for a 20-30 minute overview of how the program works and what they can expect.
- This provided an avenue for us to explore virtual programming in more depth than we had before and provided an avenue for us to connect our researchers with the public, which was great. We live in a very rural state and being able to connect with students and the public all across the state has been a goal of ours for some time. Participating in this program has gotten us to think more about how we can incorporate virtual programming into more our of outreach programs.
- We definitely learned a lot from doing virtual programs, including training scientists on virtual programs. I think this is a promising direction for our organization moving forward, although we'll have to figure out how to incorporate it into our outreach work. We also loved getting to work with more NASA-themed scientists! We plan to do a number of space-themed events at the museum with these scientists for the 50th anniversary of the moon landing this summer.
- We are very interested in working with our SMEs from this project to try and connect them with our local/regional libraries this summer for summer reading program activities.

11. How, if at all, did this experience impact your ongoing Portal to the Public efforts?

- We will expand our workshop offerings to include virtual trainings in the future.
- I am not in a position to answer this question; will let the director respond to this.
- This experience gave us a fuller appreciation of the hands-on benefits offered with our Scientists on Site program.
- It reinvigorated internal interest [at our site] to refocus our efforts on Portal to the Public programs.
- This has given us a new direction for our PoPNet efforts, which we plan to grow.
- It definitely gave us more opportunity to connect with the PoP team at PSC and that was great! The scholarships provided to NASA-researchers through this program were also really helpful to keep our PoP program running. The scientists seemed to have a great experience and many have recommended their colleagues to join our program.
- This has not impacted our current efforts, yet. However, we anticipate this experience opening up new opportunities for our Portal to the Public efforts.

12. Do you have any advice for other informal science learning organizations who might participate in the future (not otherwise shared in final reports or monthly reflections)?

- This is a good opportunity. It is important to have the process and timeline well thought out prior to starting. Be prepared to do some of your own research to more fully understand what the scientist researching. In fact, it would be helpful to do this before the first training workshop! Clear and constant communication is essential!!
- Leverage local partnerships with other scientists to capitalize on their contacts.
- Start planning and contacting organizations you would like to work with well in advance - library schedules fill up fast. Always have a backup plan when using technology, just in case something doesn't work quite as planned. Be sure to do test runs with libraries or other organizations before the actual program.
- Looking back at our project, I would say communication is even more critical when working 100% remotely with SMEs and libraries. Keeping in touch on a regular basis, even just through email, is essential to keep everyone engaged.

13. Please add any final comments or suggestions that you have for ways to improve the PoPNet experience:

- Thank you for this opportunity. It helped me to grow in content that I would not normally have pursued as I had to do some background knowledge to be able to help the scientist develop the hands-on activity. It also made much more aware of the uniqueness of presenting virtually, both the good and the challenges.
- This has been a great experience for us and we are excited to have been able to participate! Thanks!
- This was a great project- my only hope is that we can continue to find funding for virtual programs like this to reach audiences that can't travel to museums.
- I can't thank the Pacific Science Center enough for helping connect us with SMEs. Without that help, our project would not have happened.

Appendix H

Librarian Survey Summary

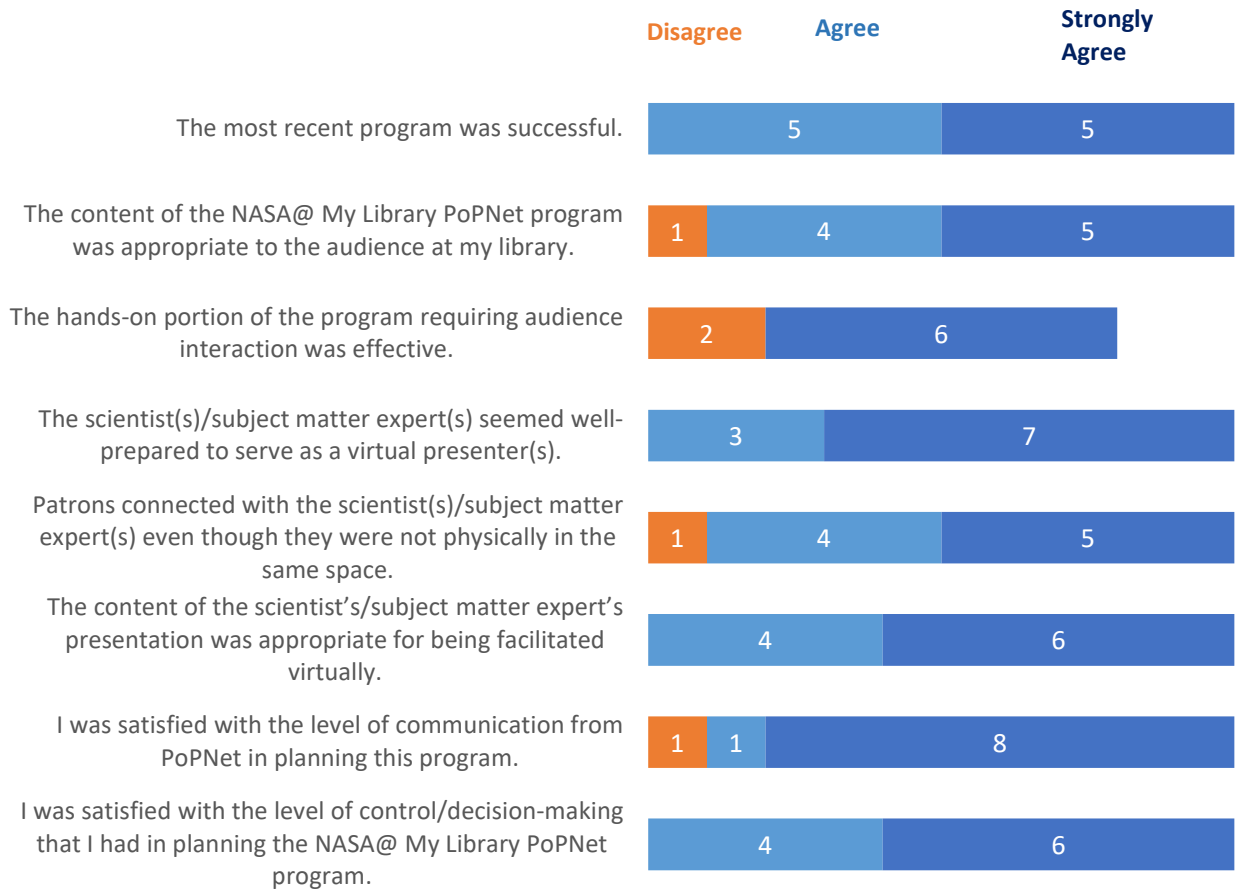
NASA@ My Library & PoPNet
Library Staff Survey Summary

Ten out of fifteen NASA@ My Library librarians who hosted a Phase II PoPNet Program completed a survey (67%) in March or April 2019.

PoPNet Site	Number of Respondents
SD Discovery Center	1
Orlando Science Center	2
OMSI	3
WYSTEM	3
Sunset Zoo	1

Most Recent *NASA@ My Library* PoPNet Program

1. **Please indicate your level of agreement with the following statements regarding your most recent *NASA@ My Library* PoPNet program. (n=10)**



No respondents chose "Strongly Disagree"

Source: PoPNet Librarian Survey (n=10)

2. **Please add any explanation regarding your responses in the table above, especially if you disagreed or strongly disagreed with any of the statements.**
   - Our biggest problem has been the audience. I feel since they are not here live some of our patrons may feel uncomfortable in attending.
   - I feel a little strange about marking "Strongly Agree" for every answer, but frankly, the programs, presenters, and resources provided in our two most recent partnerships were amazing. The only obstacle was on our end; a piece of tech that had worked in our first round of these programs (early last year) suddenly decided not to cooperate; that was no fault of yours!
   - When the university reached out to us, it was not clear to us that this was a PoPNet program. I had no idea that was what it was until March.
   - PowerPoint slides were interesting, but the camera focusing on the SME was too far away to see him. I think the content was more than my kids could handle. They didn't have any comments or questions at the end.
   - The hands-on portion was less of an experiment than we usually do. It mostly consisted of passing around material for the participants to look at and having them help move some items for the presenter. I did hear that this was modified for the presenter's second virtual location so that the audience had more to do.

