



## *Project BUILD* Summative Evaluation Report

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## Executive Summary

### Overview

The Space Science Institute's (SSI) National Center for Interactive Learning (NCIL), in partnership with the University of Virginia (UVA) and the American Society for Civil Engineers (ASCE), was awarded a grant from the National Science Foundation (NSF) to develop and implement a 3-year program, *Project BUILD (Building Using an Interactive Learning Design)*. *Project BUILD* aims to bring together public library staff from six libraries (three rural and three urban) and professional engineers from ASCE to engage youth in grades 2-5 and their families in age-appropriate, technology-rich, engineering-related learning experiences.

The ultimate goal of the program is to increase youths' awareness of and motivation to pursue science, technology, engineering, and math (STEM)-related educational and career pathways, especially for youth from rural and/or geographically isolated areas and populations traditionally underrepresented in STEM (i.e., African Americans, Hispanics and Latinos, American Indians, Alaska Natives, native Hawaiians and Pacific Islanders, the economically disadvantaged, people with disabilities, and women and girls). The project utilized a number of mechanisms to reach these goals including *Community Dialogues*, circulating Kits, and library programs.

*Project BUILD* is part of NCIL's *STAR Library Network (STAR Net)*, a hands-on learning network for libraries and their communities across the country ([www.starnetlibraries.org](http://www.starnetlibraries.org)). *STAR Net* focuses on helping library professionals build their STEM skills by providing "science-technology activities and resources" (STAR) and training to use those resources.

Education Development Center (EDC) served as the external evaluator for *Project BUILD*. This report presents summative evaluation findings investigating project implementation as well as outcomes for libraries, library staff, engineers, and library patrons (youth and caregivers).

It should also be noted that although this report was finalized after the start of the COVID-19 pandemic, all program activities and data collection were completed prior to the pandemic. Since we were not able to collect participants' reflections on how COVID-19 may impact programs such as *Project BUILD*, recommendations are based on pre-pandemic library operations.

### Key Findings

Key findings are presented below as strengths and challenges associated with various program components and stakeholder groups.

#### **Community Dialogues**

##### **Strengths**

- ❖ Especially useful for helping libraries identify potential community partners. Most (7 of 9) librarians reported that the dialogues were *very useful* for helping them identify potential partners in their community.
- ❖ Helped libraries increase their understanding of community needs, ways to reach underserved audiences, and showcase their ability to support STEM learning.

##### **Challenges**

- ❖ Time-intensive to plan.
- ❖ Some communities already have similar conversations being hosted by other organizations leading some to feel "meeting fatigue".

For more information and resources related to *Community Dialogues*, please visit <http://www.starnetlibraries.org/resources/community-dialogues/>

## STEM Kit Implementation

### Strengths

- ❖ Host libraries used the Kits in a variety of ways: circulation, in-library use, and at outreach events.
- ❖ Circulation of Kits seems to be more successful in rural communities, while urban libraries tended to find more success using the Kits in-house.
- ❖ Library staff found the Kits valuable. All library staff agreed that the Kits were a good way to provide their patrons with access to STEM activities and that they are interested in continuing to circulate their existing Kits.
- ❖ Kits provided an avenue for equitable access to STEM learning. Families who may not be able to attend a library program at a specific time can still check-out the Kits and do them at home on their own time. Library staff selected a variety of engineering-related activities and commercially available education products. Many of the activities were very visual in nature and their instruction manuals use diagrams with few words, making them more accessible to patrons for whom English is not their first language.

### Challenges

- ❖ It took some libraries a long time to prepare Kits and create a circulation system.
- ❖ Some libraries had difficulty getting patrons to check-out Kits. Some patrons were concerned about breaking or losing items. Other libraries had many youth patrons come to the library without a caregiver, making it unlikely they would check-out a Kit. In these instances, libraries tended to see more in-house use of the Kits.
- ❖ Kit management can be challenging for library staff. Library staff would have liked more guidance around how to create, publicize, and manage Kits.
- ❖ Library staff had a need for supplemental materials such as “inspiration cards” (e.g., simple instructions, prompts for patrons) and books to pair with the Kits.

## Library Program Implementation

### Strengths

- ❖ Library staff appreciated having a vetted set of curated activities from the project team and support implementing activities from their engineer partners.
- ❖ Not a large financial cost or time commitment for volunteer engineers.

### Challenges

- ❖ Time intensive for library staff to plan.
- ❖ Scheduling programs is challenging because volunteer engineers are often not available during working hours when some library programming would normally take place.
- ❖ Engineers sometimes need to travel long distances to reach their partner library.
- ❖ It is challenging to predict attendance at programs and low turnout can be disappointing for program organizers and facilitators.

## The Library-ASCE Partnership

### Strengths

- ❖ Library staff and engineers valued the partnership. All library staff and most (80%) engineers *agreed* or *strongly agreed* that the collaboration was beneficial for their organization. Nearly all library staff (95%) and engineers (90%) want to continue collaborating with their partner or other library/professional organization.
- ❖ The presence of diverse engineers who provided their experience and content knowledge helped library staff feel more comfortable conducting STEM programming and made engineering-related careers more accessible to patrons.
- ❖ Library staff provided expertise in working with youth and led program planning to reduce the burden on volunteer engineers.
- ❖ Working with the library helped engineers reach new, diverse audiences.

## Challenges

- ❖ Some library staff and engineers felt the program stagnated after the first round of programming, in part because they were repeating activities each year.
- ❖ Library staff and engineers need to have a mutual understanding of their individual roles and expectations, including informing engineers about the norms and rules of volunteering at public libraries.
- ❖ Staff turnover was challenging for sustainability when key point people (important for communication and coordination) at either the library or ASCE branch left the project.
- ❖ Library staff and engineers would like to do more outreach to the community outside of the library to better reach underserved audiences, but this presents a scheduling challenge since engineers are often not available during working hours when some programming (e.g., with afterschool groups) would take place.

## Influence on Participating Library Staff and Engineers

### Strengths

- ❖ Overall, library staff and engineers had increased interest, knowledge, and confidence in facilitating engineering-related programs with youth after their experience with the project. Those who had been involved in the project for more than one year were more likely to see an increase in interest, knowledge, and confidence.
- ❖ Library staff gained confidence and knowledge in offering STEM-related programming and gained a better understanding of engineering.
- ❖ Engineers learned about facilitating activities with young children and enjoyed reaching new audiences, especially underserved audiences.
- ❖ Most library staff (85%) and engineers (90%) reported that they are *very likely* to participate in additional engineering-related youth programming in the future.

### Challenges

- ❖ Library staff could be more supported by the project team in understanding their role in facilitating the STEM content of the program, connecting it to their existing skills, and increasing their confidence in doing so.

## Influence of Project Activities (Library Programs and Kits) on Youth

### Strengths

- ❖ Youth especially enjoyed that they got to do things that they don't normally do.
- ❖ Youth, especially girls, also enjoyed the tools and materials that they were able to use.
- ❖ The majority of youth agreed that they want to continue to do similar activities and learn more about science or engineering and also felt that someone like them could become an engineer.
- ❖ Most youth also reported that they learned about what engineers do, could identify aspects of the work of engineers, practiced engineering-related skills, and recognized the key engineering concept that "*it can take many tries to solve a problem*".
- ❖ Library staff and engineers felt that the library programs were beneficial for youth because they allowed them to engage in open-ended, collaborative, hands-on design challenges; exposed youth to a diverse group of engineers; connected engineering to real-life; and provided youth with the opportunity to practice engineering-related skills.

### Challenges

- ❖ Girls were less likely than boys to agree that someone like them could become an engineer.

## Influence of Project Activities (Library Programs and Kits) on Caregivers

### Strengths

- ❖ Caregivers reported high levels of comfort and interest in continuing to look for and do engineering-related activities with their children.

- ❖ Results suggest that the more caregivers reported engaging in Kit activities, the more likely they were to *agree a lot* that they would like to look for similar activities for their children to do in the future.

## Challenges

- ❖ Caregivers were slightly more likely to report feeling comfortable doing STEM-related activities with their children and were much more likely to agree that they learned about engineering when they attended library programs (compared to using the Kits). However, some library staff and engineers had difficulty engaging caregivers in library program activities and had concerns about caregivers taking over the activity.

## Summary of Recommendations

The project team may wish to consider:

### **Reviewing project goals and exploring alternative mechanisms for project activity implementation.**

Library staff implemented project activities in various ways that varied from the initial project plan. For example, libraries used Kits in ways beyond circulation (i.e., for outreach and for use in the library) and one library attended other dialogues in their community instead of hosting their own *Community Dialogue*.

The team may wish to consider reviewing the goals and outcomes of the various project components to clarify participant expectations and identify where variations on implementation are and are not helping to meet those objectives. Considering where and why variations occurred, in light of project goals, can help the project team shape expectations and design supports and resources for future participating libraries and ASCE branches.

### **Developing additional professional development resources, training, and support.**

Overall, library staff and engineers felt supported by the project team; however, some specific supports that could be developed further include:

- ❖ A set of guides such as a start-up guide and/or on-boarding process for new libraries and ASCE branches and a guide for libraries interested in creating circulating Kits
- ❖ Additional training and support around STEM education for library staff
- ❖ Clarification of the expectations around library staffs' contributions to the engineering-related aspects of the library programs
- ❖ Early, detailed communication about the time commitment and all responsibilities and deliverables so that library staff can plan their time and bring in support staff if necessary
- ❖ Support for reaching additional patrons through *Project BUILD* activities

### **Brainstorming ways to support the partnership between library staff and professional engineers, especially in more rural areas.**

Library staff and engineers valued their partnership, but felt it was sometimes difficult to schedule time to connect in-person for programming, especially when the library was not located in a major urban area. This has a few implications that the team may wish to consider, including:

- ❖ Consider ways to help facilitate connections between library staff and engineers beyond the initial in-person workshop
- ❖ Facilitate connections between libraries and other professional engineers if a library is not located near an ASCE branch

### **Developing additional engineering-related activities.**

Library staff and engineers found the library programs and Kits to be effective at engaging patrons in engineering-related activities. Some additions that the team could consider developing, or supporting libraries in developing and sharing, to further strengthen the project activities include:

- ❖ Additional library program activities to provide more options and reduce program stagnation
- ❖ Additional Kit resources (e.g., inspiration cards, simple instructions, book lists)
- ❖ Outreach activities that can be used outside of the library

### **Re-thinking how library staff support caregiver engagement at their programs.**

In general, caregivers benefited from engaging in library program activities. However, some library staff and engineers found it difficult to get caregivers involved and there was some concern that caregivers might take over the activity, interfering with youths' ability to explore with peers and interact with the volunteer engineers.

The team may wish to consider ways to encourage caregiver engagement while also providing opportunities for youth to explore on their own. For example, libraries could host family STEM nights or STEM Saturdays in addition to youth-only programs, administer a handout for caregivers at the end of each program, or help library staff come up with strategies to let caregivers know the goals of the program and how they can support their child while participating in activities.

### **Considering ways to strengthen the engineering education and career pathway component of the project**

Suggestions from library staff and engineers included incorporating a short recap activity at the end of each program reiterating the real-life connections of what was done during the program and additional activities to continue learning at home; providing time for engineers to share the story of how they became interested in engineering; and continuing to engage diverse engineer volunteers, encouraging engineers to share about their work in an age-appropriate manner, and making real-world and local connections.

Future activities should also continue to incorporate design challenges with tools and materials that allow for open-ended, hands-on design and exploration through iterative design as these activities were engaging for youth and promoted learning.

### **Conclusion**

In summary, the majority of participating library staff, engineers, and library patrons involved in *Project BUILD* activities benefited from their experience.

Library staff were able to better understand the needs of and serve underserved audiences through hosting *Community Dialogues*, utilizing *Project BUILD* materials in the library and at outreach events in their community, making adaptations to *Project BUILD* activities to demonstrate local connections (e.g., sharing pictures of local bridges or buildings), and working with a diverse groups of engineer volunteers at library programs to help showcase that everyone can be an engineer.