3. **Did this program use any *NASA@ My Library* resources, activities, or materials?**

	Count
Yes	3
No	5
Not sure	2
Total	10

   a. **If yes, what NASA@ My Library resource, activity or material did you use?**
      - Strange New Planet
      - Magnet kit; Braille books; digital microscope
      - Far Sides, Near Sides of the Moon puzzle. Starnet's Moon Mythbusters activity.

   b. **If yes, what worked well about the NASA@ My Library resource, activity or material?**
      - The kids were really engaged. There was plenty of movement and the activity itself was "hands-on."
      - They were engaging and encouraged open exploration. Also, the activities generated interesting conversations that allowed everyone - from experts to experimenters - to share what they knew and observed.
      - It was a great way to delve into the questions that arose from the descriptions on each puzzle piece. Great conversation starters.

   c. **All: What were challenges to using NASA@ My Library resources, activity or materials, or how would you improve the NASA@ My Library resource, activity, or materials?**

- No challenges.
- So far the materials have been great and I try and use something from them at each event I do.
- We did not use any materials from the N@ML facilitation kits in this most recent set of programs, although we did in our first round (early 2018). The only challenge, if you could call it that, was that we'd previously run that specific activity (UV Kids) as a part of our routine library programming, and we were worried that there'd be an overlap in audience. Fortunately, there wasn't—so it didn't turn out to be a problem at all.
- One challenge is that many of the resources assume a very small group, so using them with groups of 25-40 (the most common program size at this library) is not always possible.
- The presentation was planned around the scientists' expertise, which was not related to provided NASA @ My Library resources.
- No NASA@ My Library resources were used for the virtual presentations. Materials for hands-on activities were provided by the presenters. Please note shipping to Hawaii typically takes a lot longer than shipping to the continental U.S.; need to allow additional time for shipping presentation materials to Hawaii.
- These presentations were exactly what I was looking for to reach an adult audience. I don't think they need improvement.
- The materials were great!
- n/a - the scientist was covering a topic not included in the N@ML materials we have received

d. All: How did the virtual connection to the scientist influence the use of the resource, activity or materials?

- It was so great that the kids could ask their questions to the scientists and they could answer them immediately and without hesitation. Since my background is not science, the answer wouldn't have been immediate nor without hesitation!
- Using virtual connections have been great. I think once people get the hang of it and are willing to try it out the more we will achieve.
- Across all of the PoPNet programs we've run, the presenters have been wonderful at responding to questions when asked, but I did have to step up a bit more in determining the "right moment" to transition to the activity and craft, and prepare some questions in advance for the presenters while the craft/activity was ongoing. In all of these programs, silence from the presenters wasn't an option—our participants/attendees felt a bit uncomfortable with that, I think, and so were constantly asking questions. Or perhaps there were just too many questions to save for the end! In any case, I figured out questions in advance for any uncomfortable lulls that might happen.
- The scientists did a great job of highlighting the connection between the activity and their research. Their "real life" applications definitely increased the interest in the activity.
- I'm not sure if the presenter was aware of what we had available. Due to technical difficulties, the program ran for over an hour and I don't think an extra activity would have been appreciated by the audience.

- The scientist was the one who chose the resources that were used.
- The virtual connections allowed participants to ask questions and interact with the presenter while onsite library staff helped with the activity. The presenter was able to focus on answering questions and sharing information.
- It didn't. The virtual connection was general information about the solar system. The window of opportunity to hold a virtual connection was very limited, so I added it to an existing and publicized program (Moon Mythbusters) as additional information. I mistakenly thought he was going to talk more about the moon.

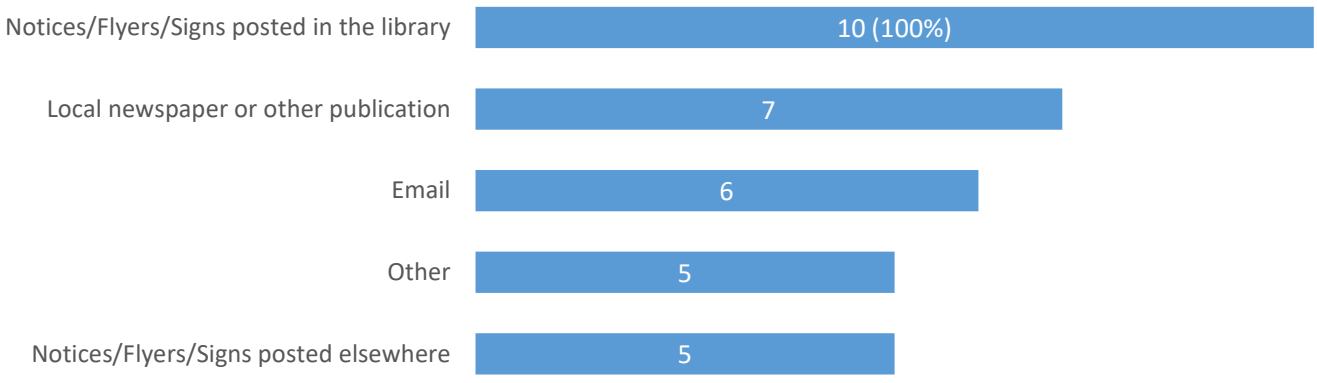
4. Prior to your PoPNet involvement, how had you reached out to NASA scientists/subject matter experts, NASA-affiliated organizations, or other individuals or organizations because of your involvement in the NASA@ My Library project?

- Research via email and hope that their cost wouldn't price my budget out and not let them come.
- yes, we have made several connections with the SME in the past this was just one more avenue we could achieve.
- I had reached out to our "local" subject matter expert (90 minutes away by highway through a mountain pass that sometimes closes in winter), and while he was interested in partnering with us, he was never able to find a free weekend in his schedule to do so. (As yet.) We've partnered with [partner name] to run a program, as well as the head of the [state astronomy consortium] to run a different program, and [a science center] as well. We have connected with a [local astronomy club] name], and are looking to partner with them this summer. We brought in a number of local scientists, researchers, and science educators over the last two years of our N@ML grant as a part of our Summer Reading Program lineup. Our budget precludes bringing in any official NASA Speakers Bureau, as we cannot afford to cover the airfare.
- We had arranged visits from experts from our immediate area to speak live.
- Yes.
- We had not reached out because there were no NASA scientists/subject matter experts in our area.
- Because of our remote location, we've been reaching out to the observatories in our community and on island, as well as local schools and STEM organizations.
- I tried to contact various organizations with no luck unless I had funding to pay for programs. Having a subject matter expert that is willing to present as part of the N@ML grant has been a great help.
- I've contacted two solar system ambassadors which came from the NASA website. The [astronomy club] has also been helpful, and is an organization I would never have contacted or discovered without the involvement in the NASA @ My Library project. I also held two different science programs last year with two scientists from the state university approximately 75 miles away.
- email (taken from organizational websites) asking for program availability, phone calls, direct conversations with local people knowledgeable about science to see if they had connections to a scientist that would fit into N@ML

a. **If yes, what were challenges or barriers to reaching out to scientists?**
   - My lack of knowledge.
   - In the past distance but with the ability to do an online program I feel it would be easier for everyone and to have programs we could normally not be able to achieve.
   - Budget, really. We are rural enough that the barriers to potential visitors are high.
   - None for us, as this was facilitated by a third party [science museum]
   - Scheduling. Ensuring that the scientists had the skills appropriate to our audience.
   - None. It was very easy and went very smoothly.
   - On the library end: our speaker died out halfway through the event, meaning we could not hear the presenter. We were able to work around this with other technology, but it did create a bit of a rough patch at the event. We have since upgraded our sound system.
   - funding
   - I did not do the work on this one (reaching out to scientists). We collaborated with the [science museum] who was fulfilling the requirements of their own grant. However, my issues for reaching out to scientists include distance, travel time and compensation because the library is in a small town that is not home to a university.
   - 1. geographic isolation (we're a long drive from most places, so people are less interested in coming) 2. lack of response from suggested NASA-affiliated organizations (Night Sky Network, Solar Ambassadors, etc) - most individuals never replied to emails or phone messages 3. cost factors that went with #1 & #2 - if the first person who will actually return phone calls is at least a 500 mile round trip for them to come, mileage starts to add up fast 4. some of the online databases of NASA-affiliated organizations don't seem to be updated regularly with current contact information (this could relate more to the individuals/organizations listed since those individuals websites were also listing events that were well out of date).

Program Attendees

1. **How was the NASA@ *My Library* PoPNet program promoted?** *(Check all that apply) (n=43)*

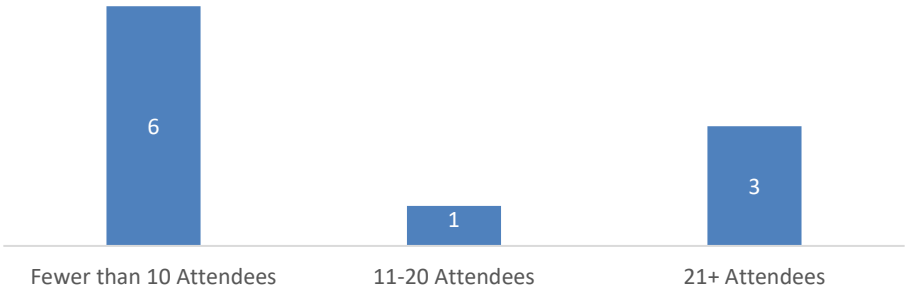


Other, please specify:

- Radio and social media. Boosted on Facebook.