Library staff and engineers found the partnership to be valuable and want to continue the partnership and/or pursue similar collaborations with other libraries or professional groups in the future. Library staff appreciated the enthusiasm and dedication of their engineer partners and valued their content knowledge and experience, which helped library staff feel more comfortable providing engineering-related programming for their patrons. Engineers valued that the library staff provided expertise in presenting programs to young children; access to new, diverse audiences; and took the lead on program planning, promotion, and set-up, making it easy for engineers to volunteer. Library staff and engineers also benefitted personally by increasing their interest, knowledge, and confidence in facilitating engineering-related programs for youth.

Youth participating in *Project BUILD* Kits and library programs reported enjoying the activities, especially that they got to do things that they don't normally do. The majority of youth indicated that they want to continue to do and learn more about engineering. Caregivers engaging in *Project BUILD* activities with their youth reported high levels of comfort and interest in continuing to look for and do engineering-related activities with their children.

Finally, it is notable that there were similar levels for participation for boys and girls and few differences in youth outcomes when comparing responses by gender. However, girls were less likely than boys to agree that someone like them could become an engineer.

## Background

The Space Science Institute's (SSI) National Center for Interactive Learning (NCIL), in partnership with the University of Virginia (UVA) and the American Society for Civil Engineers (ASCE), was awarded a grant from the National Science Foundation (NSF) to develop and implement a 3-year program, *Project BUILD (Building Using an Interactive Learning Design)*. *Project BUILD* aims to bring together public library staff from six libraries (three rural and three urban) and professional engineers from ASCE to engage youth in grades 2-5 and their families in age-appropriate, technology-rich, engineering-related learning experiences.

*Project BUILD* is part of NCIL's *STAR Library Network (STAR Net)*, a hands-on learning network for libraries and their communities across the country ([www.starnetlibraries.org](http://www.starnetlibraries.org)). *STAR Net* focuses on helping library professionals build their STEM skills by providing "science-technology activities and resources" (STAR) and training to use those resources.

The ultimate goal of *Project BUILD* is to increase youths' awareness of and motivation to pursue science, technology, engineering, and math (STEM)-related educational and career pathways especially for youth from rural and/or geographically isolated areas and populations traditionally underrepresented in STEM (i.e., African Americans, Hispanics and Latinos, Native Indians, Alaska Natives, native Hawaiians and Pacific Islanders, the economically disadvantaged, people with disabilities, and women and girls). Mechanisms used to reach these goals include:

- ❖ **Community Dialogues:** *Project BUILD* libraries were asked to host at least one *Community Dialogue* event to engage representatives from their community in conversations with a focus on reaching groups in their local area that are currently underrepresented in STEM professions. For more information and resources related to *Community Dialogues*, please visit <http://www.starnetlibraries.org/resources/community-dialogues/>
- ❖ **Circulating Kits:** Library staff developed and circulated Kits containing hands-on, engineering-related activities for patrons to engage with at home. Some libraries also had these activities available for use in the library or took them on the road for use at outreach events.
- ❖ **Library Programs:** Staff at public libraries and volunteers from their partner ASCE branches implemented a series of four library-based programs for youth in grades 2-5 under the name "*Ready, Set, Create*". These programs, lasting 1-2 hours in length, engaged youth in solving challenge-focused problems using the engineering design process and age-appropriate tools to model how engineers solve problems that help improve peoples' lives. All partner libraries participated in two rounds of *Project BUILD* programs, each consisting of four different programs: *Span-tastic Bridges*, *Designed to Survive*, *Clean-up Our World*, and *Power from Nature*. Two pilot libraries also completed a set of four programs in Year 1 of the project.

The summative evaluation, conducted by Education Development Center (EDC), aims to answer the following questions:

1. In what ways did participation in *Project BUILD* help libraries better understand and meet the needs of their community, especially underrepresented groups in the community?
2. In what ways and to what extent did library staff and ASCE volunteers feel their partnership was valuable? What plans if any do they have to continue to work together or with other libraries or professional groups in the future?
3. How and to what extent did participation in *Project BUILD* impact library staffs' and ASCE volunteers' interest in, knowledge about, and confidence in leading/co-facilitating engineering-related library programming?
4. How and to what extent did participation in *Project BUILD* impact library staffs' interest in, knowledge about, and confidence in developing circulating Family Kits?

5. How and to what extent did *Project BUILD* activities (library programs and circulating Family Kits) impact youths' interest in engineering-related activities and pathways, and awareness of engineering-related skills and careers?
6. To what extent did *Project BUILD* activities (library programs and circulating Family Kits) impact caregivers' understanding of engineering and their comfort with and interest in engaging youth in engineering-related activities?

This report presents summative evaluation findings of project activities<sup>1</sup> and is organized into five sections:

- ❖ **Section 1:** Library Staffs' Experience with *Community Dialogues*
- ❖ **Section 2:** The Library-ASCE Partnership
- ❖ **Section 3:** Influence of Project Involvement on Library staff and Engineers
- ❖ **Section 4:** Influence of Library Programs on Patrons (youth and caregivers)
- ❖ **Section 5:** Circulating Kit Implementation and Patron Outcomes (youth and caregivers)

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<sup>1</sup> Although this report was finalized after the start of the COVID-19 pandemic, all program activities and data collection were completed prior to the pandemic. Since we were not able to collect participants' reflections on how COVID-19 may impact programs such as *Project BUILD*, recommendations are based on pre-pandemic library operations.

## Methods

The evaluation utilized mixed methods to investigate the implementation and influence of *Project BUILD* activities. Surveys were collected from library patrons (youth and caregivers who participated in program activities) following each library program to gain an understanding of their experience with the program and thoughts about engineering. The survey also included questions about patrons’ preferences for various activities, which will be examined by project researchers from the University of Virginia. During the final year of the project, the evaluation team also piloted a drawing activity with youth at two library programs to investigate another method for gathering youths’ views of the program.

Patrons who checked-out a circulating Kit were also asked to complete and return a survey. This survey included questions for both caregivers and youth in order to gain an understanding of their at-home experience with the Kits. Libraries were also provided with a set of in-house Kit surveys, containing only the questions for youth, to be completed by youth who used the Kits in the library.

Finally, all library staff and ASCE engineer volunteers who helped facilitate a program in the final year of the project completed a survey near the end of program implementation to better understand their experiences and views of *Project BUILD* activities. Lead library staff and engineers from all six sites were also interviewed between December 2019 and February 2020 to gain further insights into their experience over the course of the project.

Evaluation instruments can be found in Appendix A.

**Table 1. Evaluation Instruments and Administration Timeline**

<b>Evaluation Instrument/Protocol</b>	<b>Administration</b>	<b>Response</b>
<b>Patron Program Survey</b>	Completed after each library program in Years 2 & 3	319 youth surveys 117 caregiver surveys
<b>Youth Drawing Activity</b>	Piloted during a site visit to two library programs in the fall of Year 3	24 youth
<b>Kit Survey</b>	“Circulating surveys” sent out/returned with Family Kits “In-house surveys” completed by youth using the Kits in the library	191 circulating surveys 24 in-house surveys
<b>Facilitator (Library staff/Engineer) Interviews</b>	Phone interviews with lead library staff and engineers near the end of Year 3	13 library staff 9 engineers
<b>Facilitator (Library Staff/Engineer) Survey</b>	Online survey sent to all participating library staff and engineers near the end of Year 3	12 library staff 20 engineers

## Results

### Section 1: Library Staffs' Experience with *Community Dialogues*

**Background:** Libraries were encouraged to use the *Community Dialogue* strategy developed by the project team to bring community groups and leaders together in order to (1) begin to identify potential community partners, (2) learn about the STEM education needs of their community, and (3) think about strategies to reach underserved audiences. To support library staff in planning and hosting *Community Dialogues*, the project team provided in-person training as part of the *Project BUILD* workshop held in Denver, Colorado in April 2018; hosted a webinar focused on *Community Dialogues* in May 2018; and produced a guide for libraries which, in addition to general information and guidance, included supporting materials such as template invitations, timelines, tips and suggestions. For more information on *Community Dialogues*, please visit <http://www.starnetlibraries.org/resources/community-dialogues/>

#### *Community Dialogue* Implementation

Most libraries hosted one *Community Dialogue* while participating in the *Project BUILD* program (Figure 1). The *Community Dialogues* brought together a number of local community members and organizations from government (e.g., the Chamber of Commerce, City Council representatives); education (e.g., representatives from school districts or universities); clubs or community engagement groups (e.g., Boys and Girls Club, United Way); and professionals/professional groups (e.g., the library's ASCE partners and others from their branch, other local engineers).

The main barrier to hosting more than one dialogue was the time needed to plan the event. Additionally, one library did not host their own dialogue because they felt their community already had a number of forums to discuss community needs. They described, **“Our community members have meeting fatigue. The most civically engaged members of the community are invited to a lot of meetings and would like to see organizations communicate with each other to streamline programs and services.”** Other libraries also noted that they are aware of similar conversations taking part in their community and felt that they could either join in those existing dialogues or work with these groups one-on-one. One library staff mentioned that they appreciated having the experience of hosting their own dialogue because they feel that they now have the skills to join in these existing processes.

**Figure 1. Most libraries hosted one *Community Dialogue*. (n=6 libraries\*)**

*Survey Question: During the time your library has been involved with Project BUILD, how many total Community Dialogues did your library host?*

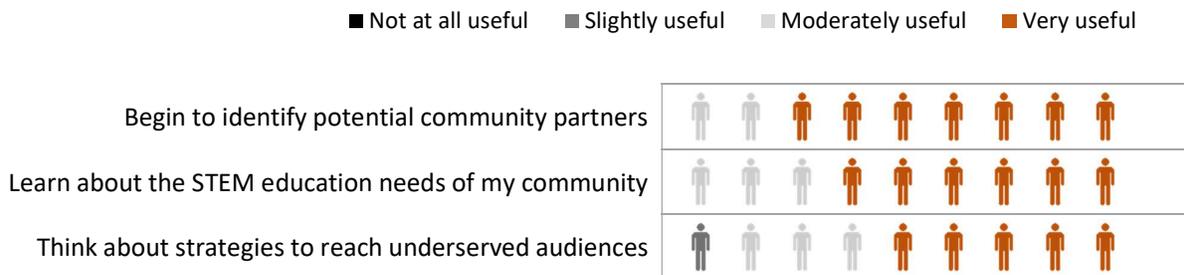


## The Value of *Community Dialogues* to Libraries and Library Staff

Overall, library staff felt the *Community Dialogues* were beneficial. Most (7 of 9) library staff reported that the dialogues were *very useful* for helping them identify potential community partners. All or nearly all library staff also felt the dialogues were at least *moderately useful* for learning about the STEM education needs of their community and thinking about ways to reach underserved audiences (Figure 2).

**Figure 2. Most library staff felt *Community Dialogues* were *very useful* for identifying potential community partners. (n=9 library staff)**

Survey Question: How useful do you feel the *Community Dialogue* strategy was for helping your library...



Source: Year 3 Facilitator Survey

### *Libraries increased their understanding of community needs and ways to reach underserved audiences*

Library staff mentioned that the *Community Dialogues* helped them better understand the challenges underrepresented groups in their community are facing and how those challenges can impact community members' ability to participate in library programming. For example, libraries described learning about the transportation challenges faced by low-income families, the language barrier to program participation, and the need to identify times when target audiences would be most likely to attend programs.

"I am a big advocate for *Community Dialogues* to address community issues and build community awareness of issues impacting those populations. I found that it not only forced the library staff to look at the issues from different points of view but also helped library staff to hone in on specific ideas/items that may not have been apparent before talking to the community in such a forum."

~Public Library Staff

Library staff took these learnings into consideration when planning their *Project BUILD* activities. For example, a number of library staff emphasized the need to bring *Project BUILD* activities outside of the library to help address that some populations may not have transportation to the library, the flexibility to attend a scheduled library program, or because individuals need to place other priorities ahead of attending library programs. One library attempted to run their *Project BUILD* programs at an afterschool program, but faced challenges transporting the materials and experienced challenges because ASCE volunteers were not available at the time the program took place. However, many libraries did have success taking simpler activities, such as those in their Kits, to outreach events such as Parks and Recreation events and other free public activities.

### *Libraries made community connections and showcased their ability to support STEM learning*

The *Community Dialogues* also helped library staff make connections with community partners (e.g., schools, Boys and Girls Clubs, Girl Scouts) and raised awareness among these organizations of the library's ability to support STEM learning in the community. Many libraries are now working with these groups to help promote and recruit their members to upcoming library programs.

For example, one library hosted several *Community Dialogues* with the purpose of organizing a local engineering festival, an idea that originated at their first dialogue. The festival included their ASCE partners as well as many local STEM organizations. The festival attracted around 500 attendees, helping demonstrate

to community members and organizations that the library is committed to supporting STEM learning in the community in ways that go well beyond books and other resources traditionally associated with a library.

Another library shared a story about how their *Project BUILD* Kits helped them demonstrate their capacity to support STEM learning for underserved audiences. They described that some dialogue attendees were initially resistant to talking about how to best reach underserved audiences because they felt that they had discussed reaching this population many times in the past with not much follow-up action. However, having *Project BUILD* activities as one concrete method helped “open the door” to having conversations and connecting with these populations. The library has since been invited to bring their programming to various underrepresented groups (e.g., Title I schools) and have received donations to continue to grow their STEM Kit programming, including a Kit that will focus on indigenous STEM knowledge.

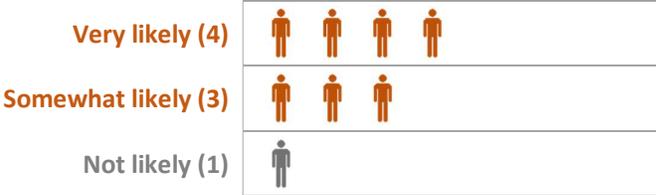
“[The *Community Dialogues*] definitely brought us to the forefront as far as a library that's offering these types of materials...they know that we have these programs...and they didn't know that before.”  
 ~Public Library Staff

*Libraries are interested in hosting and/or participating in future Community Dialogues*

Library staff saw the value in hosting more dialogues and/or participating in other community conversations in the future. All but one library staff reported that they would be at least *somewhat likely* to host additional dialogues in the future (Figure 3). Library staff mentioned that future dialogues would be especially useful when their library is planning for changes (e.g., changes to their service model) or developing new programs. They were also interested in bringing this to a district-wide or county-wide level to explore questions and challenges that could be tackled on a broader scope.

**Figure 3. Nearly all library staff are at least somewhat likely to host additional Community Dialogues. (n=8 library staff)**

Survey Question: How likely is it that your library will conduct additional Community Dialogues in the future?



Source: Year 3 Facilitator Survey

**Section 2: The Library-ASCE Partnership**

Library staff and professional engineers from ASCE worked together to plan and co-facilitate a series of four library programs per year. Lead library staff and engineers had the opportunity to meet in-person at the *Project BUILD* workshop held in Denver, CO in April 2018, where they were able to begin discussing the project and how they would work together.

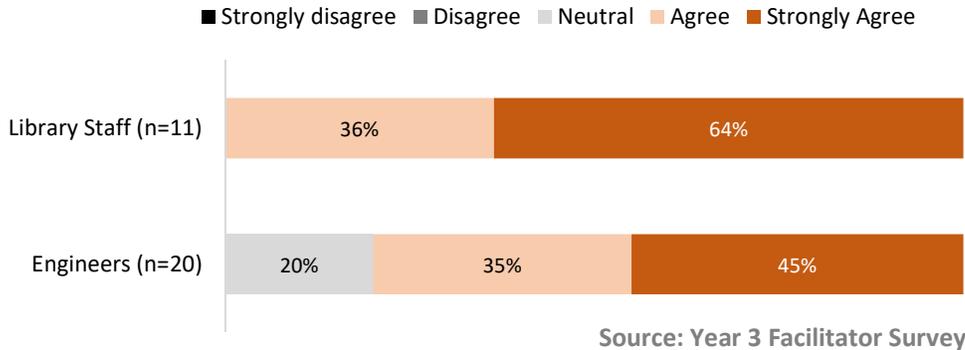
Library staff generally led the development of the programs (e.g., choosing specific activities) with input from their lead ASCE engineer partners. Once the agenda was finalized, lead engineer partners recruited additional volunteers from their ASCE branch and many prepared some supporting materials for the program (e.g., a PowerPoint presentation or other visuals to share at the program). Library staff promoted the program to patrons and ensured that all materials and resources were in place. During the program, both ASCE engineers and library staff helped youth work through design challenges. Additionally, ASCE volunteers provided their content expertise, while library staff utilized their experience facilitating programs with youth.

## Benefits of the Library-ASCE Partnership

Based on survey results, all library staff and most (80%) engineers *agreed* or *strongly agreed* that the collaboration was beneficial for their organization (Figure 4). Library staff and engineers who had been involved in the partnership for more than one year were more likely to *strongly agree* that the collaboration was beneficial than those who had joined the project in the past year (59% and 33%, respectively); however, even with limited partnership experience most still agreed that it was beneficial (Figure 5).

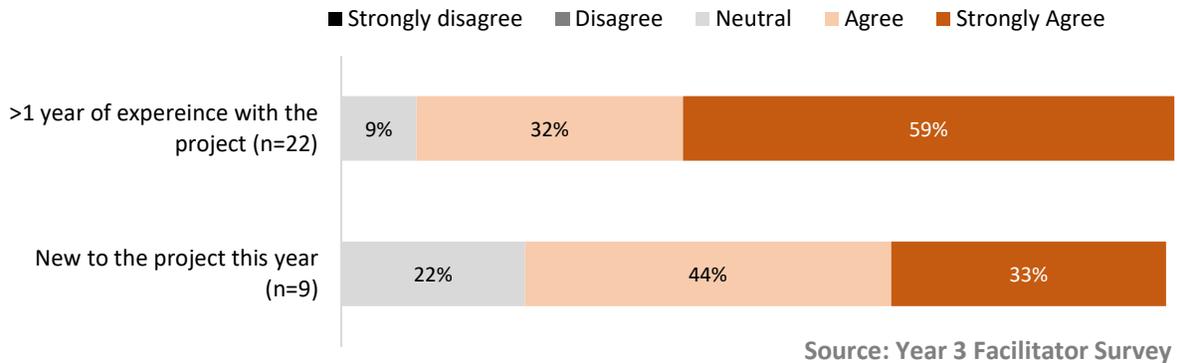
**Figure 4. All library staff and most engineers *agreed* or *strongly agreed* that the collaboration was beneficial.**

Survey Question: *Collaborating with my partner ASCE branch/ library has benefited my library/ASCE branch*



**Figure 5. Returning library staff and engineers were more likely to *strongly agree* that the collaboration was beneficial.**

Survey Question: *Collaborating with my partner ASCE branch/ library has benefited my library/ASCE branch*



### *Benefits to libraries and library staff*

Library staff shared a number of ways they and their libraries benefited from their collaboration with their partner ASCE branch, including:

❖ **Engineers provided knowledge of and experience with engineering concepts**

Having engineers with content knowledge at the library programs helped library staff feel more comfortable facilitating engineering-related activities. Library staff explained that the engineers had the expertise to easily integrate engineering concepts (e.g., giving local examples, describing how the activities connect to the work of engineers) and gave tips on how to make the activity work better (e.g., rinsing the activated charcoal before using it). For example, library staff noted,

**“What was most valuable was [ASCE volunteers]’ knowledge and experience. I learned things from them that I could not have learned from anyone else. And they helped us understand what these challenges were and how they fit in. And that gives you a level of comfort to show it to the kids.”**

**“To have somebody who designs how the water system works...and then the next thing you know, they're talking about water and integrating that into a program. You're just going to get a different insight. And it's not even about complexity. It's just about knowing the things that they know that we don't know.”**

- ❖ **The presence of diverse engineers helped make engineering-related careers feel more accessible to patrons**  
Library staff felt that having engineers at the library programs helped youth and caregivers understand the work that engineers do. For example, they were able to see that real people in their communities do the job of designing bridges or keeping the water clean. Library staff also noted that having a diverse group of engineer volunteers, including women and those from other underrepresented groups, helped youth and caregivers see that anyone can be an engineer. For example, library staff mentioned,

**“I think [the youth] looked up to the engineers. They were really impressed by them. They were so happy that they were being listened to by these people who were engineers. And they were inspired...by the engineers' interest in helping do things in the world to help people.”**

**“Working with engineers added depth to the program activities. It was also great for children to see diversity in the profession.”**

#### ***Benefits to ASCE branches and engineers***

Volunteer engineers shared various ways they and ASCE benefited from their collaboration with their partner library, including:

- ❖ **Library staff provided expertise in working with youth**

Most engineers were not used to facilitating programs for elementary-aged youth and greatly appreciated the library staffs' expertise in working with this age group. They mentioned that the library staff helped manage the youth, keeping them focused on and engaged in the activity. They also noted that library staff know their patrons and community, which helped ensure that activities were appropriate and interesting to attendees. For example, engineers noted,

**“[Library staff] understand what gets kids to get it, or enjoy what we're trying to teach them, so they can help us make slight adjustments to the content to get the kids more involved.”**

**“[The library staff] got the kids to pay attention. They got the kids to move on to the next activity. They knew how to work with kids a little bit better than probably most of the engineers.”**

- ❖ **Minimal time and monetary investment for volunteers**

Engineers mentioned that they appreciated that the library took care of the majority of the program planning, promotion, and set-up. Engineers would often prepare a short presentation related to the topic, but the preparation time for this was minimal. As one engineer noted,

**“One of the things that I really appreciated is that the library really took care of the planning. So they took on the role of collecting supplies, making the schedule, you know, booking the rooms, reaching out to the community.”**

- ❖ **Working with the library helped ASCE engineers reach new, diverse audiences**

Engineers noted that libraries have access to a diverse population of patrons and they appreciated that this provided the opportunity to volunteer with underserved youth. They acknowledged that underserved populations are in need of these types of learning activities, but they often work with other populations who have a number of quality resources readily available. For example, engineers described,

**“I think the biggest asset of the library was a different age group of kids, different background of kids in different families.”**

**“The library helps break down barriers to participation - show patrons that STEM is not out of reach for them and they can consider it.”**

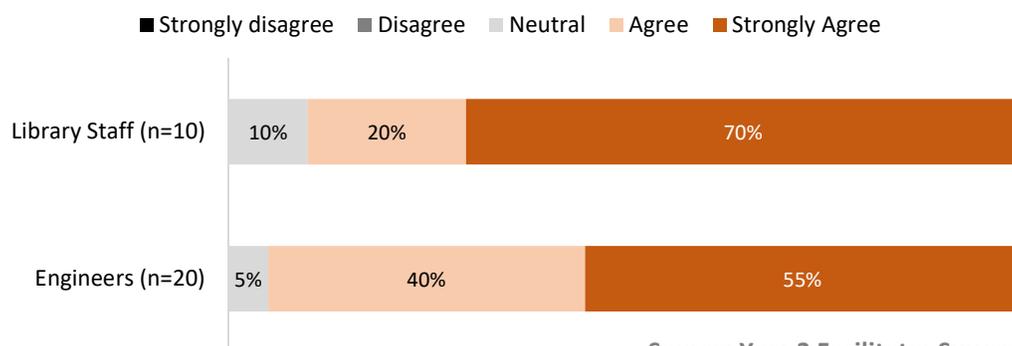
Additionally, some engineers were able to make connections that led to other volunteer opportunities beyond *Project BUILD*. Some of these opportunities were in collaboration with their current partner libraries (e.g., participating in an engineering festival co-hosted by the library, volunteering at the library’s other STEM-related events), while others were new connections beyond their partner library. For example, one engineer met a parent at a *Project BUILD* library program who then talked to their school board and principal about having ASCE volunteers conduct a program at the school. Another engineer described that their outreach coordinator made connections during their library’s *Community Dialogue* which led to them helping out with an engineering club. They noted that these opportunities were with groups that they had not previously worked with and also tended to be a more diverse group of youth than they typically engaged.