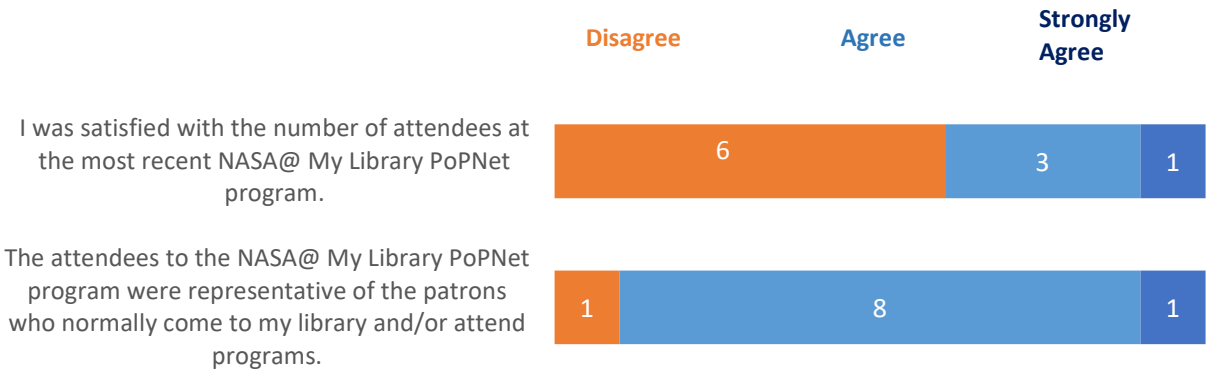
- Social Media: Twitter & Facebook
- radio
- Social media (Facebook)
- sent home with local elementary students in their weekly newsletter

2. **About how many attendees were at the most recent NASA@ My Library PoPNet program.**
   Minimum attendees – 4
   Maximum attendees – 30
   Average number of attendees – 13.3



3. **I was satisfied with the number of attendees at the most recent NASA@ My Library PoPNet program. (n=10)**

   (No respondents chose "Strongly Disagree")



   a. ***If Disagree or Strongly Disagree:*** **Please explain your response:**
      - There was no school that day, nor afterschool daycare programs. The weather was okay to walk to the library, but not such a beautiful day to sway kids to play outside instead, so I really thought we would have more students.
      - I feel there could be more attendance
      - While we had good discussions with the few attendees who came to these events, we would like to see higher attendance in the future. Might possibly revisit timing.

- This is a wonderful program that many library customers said they were interested in, but we did not get the same level of turnout as we had interest.
- Attendance numbers for our programs are not large, but I can usually count on 8-10 children coming.
- We had done a lot of publicity, so it was disheartening to have a low (for us) attendance

4. The attendees to the NASA@ My Library PoPNet program were representative of the patrons who normally come to my library and/or attend programs.

	Count
Strongly Disagree	0
Disagree	1
Agree	8
Strongly Agree	1
Total	10

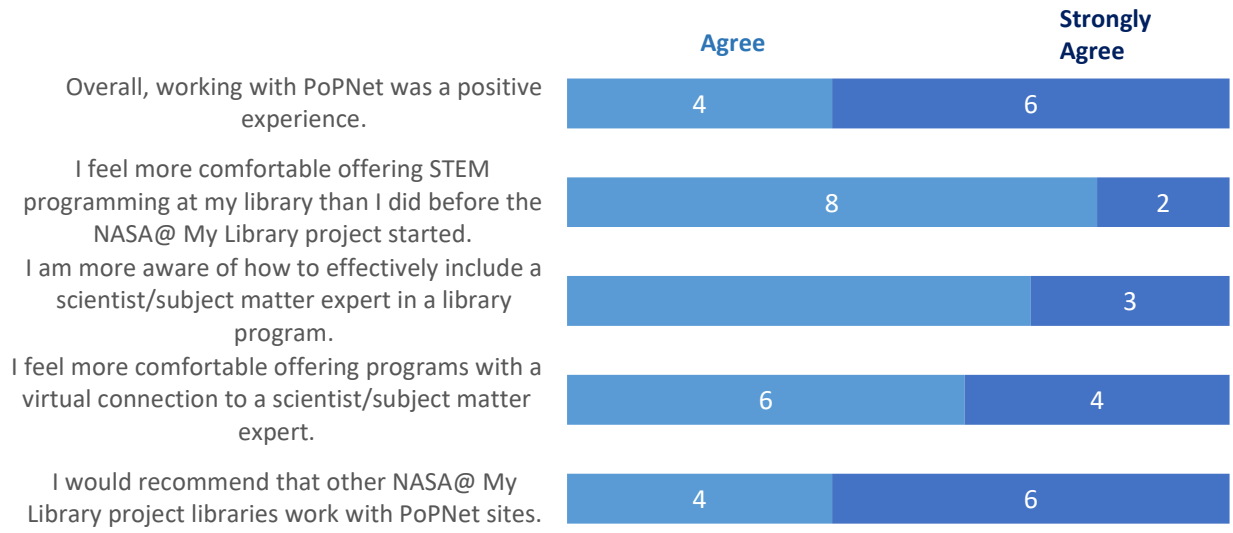
a. Please explain how the attendees differed from the usual patrons of your library.

- Many of the attendees who came do not use our library for children's programming or for materials; they heard about the PoPNet programs through our marketing and came as a result of that. They skewed older than usual (most were close to retirement age), and they were more intrepid than our usual attendees (both of our most recent PoPNet programs happened to fall on days when winter weather made driving difficult).

Final Reflection

1. Please indicate your level of agreement with the following statements. (n=10)

(No respondents chose "Strongly Disagree" or "Disagree")



2. **What was most helpful about the information or preparation you received from PoPNet regarding the program(s)?**
    - The ability to meet the scientists ahead of time and have an idea of what activity they were going to do.
    - I love the fact that when we got together neither of have thought about working together before and we are closer than we had thought.
    - The fact that the programs came as a complete package (presenter, activity, materials) was extremely nice. The only work we had to do was to ensure the tech worked (and that was a challenge, on our end) and that our marketing and promotional materials were well-distributed.
    - That they took care of all of the planning and that it was an expert who facilitated the program. We are not experts so it was very nice that we had someone who really knew what they were talking about.
    - Having the opportunity to meet with the scientist before the event to ask questions, go over the activity, or having the activity pre-prepped so we know what the final product will be were all very valuable preparation experiences.
    - The [science museum] planned everything and worked around my library's schedule and gave me all of the information I needed for marketing purposes.
    - Since I did not set up the program myself, I didn't receive any information from PoPNet. I linked to a web address and the scientist was there on the stage in real time.
    - the staff arranging the virtual visit were very helpful in answering questions and checking to make sure that we had the materials necessary for the scientist to do the presentation.

3. **How could your preparation or communication from PoPNet be improved?**
    - Start earlier; marketing an activity is easily a month earlier than the actual activity.
    - I like emails and phone calls. For me, phone calls work better for first contact if possible or and email with a followup call. Sometimes by the time I get back to work I have a ton of emails and they can be missed. So a follow up call works great to make sure I am aware of the email and to be able to ask questions.
    - The only thing I can think of to ask for is that once a speaker is scheduled for a presentation, the participating library benefits from receiving a picture of the speaker and a short biography right away—we use these in our promotional materials, since putting a face on a poster inevitably generates much more interest than just a name.
    - I would have really appreciated more basic guidance on the technical "how to" of a virtual visit. On the library end, we did not have the appropriate equipment and were unsure of what we should have purchased if funds had been available (our NASA programming funds weren't available to us at the time). Although we practiced with the iPad ahead of time, things did not work as well the evening of the presentation so attendees were not as satisfied as they could have been. It must also have been hard for the presenter as she did not get a good view of her audience. We would still appreciate more information on the appropriate webcam and microphone.
    - I don't think we could of asked for a better turnout, so no improvement needed
    - The emails and meeting via video chat prior to the events all were very helpful.