### Interest in Continuing the Collaboration

Based on survey responses, nearly all library staff (95%) and engineers (90%) want to continue collaborating with their partner or other libraries/professional organizations (Figure 6).

**Figure 6. Nearly all library staff and engineers agreed or strongly agreed that they would like to participate in similar collaborations in the future.**

*Survey Question: I and/or my library/ASCE branch would like to continue collaborating with my partner ASCE branch or other professional societies/my partner library or other public libraries in the future*

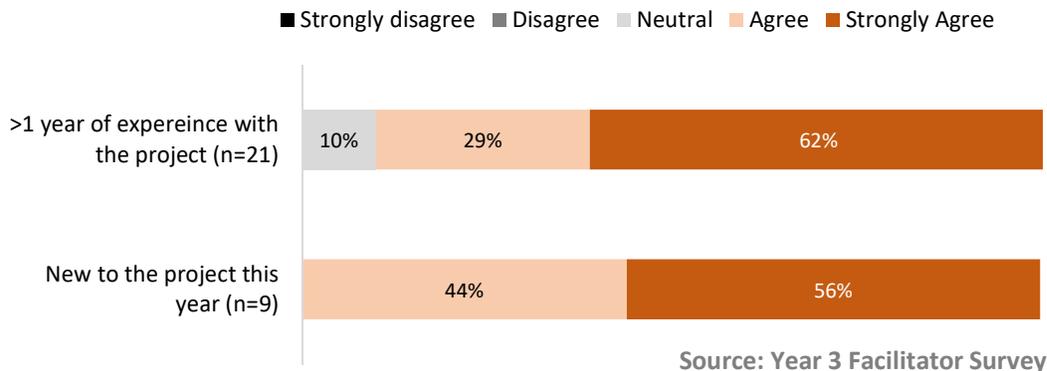


Source: Year 3 Facilitator Survey

The one library staff and one engineer who were neutral about continuing this type of collaboration had both been a part of the partnership for more than one year (Figure 7). Although they viewed participating in the project as a positive experience overall, some library staff and engineers might be looking for a new direction after being a part of the project for multiple years. For example, one library staff noted that they would like new activities to engage their patrons because some youth returned to the program in subsequent years and mentioned that they had already done an activity. Similarly, one engineer mentioned that they had difficulty recruiting volunteers in the last year of the program and thought that new program activities might help engage volunteers. Finally, one engineer noted that they had participated for two years and would like to pass the opportunity forward to a new set of volunteers.

**Figure 7. Returning engineers and library staff were more likely to be neutral about continuing the collaboration.**

*Survey Question: I and/or my library/ASCE branch would like to continue collaborating with my partner ASCE branch or other professional societies/my partner library or other public libraries in the future*



Library staff noted that, due to the success of their partnership with ASCE, they are interested in continuing to work with professional groups in the future. Library staff gained a better understanding of ASCE’s commitment to STEM outreach, and the enthusiasm of the ASCE volunteers helped open their eyes to what working with professional groups can be like. For example, library staff noted,

**“I think it is a really great model working with a professional association. And I feel inspired because I think that the engineers were such a pleasure to work with and we got so much out of it as library staff and also, of course, our community. So that inspires me to reach out to other professional associations.”**

**“[Our lead engineer] and the other engineers care about spreading their enthusiasm for engineering to children who may be inspired to consider being engineers, themselves, someday. So, what I learned is, it's not crazy to ask engineers to come and share their world with kids in the library; they want to share.”**

**“I would suggest [other libraries] do it. I think a lot of libraries don’t realize that ASCE is willing to work with them and that they’re able to collaborate because they have outreach goals. I don’t see a con to partnering with an ASCE chapter.”**

**“I made great contacts and, dare I say friends, at ASCE.”**

Engineers were also interested in continuing to work with their partner libraries. They see the important role that libraries play in their communities, especially as it relates to reaching underserved audiences. Also, they view their collaboration with libraries through the *Project BUILD* model as a valuable volunteer opportunity that is not a large cost or time commitment for their branch. They would also be interested in helping to bring the program to new cities by sharing their experiences to help promote the program and to train engineers at other ASCE branches. As one engineer described,

**“I think that libraries are a really important resource for the communities. They bring people together and they're free and they provide this service to basically anybody in the community. And so this is a program that's open to everybody. And it brings this particular viewpoint or this particular learning experience to students that might not have a lot of STEM support. So I think that it's really valuable for the community.”**

Both library staff and engineers also mentioned that they would be interested in participating in outreach events outside of the library to reach more of the public, especially underserved populations. Although there

is a challenge with scheduling when including ASCE volunteers in outreach events, existing weekend events could be a starting point. Other libraries included their ASCE partners during a public STEM festival or during STEM nights, so libraries interested in doing something larger could consider a similar approach.

## Collaboration Challenges and Lessons Learned

Library staff and engineers noted a number of challenges and lessons learned from their experience collaborating with their partner library/ASCE branch.

### *A common understanding of the roles of the library staff and engineers is vital*

Library staff and engineers stressed that it was very important to establish the roles and responsibilities of library staff and engineers early on in the partnership, discussing their strengths and goals to ensure everyone has a common vision of how the program will run. If possible, it helps to meet in-person to discuss who does what during each program. The in-person *Project BUILD* workshop that took place during Year 2 seemed to be useful for this. One engineer mentioned, **“I appreciated the training that emphasized what libraries versus ASCE folks were responsible for.”** Additionally, when library staff and engineers were not able to meet in-person at the meeting, it appears that they faced more challenges understanding roles. As one library staff mentioned, **“There didn't seem to be a clear distinction of the ASCE partner's responsibilities. Our ASCE partner was unable to attend the initial training, so that may have played a role.”**

Lead engineers also felt that it was important for them to communicate roles clearly with volunteers that they were recruiting so that the volunteers were aware of what was expected of them. For example, lead engineers noted that it was important to let volunteers know that they wouldn't be responsible for managing youth on their own and that all materials would be provided for them.

### *Having point people at the library and ASCE branch is very helpful for coordination and communication*

Library staff and engineers mentioned that it's important to have a lead person, or persons, at both the library and ASCE branch that are passionate about the project. These individuals can be the key contact persons through which communication can be funneled. This ensures consistency and helps smooth the process of program planning (e.g., one person to bounce ideas off of, make program decisions, and ensure that there is an ASCE presence at each program).

If possible, having two key contacts is beneficial because staff turnover can impact program sustainability. Nearly all libraries experienced some staff turnover during the three years of the project.

### *Engineers need to be informed of the rules and norms of volunteering with a library*

A few library staff and engineers mentioned that it was important for engineers to be aware of the library's rules and policies (e.g., safety and privacy rules, policies about food). Talking about this early on can help the library staff and engineers be on the same page in terms of processes and find ways to address any concerns. For example, some ASCE volunteers would like to have photos from the programs and they would need to work with the library staff to determine what policies are in place for taking and sharing photos, if consent forms need to be completed, etc.

### *Future collaborations need to consider the proximity of the ASCE branch to the library*

Some ASCE branches were located in a different city from the library which in some cases necessitated that volunteers drive 45 minutes or more to help out at the program. Although the engineers appreciated being able to reach a different community, it made it more challenging to recruit volunteers and hindered the ability to meet with their library partners in-person to plan programs. It was acknowledged, however, that this would be limiting, especially for rural areas where it is less likely that there will be a large number of ASCE members living in the area.

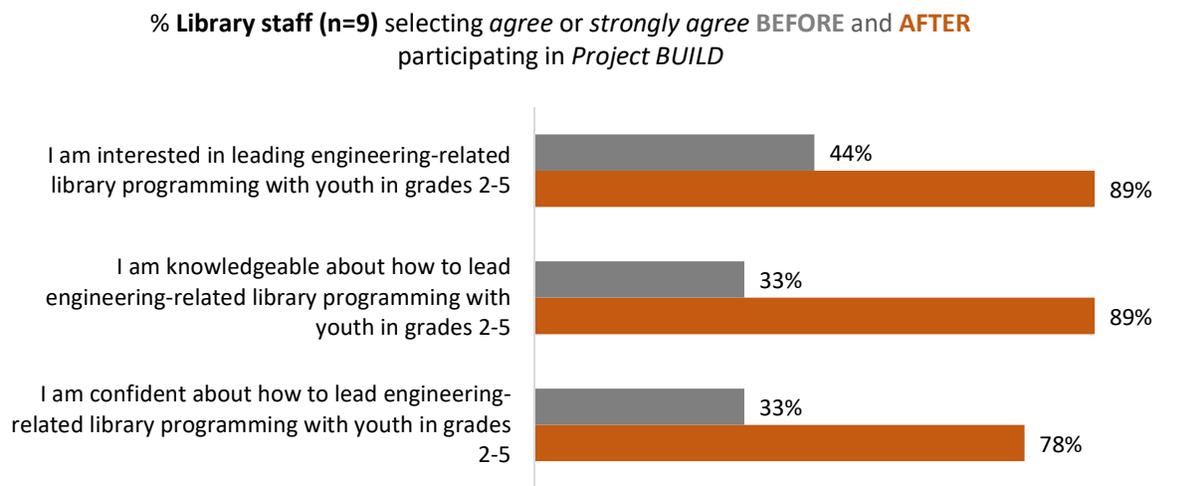
*Timing and scheduling can be a challenge*

There were also challenges in scheduling the programs due to the fact that engineers are generally not available to volunteer during working hours. This also made in-person program planning challenging when library staffs' and engineers' availability did not overlap. This was also a factor when considering outreach (e.g., at afterschool programs) when engineers were not likely to be available.

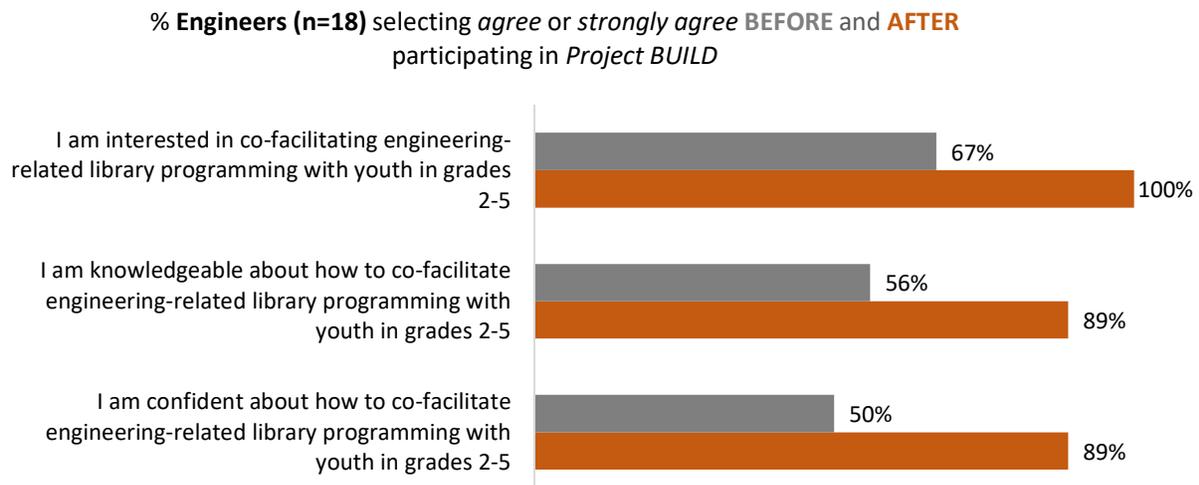
**Section 3: Influence of Project Involvement on Library Staff and Engineers**

Library staff and engineers were asked to reflect back on how interested, knowledgeable, and confident they were about facilitating engineering-related programs with youth before participating in *Project BUILD* and how they felt at the end of the project. Overall, library staff and engineers had increased interest, knowledge, and confidence after their experience with the project (Figure 8). Results also indicate that those who had been involved in the project for more than one year were more likely to see an increase in interest, knowledge, and confidence (Figure 9).

**Figure 8. Overall, responding library staff and engineers had increased interest, knowledge, and confidence in leading/facilitating engineering-related programs with youth.**

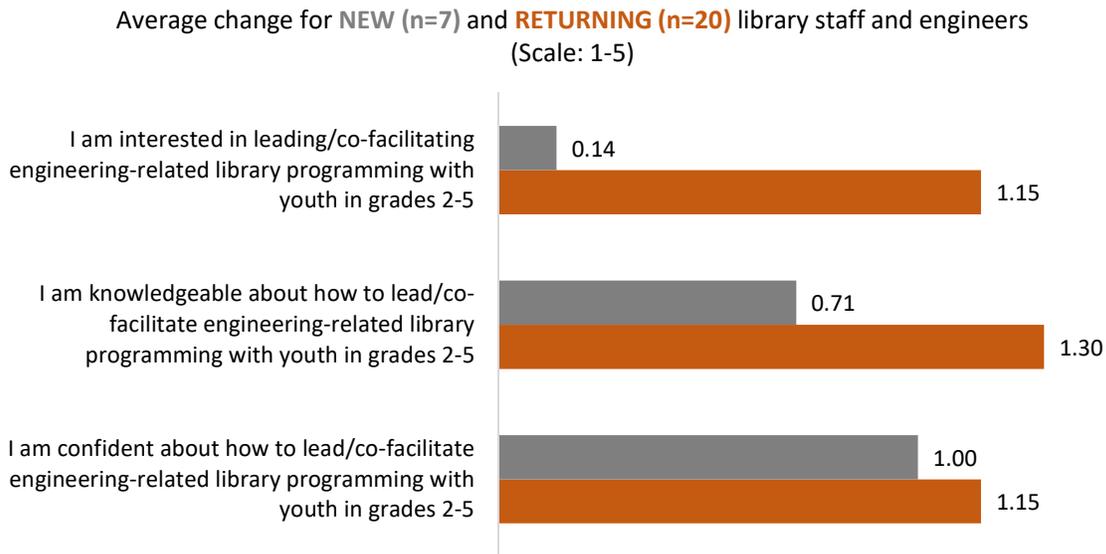


Source: Year 3 Facilitator Survey



Source: Year 3 Facilitator Survey

**Figure 9. Library staff and engineers with more than one year of experience with the project were more likely to have increased interest, knowledge, and confidence.**

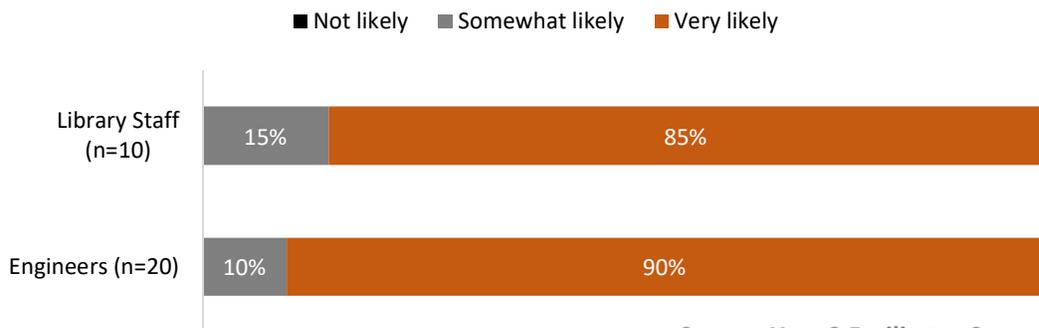


Source: Year 3 Facilitator Survey

Additionally, most library staff and engineers reported that they are *very likely* to participate in additional engineering-related youth programming in the future (Figure 10).

**Figure 10. Most library staff and engineers are *very likely* to do similar programs in the future.**

Survey Question: *How likely is it that you and/or your library/ASCE branch will conduct/volunteer to co-facilitate additional engineering-related programming for youth in grades 2-5 in the future?*



Source: Year 3 Facilitator Survey

## **Influence on Engineers**

Engineers learned to work with younger audiences (e.g., how to engage them, how to explain concepts simply) and enjoy volunteering, especially being able to bring *Project BUILD* to underserved audiences. For example, engineers mentioned,

**“I enjoy encouraging and engaging the kids in STEM activities and especially supporting the girls who seem to be overshadowed at times by the more outgoing and louder boys.”**

**“It was good to interact with the kids. I like it when the ‘lights come on’ and there are ‘ah-hah’ moments. It is nice to reach out to kids that might not have this opportunity, so I felt positive about that.”**

**“I learned a great deal about working with kids, and what they responded to. I also learned a lot from other volunteers, the way they responded to students and their approach to answering questions.”**

**“[I personally benefited] by working with children, I have honed my speaking skills and my ability to simply explain engineering concepts.”**

## **Influence on Library Staff**

Library staff explained that having a vetted set of curated activities, along with support from their engineer partners, made it less intimidating to run the program. Overall, library staff reported feeling more confident in offering STEM-related programming and many described plans to incorporate *Project BUILD* or other engineering-related activities into future programming, even if a professional engineer cannot be present. For example, one library staff is considering ways to incorporate engineering-related activities into story time or other programs. Another library staff shared the activities with a colleague who was also able to run the activities, and plans to look at the *STAR Net* STEM Clearinghouse (an online repository of activities developed by the Space Science Institute as part of their *STAR Net* project) for additional programming ideas (<http://clearinghouse.starnetlibraries.org/>). For example, library staff explained,

**“Project BUILD really helped me step out of my comfort zone when it comes to STEM programs and working with children in general. This project has made me feel like STEM is more accessible to me and I am not intimidated by the thought of leading a STEM program anymore. The STEM Clearinghouse has been very helpful to me and I've shared it with many of my colleagues.”**

**“Having the materials and the program vetted and consciously put together for specific principles and then to have the engineer there, it took the pressure off, I didn't have to be the expert.”**

Some library staff also described that participating in the project and working with their engineer partners helped them gain a better understanding of engineering, a new perspective on failure, and how the engineering design process can be applied to their everyday life. For example, one library staff shared,

**“I am personally more knowledgeable about the field of engineering and real world examples of the work that engineers do. I have been able to use Design Thinking in developing and adapting Family Kits. For example, Keva Planks are way too heavy for children to carry on the walk home from the library. We switched out the Keva circulating Kit with an additional K'Nex set.”**

## Challenges Faced by Library Staff and Engineers

Challenges faced by libraries and engineers during their time with the project are described in this section.

*Both library staff and engineers felt disheartened at times when program attendance was low.*

Library staff and engineers felt that the program was beneficial for youth and would have liked to have reached a larger audience, especially given the fact that the engineers were taking their personal time to attend the programs. Engineers who participated in outreach programs (e.g., the engineering festival that one library co-hosted) felt that this was a good way to reach a large audience, but they also noted that working with a smaller group of youth provided a more focused, in-depth experience. For example, one engineer noted,

**“Sometimes it’s a little disappointing when you have set things up and less than ten kids come in. So I think, at least from my experience, the best bang for our efforts and buck is probably the festival. But at the same time, you get a more intimate and impactful arrangement with these small group settings.”**

Some engineers and library staff felt that library staff could be more supported in understanding their role in facilitating the STEM content of the program, connecting it to their existing skills, and increasing their confidence in doing so (e.g., through more general training and support around STEM education). For example, one library staff suggested having a specific person available that they could reach out to if they have questions about their library program activities. They also suggested tying aspects of the project back to library staffs’ strengths. For example, one library staff mentioned, **“training should incorporate ways to increase [library staffs’] confidence in presenting STEM programming for those with non-STEM backgrounds. Demonstrate how they can make it blend with their other skills.”**

Some engineers echoed this, with one explaining how **“the library staff did a great job of prepping and planning, but the day-of, running the activity, they kind of shied away from.”** The engineer felt that it was important for the library staff to take on a larger role in running the program if the goal was to help empower library staff to do similar programs, perhaps without the engineers, in the future. Engineers sometimes felt that since subject matter experts were present, the library staff seemed to default to them to present the engineering concepts. However, engineers pointed out that the library staffs’ ability to make concepts interesting and understandable to youth is a place where library staff can help support the engineers when facilitating the program.

*Library staff also noted that the project was staff-time intensive, especially for the lead library staff.*

One library used the stipend to pay for a substitute library staff member to free up their lead library staff to work on *Project BUILD*-related activities. A library staff member at another library noted that it would have been helpful if they had used part of their stipend to pay for someone to coordinate and lead the program.

One library staff member went on to explain that *Project BUILD* programs are different from and more involved than their typical school-aged programs, which makes them valuable but also time consuming to prepare. They suggested that it would be helpful to have an overview of the project with a timeline laying out different expectations to help them plan their time from the beginning. For example, one library staff member explained,

**“It’s really valuable and uplifting. It’s just that compared to a standard issue library programming there’s a learning curve. I can provide school-aged programming on the fly whereas this program is more complicated and elevated. So it took more time.”**

## Section 4: Influence of Library Programs on Patrons

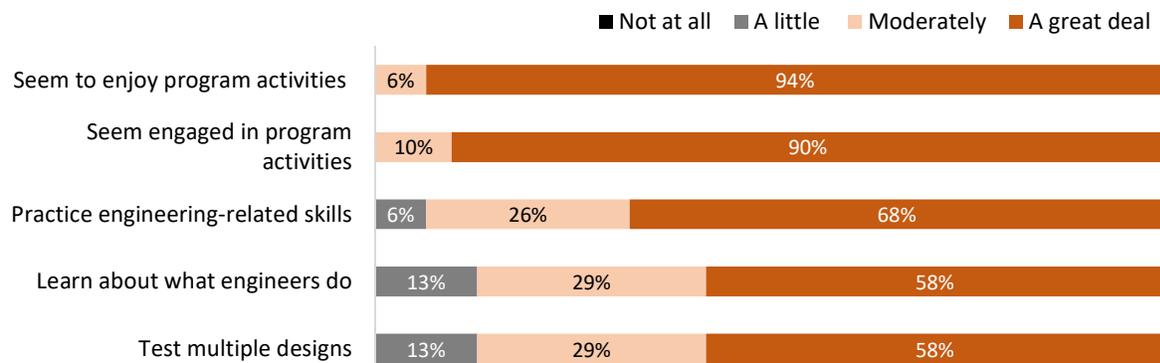
All partner libraries participated in two rounds of *Project BUILD* programs, each consisting of four different programs: *Span-tastic Bridges*, *Designed to Survive*, *Clean-up Our World*, and *Power from Nature*. Year 2 programs occurred from September 2018-March 2019 and Year 3 programs took place from August 2019-February 2020.

### Program Facilitators' (Library Staffs' and Engineers') Views of *Project BUILD* Library Programs

Based on combined survey responses from program facilitators (library staff and engineers), most felt that youth enjoyed (94%) and seemed engaged in (90%) program activities *a great deal*. Nearly all (87% or more) also reported that youth at library programs at least *moderately* practiced engineering-related skills, learned about what engineers do, and tested multiple designs (Figure 11).