- it would have been nice for the materials for the presentation to come a couple of days earlier - one item arrived the day of the presentation, we were getting a little worried because we didn't have a substitute for that component

4. **From your experience, please identify one or two benefits and drawbacks of a "virtual" visit by a scientist, as opposed to an in-person visit.**
    a. **Benefits of a "virtual" vs in-person scientist visit:**
        - The expertise and audience can have that immediate, no hesitation feedback.
        - We can have presenters that we have not been able to before due to distance and sometimes cost.
        - The scheduling seems to be more flexible—we don't have to plan for a three-day trip, with the attendant expenses. More scientists get to participate in presenting their research, as many are too busy to tour the country physically.
        - We are able to draw from a large pool of scientists.
        - Attendees have the opportunity to learn from scientists actually involved in NASA research.
        - In-person is always better in my opinion but that is not an option here.
        - We can offer excellent resources/presentations reasonably.
        - no cost
        - It allows for the chance to experience unique learning opportunities.
        - No limit to geographic location of the scientist (time and expense of travel) for someone to do the program. The presenter may be able to use a specialized set-up or tools that might not travel well for a demonstration

    b. **Drawbacks of a "virtual" vs in-person scientist visit:**
        - Faulty equipment/connection/lighting. Not understanding what is supposed to happen in the activity if you do not have that background.
        - I have noticed that our patrons are not sure about the virtual and think they would not be able to ask questions. Or if they came once and there were technical issues they do not want to come again.
        - I do think we would draw more attendees here, personally, from a physical visit—but a part of that is that we're so starved of "big name" visitors in rural [state] in general. That said, having a virtual visit enables the scientists and presenters themselves to have a greater reach, and as I understand it, remote virtual visits enable more scientists, in general, to participate in presenting their research.
        - The virtual set-up relies on technology that can fail. Also, students need more encouragement to engage with the scientist because it is a bit more awkward.
        - People had a lot of questions and this was a bit more complicated. This may have been due to the fact that we did not have the best equipment to smoothly conduct an virtual visit.
        - Technical challenges. Our connection was spotty at times, which caused interruptions during the presentation and inconsistent audio. Although not a huge drawback, we do need to keep in mind the time difference between [our library and the PoPNet site].

- harder for the audience to interact with the scientist, though they could still ask questions via chat box
- A virtual visit lacks that feeling of community. In the one program we did the scientist was speaking in front of a live audience - we were just something on the sidelines. The technology itself can be a drawback. What happens when it doesn't work? Typing questions can be cumbersome.
- Technical issues can make an otherwise stellar presentation have less of an impact - our first virtual scientist did a fantastic job, but the sound kept fading out on him so it was hard for people sitting more than 2 chairs away from the speaker system to hear him at certain points. Also, with web cameras, the range of what both the scientist and audience can see is limited. It's harder for the scientist to see if the audience is getting what the explanation is or what exactly the participants were doing when they try the experiment, AND it's hard for the audience to see some actions/props because of distance to the items and the limits of the screen/camera

5. Please add any final comments or suggestions that you have for ways to improve the PoPNet experience

- I think absolutely in-person visits are better, but I also know that I am a small town in the middle of [state]. Getting an expert to come here in-person is virtually impossible with the size of my programming budget. Having the ability to connect virtually, even with the drawbacks, is such a better option for our library, and the kids seem to be really excited about it!
- For the someone who had hearing or sight issues feel uncomfortable at the virtual presentations where they would be less so at an in-person visit.
- This is a difficult thing to quantify; the only drawback to them that I could perceive is that there was no opportunity to socialize after the program was over, as pretty much always happens at in-person physical visits. Sometimes those after-program casual conversations turn out to be pretty magical, and not just in respect to networking various local individuals.
- About the same
- In-person visits are always ideal but this was a terrific way for people to learn more about the most current research without traveling.
- The questions that were asked had to be asked by my staff member, so it needs to be more interactive. But I think that was just because of the lack of tech on our end.
- Patrons who did attend were very impressed and grateful to have access to these resources. They realized we would not otherwise have had access to the resources because of our remote location.
- I think the effects are the same.
- The one program we did seemed not to impact our patrons very much.
- I think the virtual programs would have been more effective if the scientist was on-site; however, I also think that we would not have been able to actually get these scientists to our library. The patrons who attended were glad to have an actual scientist present to answer questions. Some kids looked inspired by the first virtual program (which had more of a hands-on component) to learn more about the subject.

6. **Please add any final comments or suggestions that you have for ways to improve the PoPNet experience:**
    - So far I have nothing it has been good to be able to do online presentations. There will always be bugs to work out and so far we have been able to improve on them.
    - I cannot even begin to describe how wonderful it was to participate in these PoPNet programs! I have attempted to provide feedback that will be useful, but honestly? We were honored and delighted to be a partner in this, and there were no drawbacks at all for us.
    - This was an excellent opportunity for program attendees, particularly young attendees. We really enjoyed working with the [partner]. [Presenter name] is a fantastic presenter. We would have appreciated more guidance on the technical aspects of a virtual visit as this is something the library has not done before.
    - We appreciate the opportunity to participate in this program and would love to see this program continue. Many thanks!
    - I really appreciate this resource and partnership.
    - It would be great to have a list of some scientists that might be willing to do these presentations - even though I think an in-person program is more effective, it is very hard to get someone to a rural area to do a program

Appendix I

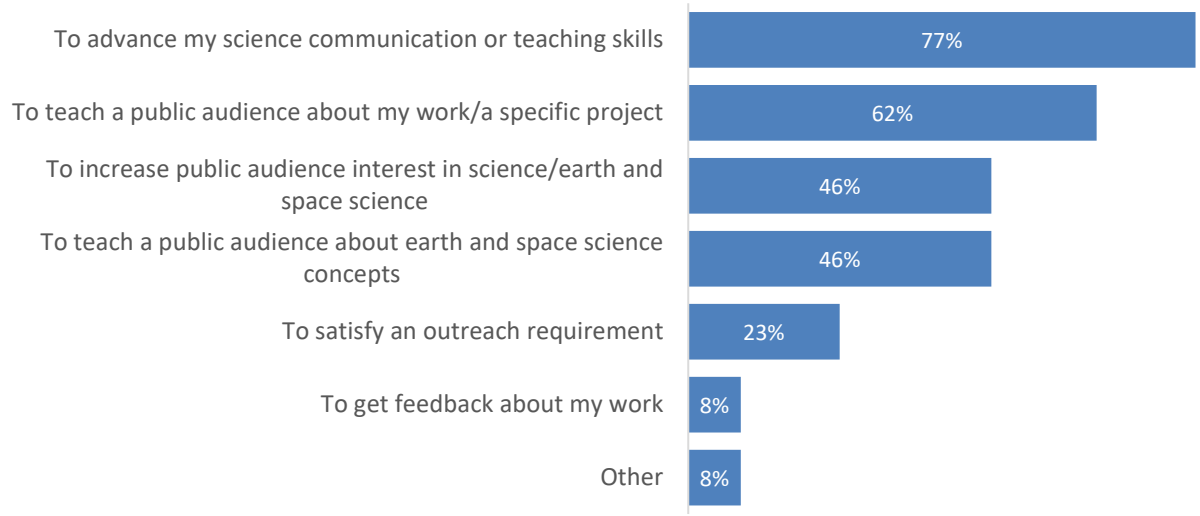
Scientist Survey Summary

NASA@ My Library & PoPNet
Scientist/Subject Matter Expert Survey Summary

There were 13 respondents to the survey sent to 22 scientists who led NASA@ My Library & PoPNet programs, a response rate of 59%. Respondents represented all five PoPNet sites who trained SMEs.

Site	Number of Respondents
OMSI	5
SD Discovery Center	4
WYSTEM	2
Orlando Science Center	1
Sunset	1

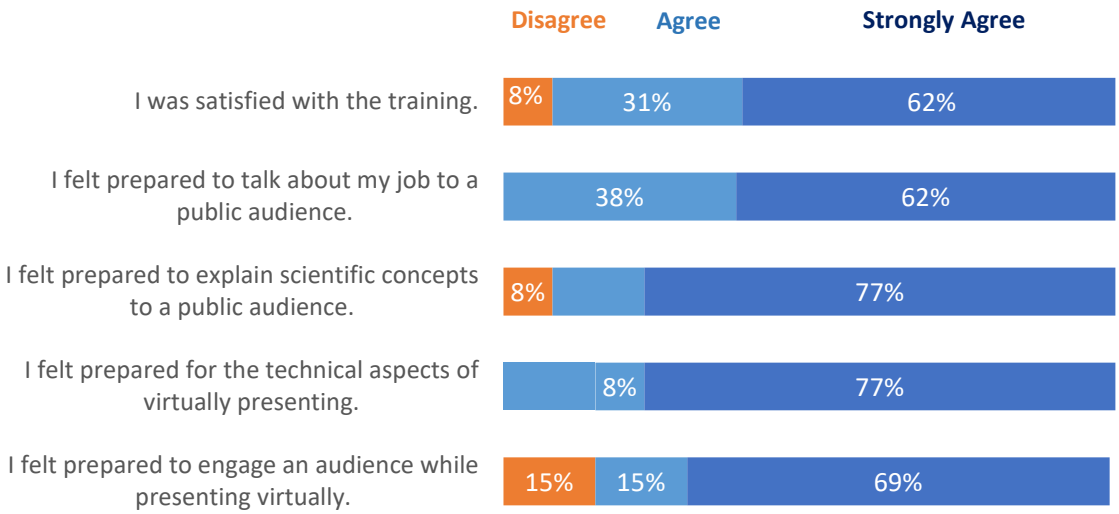
1. Why did you choose to participate in PoPNet NASA@ My Library? Please check all that apply.



Other, please explain:

- Test out how virtual trainings/event techniques could be leveraged in other programs.

2. Please rate the following items regarding the training and support you received for this project.
(No respondents chose "Strongly Disagree")



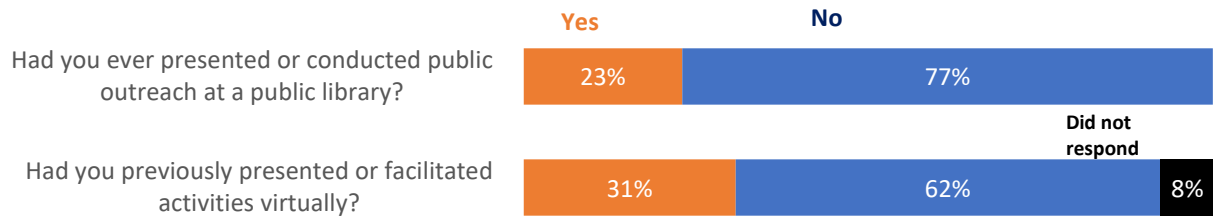
3. What was the most helpful aspect of the training or support you received from PoPNet or NASA@ My Library?

- The variety of training activities were useful and easy to do virtually. Using the room breakout feature in Zoom was great.
- Honestly, the support from the staff at the [science museum] has been amazing. They have worked so hard to prepare me for the NASA @ My Library program and continue to make sure that we have all of the support and guidance we need. It has been so helpful to learn along with them as one of the first cohorts of this program. Through this experience, I have gained invaluable experience in participating in outreach and public interaction with science.
- The [science museum] Communication was great!
- I did not receive training?
- The "Why" exercise - a series of "why is that important?" questions to each response, which really got to the heart of why I am studying what I am studying, allowing me to get a better idea of how to explain and engage non-scientific audiences.
- Activities where we were asked to explain our research in varying levels of details
- Language skills for science communication.
- Thinking abstractly about how to present material.
- How to interact with the kids and make them excited about science and my research.
- Elevator pitch exercises
- They had us spend time thinking about how to present to diverse audiences and practice. We got a lot of great feedback from practicing in front of our peers at training.
- I learned how to talk and engage kids which is the hardest audience in my opinion.

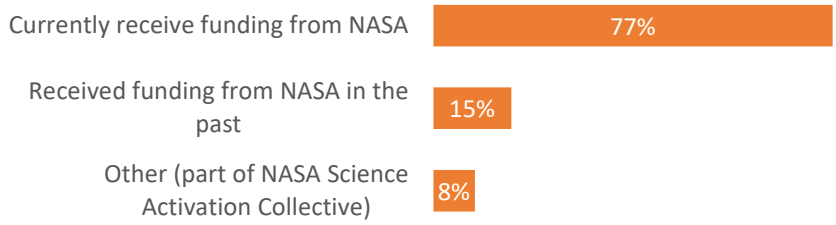
4. **In your experience what are the benefits of presenting or facilitating activities virtually versus in person?**
   - Broader dissemination or reaching audience that are otherwise hard to reach.
   - I think the biggest benefit of engaging in these activities virtually is that we are able to reach so many people that do not have the direct access that living in a major city affords people. One of the events I participated in was in [state] and it was so amazing to be able to share my science with them even though they were thousands of miles away. Virtual outreach presents so many unique opportunities for us to talk to people we would never have the chance to otherwise.
   - Less travel, more diverse audience.
   - You can reach different audiences and still be very involved! Save time and money
   - Virtually means that I can present to people who otherwise don't have access to these kinds of events, without requiring a lot of travel from me.
   - Presenting virtually overcomes the challenges of driving long distances or during unfavorable weather conditions.
   - being able to give a presentation without having to travel
   - Being able to reach a broader audience, particularly in places where there isn't much access to interactive learning.
   - Ability to access areas that are remote and allow us to serve that audience.
   - Broader participation. Greater Accessibility. Engagement opportunities that would otherwise be much more restrictive or even impossible.
   - The only is the time and cost of travel. In person is always better.
   - virtual presentation can be beneficial for audience in remote locations.

5. **Before your involvement with this project, had you ever presented or conducted public outreach at a public library?**
6. **Before your involvement in this project, had you previously presented or facilitated activities <u>virtually</u>?**
   a. **Yes, please describe:**
      - 2 types--more informal conversations and lead compute-base coding activity before. Haven't virtually facilitated a hands on (ie not on computer) activity.
      - Via videolink to the [program name]
      - I have made numerous presentations on my research to collaborators virtually.

Before your involvement with this project…



7. **Do you have any connection to NASA or NASA's Science Mission Directorate?**

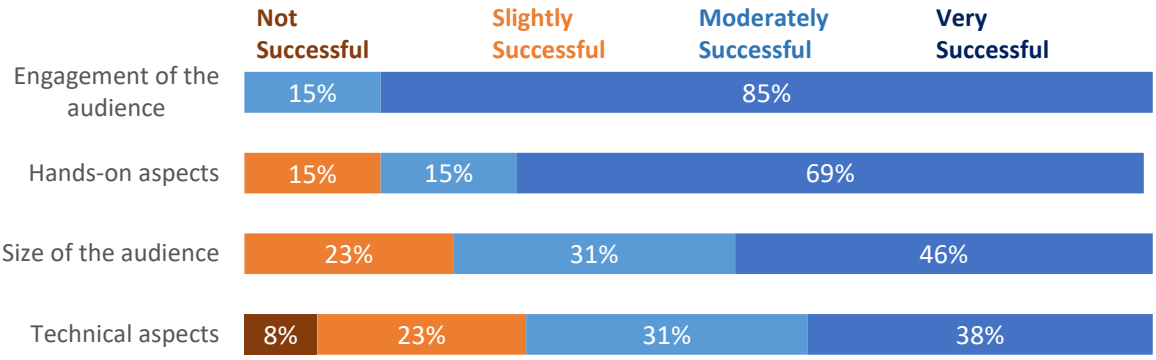


Other, please describe:

- part of NASA Science Activation Collective

The Program

8. Please rate the following aspects of your most recent PoPNet NASA@ My Library presentation or activity.



9. What worked well in your most recent PoPNet NASA@ My Library program?

- Activity had relatively easy instructions that I can provide virtually. Although I would have liked a larger group, the small group did make the interaction easier. This also might not be very representative of a normal virtual audience.
- In my most recent event, the one on one interactions worked best in my opinion. The last event I participated in had a relatively small group of people attending, so I was able to directly interact with many of them. This was not at all hampered by the virtual aspect.
- The Q and A was great.
- Q&A went very well! I was able to engage with the audience despite the distance
- There was quite a large crowd, which was exciting to see. The audience (many children) were very excited and had lots of questions for me, and wanted to keep talking!
- Leading a hands-on activity was challenging but the help I received from the facilitator at the Library was crucial in leading a hands-on activity.
- There were two other presenters besides me and the children were able to move between us to ask us questions and participate in our activity. I preferred this to the standard set-up as it allowed more of the audience to be engaged
- Good timing for the activity, engaged audience and great facilitators.

- The audience was engaged.
- making the audience engage with the hands-on experience
- Both in-house and online audience was engaged. Technical facilitation and prepping was relatively easy.
- The librarians were great at helping facilitate when I wasn't describing what I wanted the students to do. They were also encouraging of the students to be active and participate.
- hands- on activities