**Figure 11. Nearly all responding library staff and engineers felt youth enjoyed and seemed engaged in the program activities *a great deal*. (n=31)**

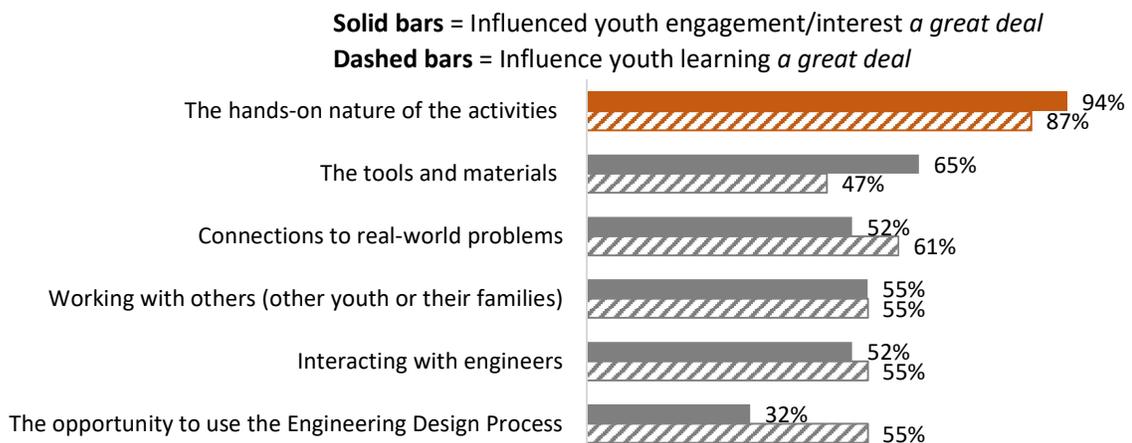
Survey Question: *In your opinion, to what extent did youth at Project BUILD/Ready, Set, Create programs...*



Source: Year 3 Facilitator Survey

Program facilitators were asked to identify the extent to which various aspects of *Project BUILD* library programs influenced youths' engagement/interest and learning. As shown in Figure 12, at least half or more of facilitators selected nearly all aspects as having a *great deal* of influence on youths' engagement/interest and/or learning. The hands-on nature of the activities was most likely to be selected as having a *great deal* of influence on both engagement/interest (94%) and learning (87%).

**Figure 12. Program facilitators felt the hands-on nature of the programs influenced youths' engagement and learning *a great deal* (n=31)**



Source: Year 3 Facilitator Survey

### *Open-ended, hands-on design challenges provide multiple entry points*

During interviews, program facilitators further explained that the hands-on nature of the activity was especially impactful because the design challenges were open ended and offered a variety of materials. Facilitators noted that this allowed youth to be creative and offered multiple entry points so that youth found something that interested them even if they were not initially drawn-in by the engineering aspect of the program.

For example, one engineer shared a story of a girl that came into the program with the attitude that “building things is for boys”. They were doing an activity about landslides and one engineer had her create some shrubs, explaining that landscaping is something engineers consider when designing for landslides. The engineer went on to describe, **“so we had her build some shrubs...and it protected the house. And she was like, oh, wow, something pretty could actually protect the house. I want to know more.”**

An engineer at a different site shared a similar story about a girl who was creating a unique windmill design which turned out to work very well. The engineer further noted that, **“this was kind of a student who... it seemed to me like she really didn't kind of see herself as a problem solver. And then when that clicked, she was like, ‘oh, that's really exciting.’”**

### *Incorporating the engineering design process emphasized the ways engineers work and that it's ok to try again*

Doing hands-on activities also engaged youth in work similar what engineers do, which both emphasized specific things that engineers work on (e.g., designing bridges) as well as the process they use in their work – the engineering design process (EDP) and testing multiple designs. As one facilitator explained,

**“Hands-on [activities] helped them discover something new and understand that, for example, engineers design buildings to accommodate the wind. It's something that was new to them. Also, bringing in the EDP and trial and error.”**

Additionally, facilitators felt that using the EDP helped youth realize that it's ok to try again and improve, which is an important life lesson that youth walked away with. Youth were also eager to try again and improve their designs. For example, facilitators shared,

**“[Youth] were working and all of a sudden I hear [a little boy] yelling, ‘I improved! I improved!’ It was like, he got it. He kept saying, ‘Oh, see if you can improve.’”**

**“[During the water filter activity] I literally stood there for 20 minutes, pouring water out and the kids would come up, test their design. They'd look at the water. Go back and try to figure out how to make it better. I was amazed that we spent that long because they just kept reiterating their designs.”**

**“They learned a lot about the process. They learned that you don't always get it right the first time. And then they got into that. They didn't get frustrated. I think a lot of them really got into trying again.”**

Facilitators also noted that it was important to have an extended period of time to iterate on designs so that youth could gain the benefit of trying again. For example, libraries often held programs that were longer than one hour and/or focused on only one design challenge so that youth had a lot of time to create multiple designs.

### *Real-life connections helped youth understand the work of engineers and its relation to the design challenge*

Connections to real-life helped youth understand the work that engineers do and how it related to the design challenge. Many programs made local connections such as mentioning or showing pictures of a local bridge or sharing a story about water contamination in their community. For example, facilitators shared,

"And [youth] were like, hey, I recognize that or I've driven across that or my parents talk about that. It was that relationship between what they see every day and kind of what they're learning."

"When you show them a real world application, we don't just crunch numbers all day. I think, help them understand better what we do."

Another engineer provided an example of how, during an activity on earthquakes, they showed a video of engineers using a real shake table. They explained that the "kids could see what those experiments that [youth] were doing [during the activity] and also what those experiments look like in the real world for engineers who were really designing."

#### ***Youth worked in teams and learned from one another***

Facilitators also felt that youth benefitted from working in a team and learning from their peers. They noted that youth who worked in teams "typically saw better progression through the iterative design process and working toward a solution collaboratively. They gained experience collaborating, sharing ideas, working through problems and expressing themselves verbally." Youth also saw examples of what other teams were doing and learned from their designs as well, just as real engineers do in their work. As one facilitator noted,

"I think the kids benefited from kind of being forced to work in a team. So not only are they getting a feel for engineering and for the engineering process, but they're also engaged in social activities that help them learn how to interact with different ages, with kids they don't know, in different situations. I felt it was a really holistic experience."

#### ***Engineer volunteers helped connect a face to the profession and made the career feel more accessible***

Library staff and engineers felt that the presence of the engineers was valuable because they were able to bring in specific content knowledge and connect a face to the profession, showing youth that real people actually work to solve engineering-related problems. Facilitators felt that having a diverse group of engineers also helped make the profession seem more accessible. Some facilitators felt that this message was especially important for the caregivers in the room to help them learn about the engineering profession and see it as something accessible for their children. For example, one engineer explained,

"When the kids you're seeing look a little more like you. It's like I can do it. I can do it. It's a possibility for me."

### **Suggestions for Strengthening the Engineering Career Pathway Connection**

Library staff and engineers provided some suggestions for how to strengthen the engineering education and career pathway component of the program.

A number of library staff and engineers mentioned that there should be time for engineers to share how they became interested in engineering, especially by relating it to what they were like and interested in when they were in elementary school. Engineers noted that this could be challenging for some because there is a wide variety of civil engineers, with some working on projects that are less visible (e.g., industrial pipelines). These engineers might need more support about how to talk about these types of jobs and how to make them accessible to youth. They felt the engineer should continue to be encouraged to share a little about their work in an age-appropriate manner and perhaps enhance it by having engineers bring in something from their work (e.g., a model, piece of equipment) to show youth and caregivers. For example, at one library, the engineer brought their hardhat and other gear with them and allowed youth to try them on.

Some library staff and engineers also suggested incorporating a wrap-up activity at the end of the *Project BUILD* library program explaining what they did that day, its connection to real-life engineering, and additional activities that they could do to continue their learning on the topic at home. This could also be offered as a more detailed version of the existing take-home activity handout, with additional engineering-

related activities and information about that day’s activity along with resources to continue the learning at home. For example, one library staff shared,

**“Our engineer brought in activities that families could do at home to extend the learning. I think that’s important when you bring a family member in. Maybe that’s something you look at if you were to continue on and continue to do activities based on the *Project BUILD* materials. I would beef up the take-home stuff.”**

Library staff and engineers also mentioned that having a diverse set of engineer volunteers and making real-world and local connections was important and something that programs should continue to incorporate in the future.

### **The Influence of *Project BUILD* Library Programs on Youth**

Results pertaining to patron outcomes will be shown overall as well as compared by year and disaggregated by gender, when applicable. When considering findings by year, it should be noted that very few youth returned to *Project BUILD* programs across the two years (Year 2 and 3 of the project). Based on optional names provided by youth on their surveys (which was filled out on 86% of surveys), only six youth could be identified as having attended during both years. Due to the informal nature of the program, it was not feasible to administer both pre- and post-surveys. Therefore, it is possible that libraries are attracting a different group of youth, with different characteristics (e.g., prior knowledge of or interest in engineering), to programs during the second year which is impacting their responses to survey questions.

#### **Youth library program participants**

As shown in Table 2, the number of youth patron surveys decreased from Year 2 to Year 3, suggesting that program attendance may have also decreased. During interviews, many library staff mentioned that their Year 3 program attendance was the same or less than Year 2. Additionally, one library mentioned that they experienced a large decrease in program attendance which they attributed at least partly to the weather.

**Table 2. There were fewer youth patrons surveys returned in Year 3.**

	# Completed surveys		
	Year 2	Year 3	Combined
<b>Youth</b>	193	126	319

Few youth returned for multiple program each year (Table 3). Based on names reported on surveys, 228 youth attended more than one program in either Year 2 or year 3 and only 39 youth (17%) returned surveys for more than one program.

**Table 3. Most youth attended only one program in a given program year.**

# Programs attended	# Individual Youth*		
	Year 2 (n=140)	Year 3 (n=88)	Combined (n=228)
<b>1 program</b>	119	70	189
<b>2 programs</b>	14	15	29
<b>3 programs</b>	7	3	10

*\*Based on optional names reported on surveys*

Based on survey responses, there were slightly more male than female youth at library programs (Table 4). However, in Year 3 the percentage of male and female youth participants was approximately equal. Overall, youth participants were most likely to identify as either White (34%) or Black/African/African American (27%). The majority of youth participants identified as a race/ethnicity other than White (66%) and this remained consistent from Year 2 to Year 3 (Table 5). Finally, approximately three-quarters of youth in both Year 2 and Year 3 were in the target age range of grades 2-5 (Table 6).

**Table 4. In total, there were slightly more boys at library programs.**

	% Youth respondents		
	Year 2 (n=174)	Year 3 (n=112)	Combined (n=286)
Female	40%	50%	44%
Male	59%	49%	55%
Other	1%	1%	1%

Source: Youth Program Survey

**Table 5. The majority of youth participants identified as a race/ethnicity other than white.**

	% Youth respondents		
	Year 2 (n=145)	Year 3 (n=96)	Combined (n=241)
White	34%	34%	34%
Black/African/African American	22%	33%	27%
More than one	19%	13%	16%
Asian	12%	7%	10%
Hispanic/Latino/Latina	9%	6%	8%
American Indian/Alaska Native	4%	3%	4%
Native Pacific Islander	-	1%	<1%
Other	1%	2%	1%

Source: Youth Program Survey

**Table 6. The majority of youth were in the target age range of grades 2-5.**

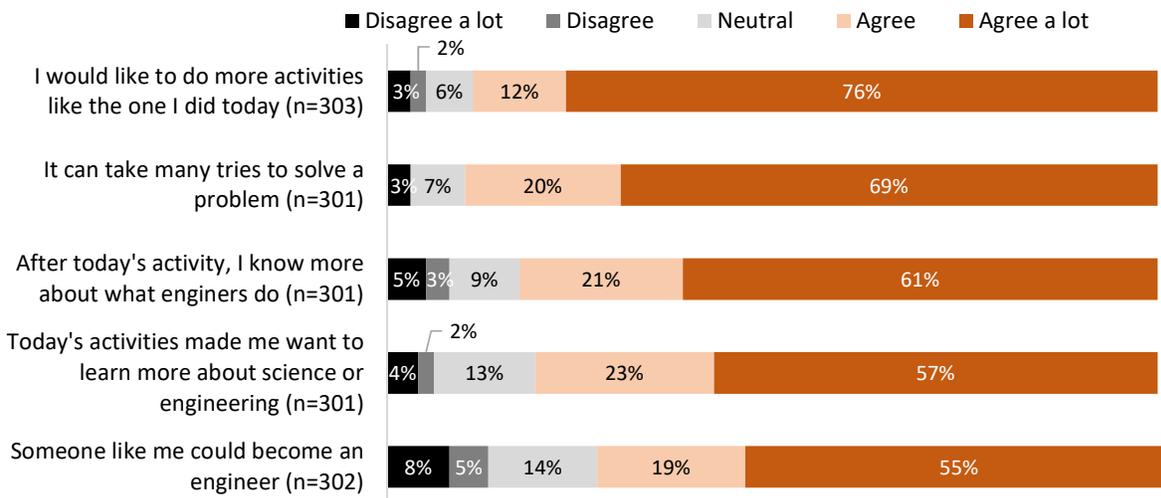
	% Respondents		
	Year 2 (n=182)	Year 3 (n=119)	Combined (n=301)
Pre-K	3%	-	2%
Kindergarten	-	1%	<1%
1st	3%	9%	6%
2nd	19%	13%	17%
3rd	26%	21%	24%
4th	16%	25%	20%
5th	16%	17%	16%
6th	10%	4%	8%
7th	4%	8%	6%
8th	1%	1%	1%
9th	-	1%	<1%
% in target age range (grades 2-5)	77%	76%	77%

Source: Youth Program Survey

### Youths' overall perspectives following library programs

As shown in Figure 13, overall, the majority of youth *agreed* or *agreed a lot* that they would like to do similar activities (88%) and learn more about engineering and science (80%) after participating in *Project BUILD* library programs. Most youth also *agreed* or *agreed a lot* that they learned about what engineers do (82%) and understood the key engineering message that “*it can take many tries to solve a problem*” (89%). Youth were slightly less likely to select that someone like them could become an engineer (74% overall).

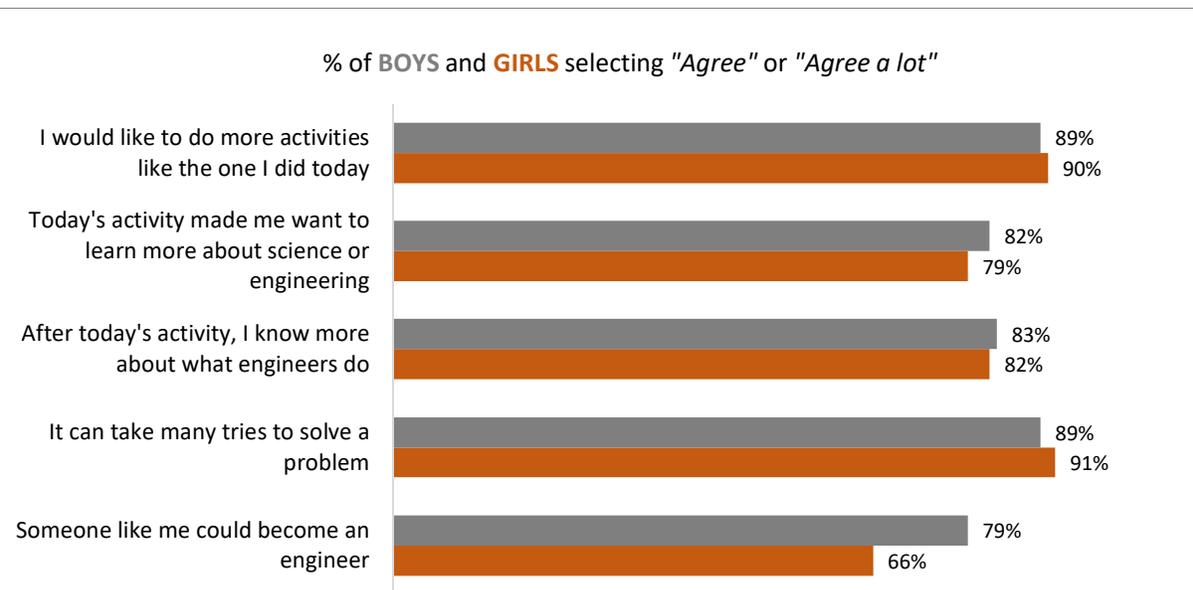
**Figure 13. Most youth respondents agreed a lot that they want to do more activities like the one they did at the *Project BUILD* library program.**



Source: Youth Program Survey, Year 2 & 3 Combined

Looking across both years, girls and boys were approximately equally likely to *agree* or *agree a lot* to all statements provided in the survey with the exceptions of “*Someone like me could become an engineer.*” Girls were less likely than boys to agree with this statement (66% and 79%, respectively; Figure 14).

**Figure 14. Girls were less likely than boys to agree that someone like them could become an engineer.**

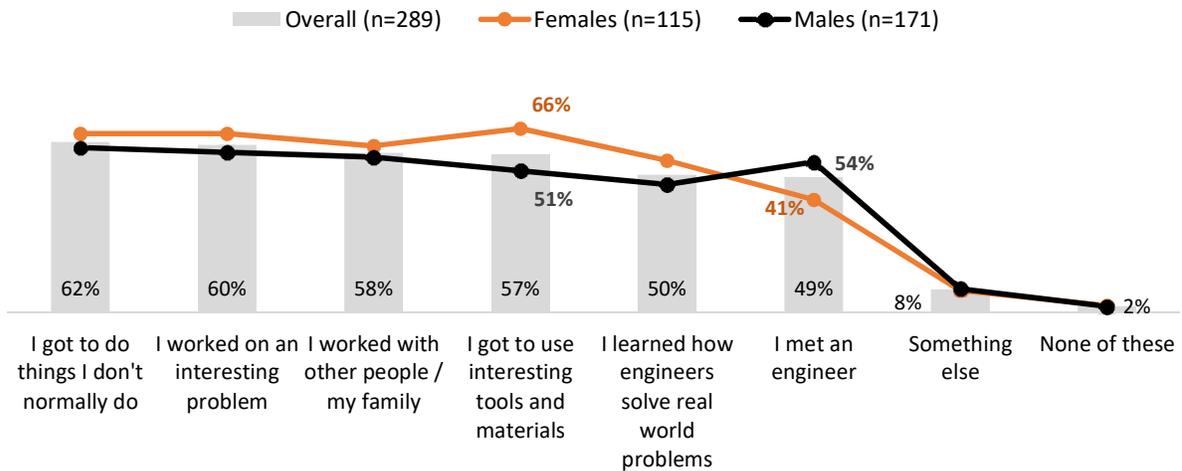


Source: Youth Program Survey, Year 2 & 3 Combined

### Aspects of library programs that youth enjoyed

As shown in Figure 15, when asked to select on the survey what they enjoyed about the *Project BUILD* activity they had just participated in, youth were most likely to indicate that they enjoyed the chance to do things they don't normally do (62%). Girls were more likely than boys to select that they enjoyed that they got to use interesting tools and materials (66% and 51%, respectively), while males were more likely than females to select that they enjoyed that they got to meet an engineer (54% vs. 41%).

**Figure 15. Both boys and girls in Year 1 and 2 enjoyed that they got to do things they don't normally do.** Survey Question: Which of the following things did you enjoy about today's activity? You may choose more than one answer.



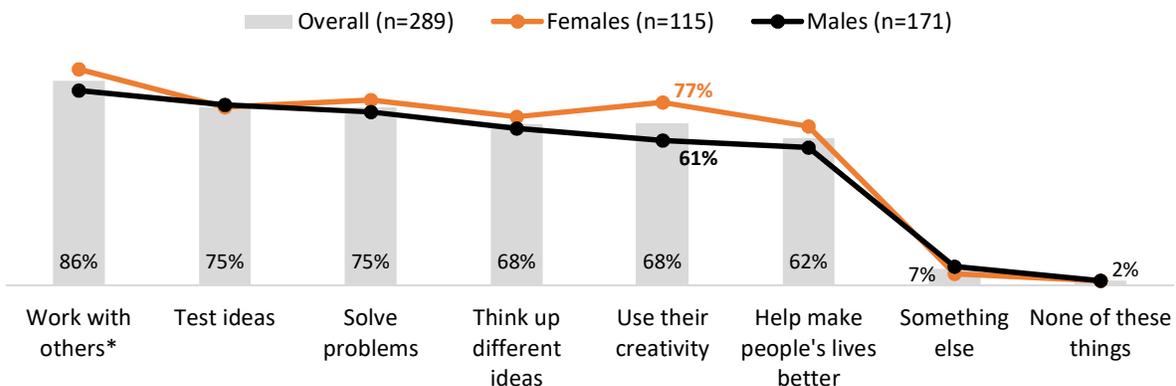
Source: Youth Program Survey, Year 2 & 3 Combined

### Youths' awareness of the work of engineers

When asked to identify specific activities that an engineer would do for his or her job, at least three-quarters of youth selected that engineers do not work alone, that they test ideas, and that they solve problems (Figure 16). At least two-thirds of youth also identified all other engineering-related activities listed. Overall, boys and girls were about equally likely to identify each activity. However, girls were more likely than boys to select that engineers use their creativity (77% vs. 61%).

**Figure 16. Youth were most likely to identify that engineers work with others, test ideas, and solve problems.**

Survey Question: Which of the following would an engineer do for his or her job?

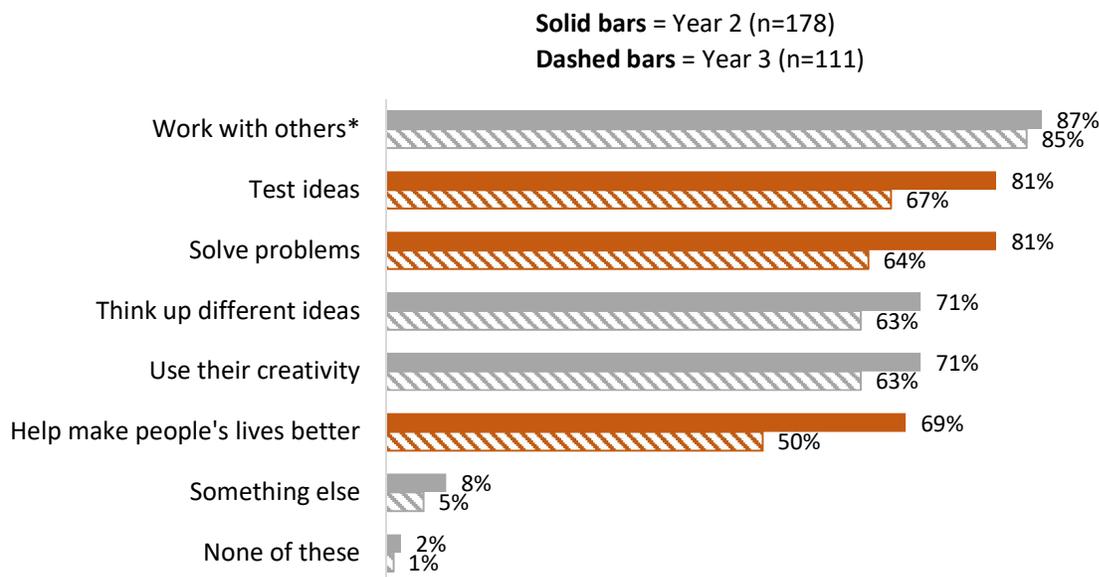


\* Reversed from original answer choice "Work alone"

Source: Youth Program Survey, Year 2 & 3 Combined

When comparing the two years of the program, youth were much less likely to select that engineers test ideas, solve problems, and help make people’s lives better in Year 3 compared to Year 2 (a 14%-18% decrease depending on the answer choice; Figure 17).