10. What were challenges overall in delivering your most recent PoPNet NASA@ My Library program?

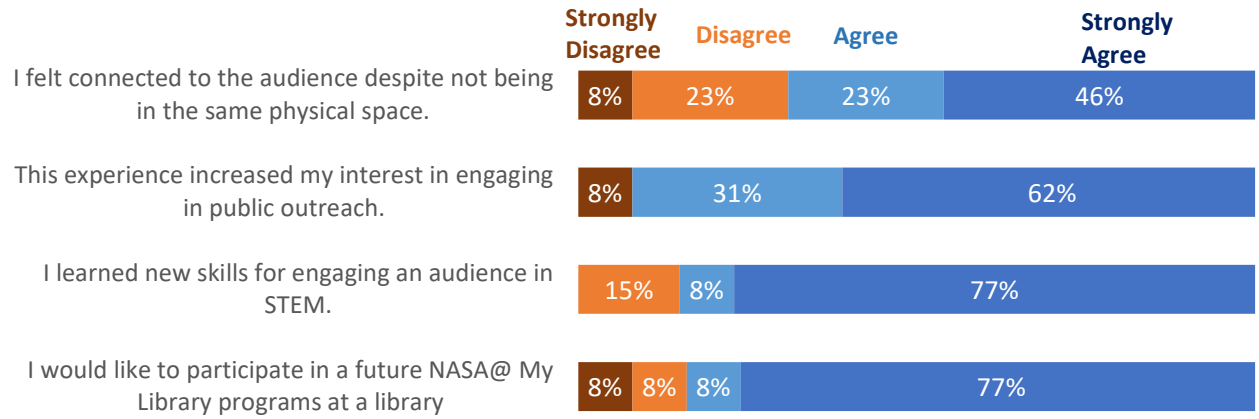
- Since I didn't have a chance to talk with the librarian ahead of time and discuss how we were going to do the facilitation, some of that was done more on the fly and not quite how I would have liked.
- Perhaps the most challenging aspect of this program has been overcoming some technical difficulties. For example, when I called into one of the events, we lost the speaker about halfway through the presentation. While this was difficult, I worked with the staff to figure out a way to continue the event (I actually called someone on the phone and used speaker phone to continue while having the video through the online program). Similarly, the microphone system in another event made it hard to hear individuals because the speakers would pick up most of the sound in the room. While these are small issues in the end, they are actually the only ones I can think of to talk about. The staff at [science museum] has been amazing at facilitating these events and making sure any and all challenges are handles quickly and as easily as possible.
- Audio at remote location could have been better.
- Difficulties in seeing the audience
- The internet went out at the library in the beginning part of the program. We also tried to do a multi-scientist event, which I think got to be a little bit tricky with the "break-outs" and the "all-together" question sessions. I prefer when it is just me.
- I could not see the audience, so I could not gauge their reaction to the activity.
- The down-side to the 3 presenter format was that I was not able to describe what I do to the whole room in detail prior to the audience breaking into groups which required me to repeat myself to everyone that came to my station
- To explain a complicated hands-on activity, but the librarian did a great job helping setting up the activity.
- The technology was tested the day of the event, but 5 hours later for the actual event the technology didn't work and I couldn't see the audience while I presented.
- Virtual presentation is a bit difficult due to techinical problems.
- Live technical issues with slides interrupted the rhythm and flow of the presentation. I would have preferred to have a large screen in front of me that shows a live feed video of the remote participation audience.
- The technology was a nightmare. The group of fellows repeatedly warned the leaders that their choices of technology were poor. They refused to listen and insisted that we use the faulty technology even after witnessing disaster. I participated in one virtual presentation where the

audio and video repeatedly cut out. I participated in another where they couldn't get anything to work. I ended up conference calling it in. It was so frustrating that I will not be volunteering for those facilitators again.

- They were frozen, so I couldn't see what it was going on and end up talking to the librarian a lot to make sure everybody was listening or were done with their activity before I resume my presentation. I wanted to be able to see their face talk to them but it didn't happen

Wrap-up

11. Please indicate your level of agreement to the following statements regarding the project.



12. Please add any explanation regarding your responses in the table above, especially if you responded "Disagree" or "Strongly disagree" to any of the statements.

- Overall, I think this program is an amazing way to engage with a wider audience than the people locally available. This provides important interaction on both the side of the scientist and the public in a low stress situation. I think this program is incredibly valuable.
- These are some of my favorite outreach events!
- It is difficult to feel connected to an audience that I am speaking to virtually. Not being in the same room makes it difficult to read the body language and respond accordingly.
- This has been an awesome experience and I am always impressed at the level of questions I get form the audience, especially from the young future scientists.
- It was hard to track some of my audience at times, since they weren't within the camera field of vision.
- The audio on the remote end wasn't very good. Audience members had to talk to the librarian and the librarian repeat the questions to me. This made me feel disconnected from the audience.
- As mentioned before - I would have preferred to have a large screen in front of me that shows a live feed video of the remote participation audience. It makes it easier to quickly tell if you're on pace with everyone and improves your improvisation skills on the spot. In my specific experience, I did not learn new skills for STEM engagement. Maybe because the skills that we

did work and train on during the prep sessions were not directly applicable to my situation when presenting.

- I will not participate for the current facilitators. If there are new ones who will be receptive to better technological options, I would definitely reconsider.

13. Was there anything surprising about your experience in this PoPNet NASA@ My Library project?

- I think the most surprising thing about the NASA @ My Library project was the diversity of the audiences! One event was composed entirely of children under the age of 10 while another was composed of adults over the age of 50. These differences really make the event so special in my opinion. It's so inspiring to see interest in science span generations.
- It was more fun and engaging than I expected.
- It was surprisingly easy, since the people who have attended my library events have been very inquisitive.
- I was surprised that the organizers hadn't made specific plans about what technology would be used for the presentations. I felt very poorly prepared for the virtual presentation because I didn't feel like we tested any of that or made any progress for preparing for that.
- The facilitators are scientists, but they did a horrible job of efficiently using our time.

14. Please add any final comments or suggestions that you have for ways to improve the PoPNet NASA@ My Library experience:

- As we went through the training process it was a little hard to figure out what to expect or what was expected of us. I know these training activities are intentionally kept vague sometimes, but some sort of more clearly defined calendar or list of dates/requirements/expectations would have been very helpful, along with earlier communication.
- The only way I can suggest an improvement is to just have more events!
- I had a lot of fun!
- Keep it going! It's a great idea, and I think it works well most of the time.
- I didn't feel like I knew what to expect from the two different presentations I did. They were for very different audiences and very different types of events. I think it would have been good to explain all that earlier. I feel like I spent all my effort preparing for a 5 minute conversation with a young (5 yo) child and then when I had to do the virtual presentations they were for high school students.
- Consider building a better training session for the professional science contributors - More time and a better [program] portfolio that would help and engage them as well. Consider collecting techniques and ideas that science contributors have been doing, prior to the training, in order to have a more diverse and more inclusive set of tools for engagement. In general, it feels like this program is focused on making the program as a whole work, without considering what would be the metric for improvement or progress for the individual participants - Science professionals, library audience member, library staff, etc.
- The communication training was terrific. The virtual piece was awful. Please train the facilitators on using technology.

Appendix J

Patron Survey Summary

NASA@ My Library and PoPNet Phase II
Patron Survey Summary

Phase II of the PoPNet involvement in the *NASA@ My Library* project included 29 programs at 15 different libraries. This summary includes the results of 276 patron surveys from 14 PoPNet events at nine different host libraries (a participation rate 50%, with 14 out of 28 programs submitting patron surveys)[1]. Patrons were asked to complete one of two surveys—most librarians with programs before November 2018 used the *"*standard*"* *NASA@ My Library* patron survey; patrons who attended events after that date were most likely to complete the patron survey specifically designed for PoPNet programming.

Results are also shown side-by-side with 4,160 patron surveys collected from other *NASA@ My Library* programs held between November 1, 2017 and October 31, 2018. These surveys represent 418 events held by 66 partner libraries.

Patron Surveys Received for Phase II *NASA @ My Library* PoPNet Programs

Survey Version	PoPNet Programs[2]		Selected PoPNet Programs[3]	
	Count	Percent	Count	Percent
NASA@ My Library Year 2 Patron Survey	169	61%	17	14%
PoPNet Patron Survey[4]	107	39%	107	86%
Total	**276**	**100%**	**124**	**100%**

[1] We do not know how many attendees were at each program to be able to calculate the response rate at each of those programs.

[2] PoPNet Programs refers to Phase II PopNet programs only, for this analysis.

[3] "Selected PoPNet Programs" includes Phase II PoPNet programs, excluding the Science Fair Readiness Fair from Broward County Public Library. The Science Fair program was held at a nearby science center with a live stream to two PoPNet libraries. Two scientists led a 20-minute presentation on a large stage that was broadcast on a webinar, showing a view of the stage and the presentation slides. Librarians led hands-on activities during a 40-minute break between the presentations. Their patron surveys accounted for more than half of all PoPNet Phase II patron surveys and, with such a different program format, evaluators wanted to take a look at the data trends of all other PoPNet programs that almost all had a 1-1 virtual connection with a scientist.

[4] The PoPNet version of the patron survey has a few differences from the *NASA@ My Library* patron survey, including open-ended questions about what respondents liked and didn't like about the virtual connection and one revised scale item on whether the virtual connection with the scientist was engaging. Optional demographic questions also offered slightly different response choices.

Libraries and PoPNet Sites Submitting Patron Surveys for Phase II *NASA @ My Library* PoPNet Programs

PoPNet Site	Library	Program Title	Number of Patron Surveys	Survey Version
Orlando Science Center	Broward County Public Library	Science Fair Readiness Program- Small Bodies, Big Impact & Exploring Space Made Easy with Algae	152	Year 2
OMSI	King County Library Systems	Space radiation, phytoplankton, exoplanets	19	PoPNet
OMSI	Salem Public Library	Multi-Scientist Event	17	Year 2
Sunset Zoo	Wilson Public Library	Space Telescope Science Institute and JPL Scientists Presenting	16	PoPNet
SD Discovery Center	Ely Public Library	Dark Matter	12	PoPNet
WYSTEM - WY NASA Space Grant	Rio Rancho Public Library	Astronomy Follow-Up Webinar	11	PoPNet
SD Discovery Center	Ely Public Library	Nano particles/technology	10	PoPNet
SD Discovery Center	Yankton Community Library	Combinatorial game series and Graphing Theory	9	PoPNet
OMSI	King County Library Systems	Viruses in extreme environments	7	PoPNet
OMSI	Thelma Parker Memorial Public Library	Phytoplankton populations from satellite data	6	PoPNet
OMSI	Thelma Parker Memorial Public Library	Viruses in extreme environments (DNA)	6	PoPNet
Orlando Science Center	Kershaw County Public Library	The Scales of the Universe - From the Everyday to the Literally Astronomical	4	PoPNet
Sunset Zoo	Wilson Public Library	New planet	4	PoPNet
Sunset Zoo	Wilson Public Library	Galaxies	3	PoPNet

Program Perceptions

Patrons were asked to indicate their level of agreement with six statements on a 4-point scale from Disagree a lot (1) to Agree a lot (4). Overall, patrons gave very high ratings on each of these items, suggesting patrons had a positive experience at the PoPNet events they attended. Nearly all (99%) patrons indicated that the programs were interesting and 98% agreed the virtual connection with the scientist was engaging, with 29% selecting "Agree and 69% selecting "Strongly Agree."

Patron Perceptions of the PoPNet Programs

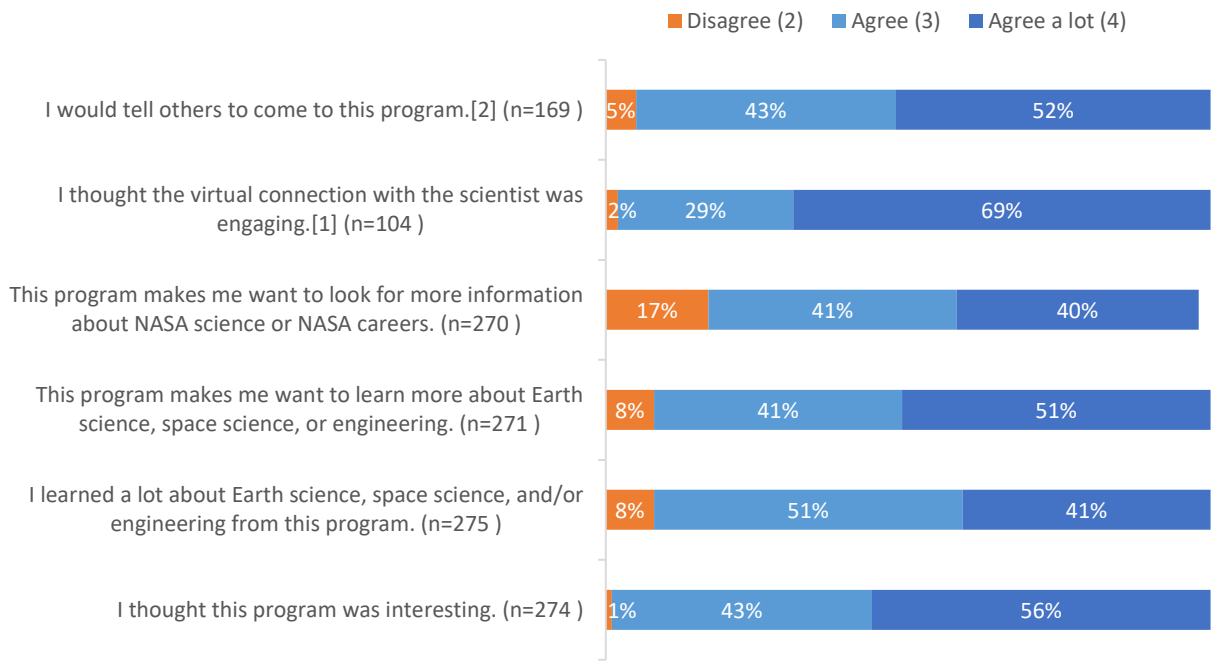
		n	Disagree a lot (1)	Disagree (2)	Agree (3)	Agree a lot (4)
	All PoPNet Programs	274	-	1%	43%	56%

		n	Disagree a lot (1)	Disagree (2)	Agree (3)	Agree a lot (4)
I thought this program was interesting.	Selected PoPNet Programs	123	-	1%	32%	68%
	Other *NaML* Programs[5]	4,113	1%	1%	34%	64%
I learned a lot about Earth science, space science, and/or engineering from this program.	PoPNet Programs	275	-	8%	51%	41%
	Selected PoPNet Programs	123	-	6%	44%	50%
	Other *NaML* Programs	4,078	1%	7%	47%	45%
This program makes me want to learn more about Earth science, space science, or engineering.	PoPNet Programs	271	<1%	8%	41%	51%
	Selected PoPNet Programs	123	-	7%	33%	59%
	Other *NaML* Programs	4,056	2%	8%	38%	51%
This program makes me want to look for more information about NASA science or NASA careers.	PoPNet Programs	270	1%	17%	41%	40%
	Selected PoPNet Programs	121	-	12%	46%	41%
	Other *NaML* Programs	4,058	3%	12%	39%	46%
I thought the virtual connection with the scientist was engaging.[6] [7]	PoPNet Programs	104	-	2%	29%	69%
	Selected PoPNet Programs	104	-	2%	29%	69%
	Other *NaML* Programs					
I would tell others to come to this program.[8] [9]	PoPNet Programs	169	-	5%	43%	52%
	Selected PoPNet Programs	17	-	6%	35%	59%
	Other *NaML* Programs	4,081	2%	4%	33%	61%

[5] "*Other NaML Programs"* are patron surveys collected from non-PoPNet *NASA@ My Library* programs held between November 1, 2017 and October 31, 2018.

[6] This question was only asked on the PoPNet Patron Survey version.
[7] 1 respondent (<1%) selected "Disagree a Lot"
[8] This question was only asked on the *NASA@ My Library* Patron Survey version.
[9] 2 respondents (<1%) selected Strongly Disagree

Patron Perceptions of the PoPNet Programs[10]



Patrons were asked open-ended questions what they liked and disliked about connecting virtually with a scientist. Many patrons shared that they liked being able to have access people that 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." Other patrons appreciated the higher levels of knowledge that virtual scientists could offer and appreciated hearing and learning about the program topic.

When asked about what they did not like about connecting virtually with a scientist, many patrons mentioned both audio and visual technology challenges. Patrons also shared that they felt it was impersonal and that they would have preferred in-face meetings.

What did you like about connecting virtually with a scientist?[11]

98 responses

Opportunity to Ask Questions (22/98 responses)

- I got to ask questions
- I liked that it was easy to ask questions
- Getting to personally meet and ask questions
- You can ask 1-1 questions
- I got answers to many questions
- It gave me a chance to answer my questions personally
- Being able to ask questions of an expert
- Having an expert to ask Questions
- Feels personal - you get to ask specific questions
- Great to ask questions

[10] Figure shows all PoPNet Phase II Patron Survey data

[11] This question was only asked on the PoPNet Patron Survey.

- The live Q&A
- Getting live answers to questions.
- Interaction with hands on and answering questions
- He cans answer Q's then and follow up
- That we could ask them questions and they could answer them.
- He could answer questions our librarian couldn't have
- We could ask him questions and he could answer right away.
- Having someone knowledgeable answer questions
- She was able to answer questions our librarian couldn't
- Information that scientist can provide like being able to answer a question right away
- I enjoyed his ability to answer questions
- She knows so much more than I do and can answer it better/answer questions

I Got to Learn (14/98)

- I got to learn more.
- The new information I collected
- I learned a lot about a new field I had no previous knowledge about.
- I learnt something that I didn't even know existed
- Learning about radiation
- Learnt a lot of new things about the topics discussed and presented here
- Learning
- I was able to learn first hand
- I liked learning about phytoplankton and discovering more about our planet.
- She knows about galaxies
- She told us about planets
- I love that there may be exo planets with life on them
- I love that we are learning about planets
- I liked that they talked about the galaxy

Meet/Talk to a Scientist (12/98)

- I liked about that we had a good conversation
- We got to talk with them instead of doing something they planned and just gave to us.
- We could talk
- She was a real scientist. I enjoyed that she shared about her interest in math as a kid.
- They are working scientists
- We got to meet a NASA scientist and learn from her
- It was beneficial to be able to engage and see the scientist
- I am a 5th grade teacher and this program aligned well with what I teach in my classroom. Being able to talk to scientists is an amazing opportunity for patrons.
- His main work
- It was interesting to learn about how he did his work
- Deeper insight into a scientist life and what happens out in the field
- Outside speaker and tech use

Accessing Scientist from Afar (11/98)

- A chance to have contact with more "experts" than physical travel would allow
- Access to resources beyond those available in our community.
- Accessible
- Allowed interaction without requiring travel on any party's part

- Being able to meet with a professional in our small town.
- Connecting virtually allows other scientists to teach and present from around the world without having to be there.
- Fun to have scientist accessible
- That we could learn even when they weren't here.
- Talked to scientist a long way from me. Small carbon "footprint." :-)
- The audience can talk to astronauts anywhere
- The scientist can be in a different state

Scientist Was Knowledgeable (7/98)

- They were experts to tell us what they know
- He was a true expert.
- So knowledgeable
- [can't read], very knowledgeable
- She knew a lot
- He knows a lot about space
- Their expertise

Interactive (6/98)

- Helping us with the activities
- Informative, Interactive
- It was very interactive
- Interesting concept. Hands on activities were good.
- Creating the virus, hands-on talk :) Dr. Nacho and the library staff were great!!
- It was fun. He/Dr. Nacho was engaging and building our virus in 3-D was great.

Comments About Technology (4/98)

- I could hear better this time. Her presentation was clear and had visuals (a positive).
- We could hear from them clearer
- Using zoom breakout rooms was a great use of teleconference tech
- Clear audio, great slides

Scientist was Passionate (3/98)

- Seeing and hearing her physical devotion and enthusiasm for her study
- Seeing the enthusiasm of a researcher, and hearing a new perspective
- I am with my son. The scientists were enthusiastic and spoke passionately about their topics

Visuals (3/98)

- They could show us many photos on the screen
- Cool to see the person on the screen.
- The pictures

Generally Positive (12/98)

- That people are able to tell us about this.
- I like that a NASA scientist is able to tell us about this
- GRRREAT!
- It was interesting
- It was awesome

- Everything (3)
- It was great
- It was so much fun.
- No awkward eye contact.
- They succeed in a lot of her mistakes

N/A, Nothing

- IDK (I don't know)
- N/A
- Nothing

Other

- I didn't stay, it was more of children's program than I was expecting

What did you not like about connecting virtually with a scientist?[12]

84 responses

Technology Issues – Sound (23/84 responses)

- Difficult to hear at times.
- Hard to hear "scratchy"
- Hearing them/Hard to hear (3)
- It was hard for her to see what was happening during movement activity.
- It was hard to hear and would have been better if the scientists were here in person
- It was a noisy room. Audio was difficult at times. Overall not too bad.
- It was sometimes hard to hear what she was saying
- Small sound issues.
- Sometimes it was hard for him to hear our questions.
- Sound/Sound quality (6)
- The audio was intermittent
- The voice was blurry
- There was a little (rarely) miscommunication due to sound
- There were initially audio issues but they were quickly resolved.
- Volume - straining to hear at times.
- Volume aid easy communication

Technology Issues – Visual (9/84)

- Can't really see/hard to see them (3)
- In order to see them, we had to shut off some lights making it hard for them to see us.
- The screen was blurry
- The screen was every were
- The screens were too small
- Pictures were blurry
- They couldn't always see the kids clearly

Technology Issues – Other (8/84)

- Bugs, lag, volume problems

[12] This question was only asked on the PoPNet Patron Survey.

- I sympathize that iPad connectors are hard to work with.
- Little bit of a lag.
- Tech difficulties
- Technical glitches. Speaking face-to-face is always better for back and forth
- Technological difficulties made it a bit difficult to have a more engaging program.
- The tech challenge
- Time lag in qta

Would Prefer to See Live (5/84)

- I wish he were really here
- It would be better if we could actually see all of them in front of us.
- It would be better to see them live.
- Person wasn't there, but it wasn't terrible
- The presentation could been seen as less engaging without the scientist in the room.

Format/Content (4/84)

- I would have liked to talk about the purpose of connecting the dots (moving on the moon) earlier and for longer.
- Limited time with each scientist. Seem like not enough time to do it all; craft and talk to scientist.
- Too many stations, not enough time to go through all of them
- Hard to ask questions

Other (4/84)

- anything
- It wasn't personal
- It’s hard
- The timing was challenging. I had to leave early for another meeting.

I liked it/Nothing (12/84)

- I like all of it./I liked everything (5)
- It was all good. More interactive experiments would be welcome.
- N/A/Nothing (5)
- IDK

Prior Attendance at Library Events

The majority of patrons (86%) had not been to the library before attending this program. Just over two-thirds (68%) had not been to any programs about earth, science, space science and engineering prior to attending the program they were attending.

Prior Attendance at Library

	PoPNet Programs			Selected PoPNet Programs			Other NaML Programs		
	n	Count	%	n	Count	%	n	Count	%
Respondents who have been to this library before today.	106	91	86%	106	91	86%	Not asked		
Respondents who have been to any programs about **earth science, space science, and/or engineering** at this library before today?	266	85	32%	119	64	54%	4,001	1,543	39%

Patron Characteristics

Patrons were asked to provide optional information about their family status, gender, race/ethnicity and age/grade. Most patrons self-identified as a child/student (71%).

Family Status of Respondents

	PoPNet Programs		Selected PoPNet Programs		Other NaML Programs	
	Count	Percent	Count	Percent	Count	Percent
A child/student	179	71%	66	56%	1,944	52%
A parent, grandparent, or caregiver (attending with child/grandchild)	52	21%	29	53%	1,440	39%
Other	22	9%	22	19%	353	9%
Total	**253**	**100%**	**117**	**100%**	**3,737**	**100%**

Other, please describe[13]:

- [?] astronomy educator
- adult
- Adult w/o kids
- An employee of the library
- disabled adult
- Family
- interested citizen of planet earth
- interested community member
- library board member
- library facilitator
- library patron
- library staff
- library volunteer
- parent without child
- Rata (spanish)
- resident
- senior citizen
- single
- teen volunteer

[13] Responses from all Phase II PoPNet programs

A little over half of the respondents (59%) were female.

Gender of Respondents

	PoPNet Programs		Selected PoPNet Programs		Other NaML Programs	
	Count	Percent	Count	Percent	Count	Percent
Female	147	59%	62	54%	2,344	62%
Male	98	39%	51	44%	1,394	37%
Other; please describe:	2	1%	1	1%	30	1%
Prefer not to say	1	<1%	1	1%	N/A	
Transgender	2	1%	n/a		12	<1%
Total	**250**	**100%**	**115**	**100%**	**3,780**	**100%**

Race/Ethnicity of Respondents (n=253)

Respondents selected all that applied

	PoPNet Programs n = 253		Selected PoPNet Programs n = 115		Other NaML Programs n = 3,707[14]	
	Count	Percent	Count	Percent	Count	Percent
White	142	56%	82	71%	2,184	59%
Asian	32	13%	9	8%	180	5%
Black, African or African American	31	12%	4	4%	358	10%
Hispanic/Latino/Latina	31	12%	0	-	478	13%
Other	10	4%	6	5%	108	3%
More than one race	5	2%	6	4%	254	7%
Native Hawaiian or Other Pacific Islander	5	2%	3	3%	30	1%
Prefer not to say	4	2%	4	4%	N/A	-
American Indian or Alaska Native	2	1%	1	1%	115	3%

Other, please describe:

- Can't say
- Caribbean
- I am a mutt-mix of everything
- Indian
- Irish
- Jewish
- Mix
- Rata (spanish)
- Who wants to know

Age/Grade of Respondents

Most respondents were in Grade 6-8 (37%) or Grade K-5 (29%).

	PoPNet Programs		Selected PoPNet Programs		Other NaML Programs	
	Count	Percent	Count	Percent	Count	Percent
Grade K-5	70	29%	33	30%	1,257	34%
Grade 6-8	89	37%	23	21%	556	15%

[14] The Year 2 NaML patron survey asked respondents to select one response (including an option for "More than one race").

Grade 9-12	29	12%	12	11%	345	9%
I am not a K-12 student/Adult	30	13%	20	18%	1,469	39%
Other; please describe:	23	10%	22	20%	97	3%
Total	**241**	**100%**	**110**	**100%**	**3,724**	**100%**

Other, please describe:

- 85
- Adult (2)
- adult retired
- college graduate - retired
- degree
- great grandparent
- I am a parent and a 5th grade teacher at the local elementary
- I am constantly changing
- I have white hair!
- library patron
- Old phart
- out of school
- parent
- parent with child's input to survey
- parent/homeschool
- retired