**Figure 17. In Year 2, youth were less likely to select that engineers test ideas, solve problems, and help make people’s lives better.**



\* Reversed from original answer choice  
“Work alone”

Source: Youth Program Survey, Year 2 & 3  
Combined

### Youth drawing activity pilot

In Year 3 of the project, a member of the evaluation team conducted site visits with two different partner libraries to facilitate and pilot a youth drawing activity. Youth were asked to draw two pictures (1) a picture of what they did at the library program they had just participated in and (2) a picture of a future library program activity that they would want to participate in. The purpose of the drawing activity was to test an evaluation tool that would allow youth to express their views of the program in a manner that was more engaging than a traditional survey and did not depend as heavily on reading ability.

Both library programs featured activities tied to the theme “*Cleanup Our World*”. Most youth drew something representing a hands-on element of the program (e.g., the water filters they created or the water that they dirtied and then cleaned up) and some specifically mentioned “experimenting”. Drawings of future activities varied, but some tied into what they did that day (e.g., making recycled bracelets, building an eco-friendly house, cleaning up a lake). Sample drawings from youth can be found in Appendix B.

These pilot findings suggest that the aspects of the program that stood out to students were:

- ❖ **The topic:** Youth wanted to do more activities related to helping the environment
- ❖ **The hands-on, building aspects of the program:** Youth often drew the items that they created during the program
- ❖ **The opportunity to “experiment”:** Some youth noted ways that they create multiple designs and “experimented” during the program to solve the design challenge

## Influence of Library Programs on Caregivers

This section describes findings from the caregiver patron survey, administered to all caregivers who stayed at library programs.

### Caregiver engagement at library programs

Similar to youth surveys, the number of caregiver patron surveys decreased from Year 2 to Year 3 (Table 7).

**Table 7. There were fewer caregiver patrons surveys returned in Year 2.**

	# Completed surveys		
	Year 2	Year 3	Combined
Caregivers	85	32	117

In Year 3, library staff and engineers reported that, in general, at least a few caregivers stayed for library programs and were engaged in the activities (Table 8). This is consistent with the fact that some caregiver surveys were returned for most programs.

**Table 8. Library staff and engineers observed that at least a few caregivers stayed and participated in program activities. (n=31)**

Survey Question: In general, to what extent were caregivers/parents engaged in program activities?

	% Facilitators (n=31)
No caregivers/parents stayed for the programs	-
At least some caregivers/parents stayed for the programs but were NOT engaged in program activities	19%
Only a few caregivers/parents stayed and were engaged in program activities	35%
About half of caregivers/parents stayed and were engaged in program activities	16%
All or nearly all caregivers/parents stayed and were engaged in program activities	29%

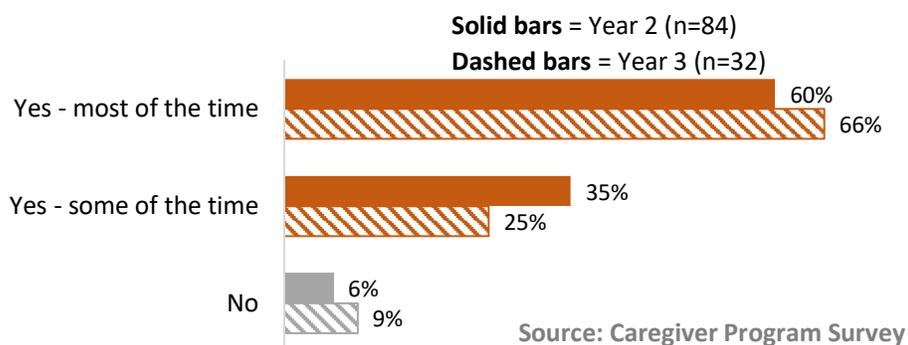
Source: Year 3 Facilitator Survey

When caregivers stayed at the program, library staff and engineers noted that they usually engaged by helping youth build their designs and providing feedback.

All caregivers who remained at the program were asked to complete a survey. In both Year 2 and Year 3, 90% or more of these caregivers reported that they participated in the activities with their children at least some of the time and at least 60% participated in most of the activity (Figure 18).

**Figure 18. Nearly all caregivers who stayed at programs participated in activities at least some of the time.**

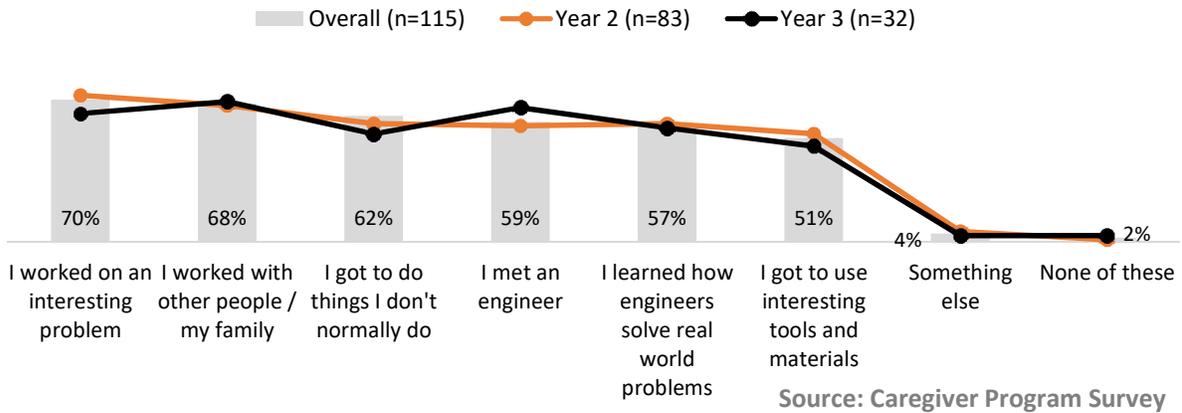
Survey Question: Did you participate in today's activity with your children?



When asked to identify specifically what they enjoyed about program activities, most caregivers selected that they got to work on an interesting problem and work with other people or their family (Figure 19).

**Figure 19. Caregivers enjoyed the interesting, collaborative design challenges.**

Survey Question: Which of the following things did you enjoy about today's activity



### Caregivers' program experience

Survey results indicate that nearly all (97% or more) caregivers who stayed at *Project BUILD* library programs *agreed* or *agreed a lot* that they would like to seek out and do similar activities with their children in the future and felt that the program was a valuable learning experience for their children (Figure 20). Over 90% also *agreed* or *agreed a lot* that they felt included in program activities and that the program helped them learn about engineering and feel more comfortable engaging their children in science or engineering activities.

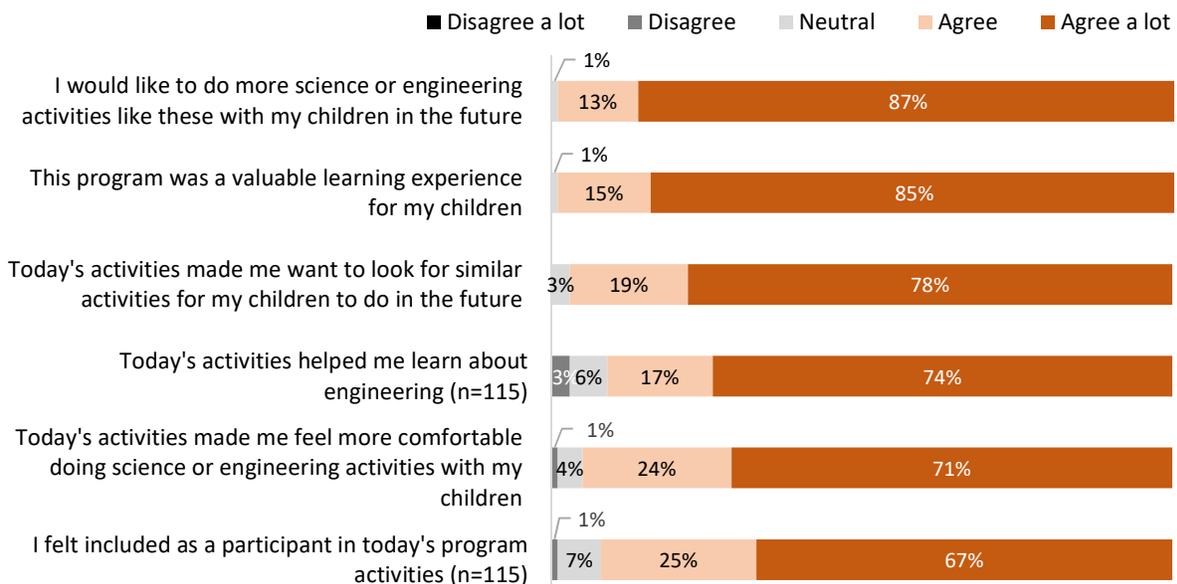
#### Feedback from Caregivers:

"I enjoyed watching my child use critical thinking skills to build a bridge."

"I got to see my son challenged and it was great to see him succeed."

"I learned how bridges are built and supported."

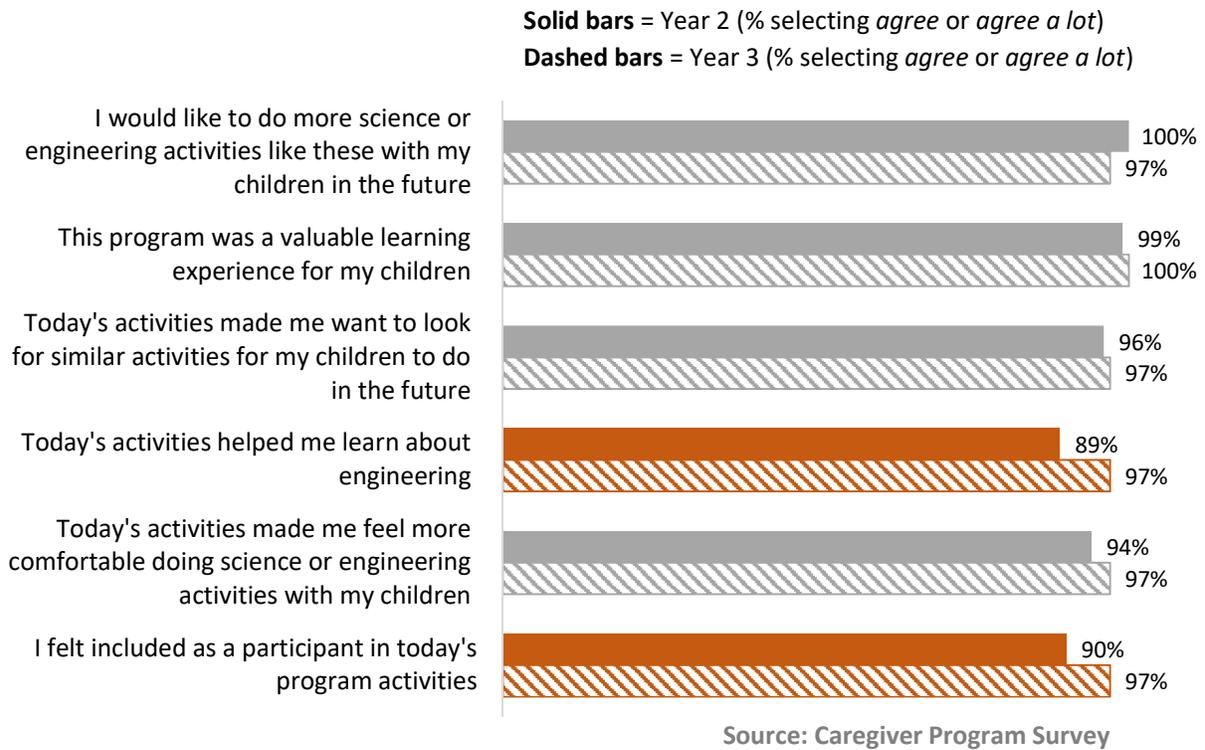
**Figure 20. Overall, most caregivers *agreed a lot* that the program was valuable and that they want to do similar experiences with their children in the future. (n=116 unless otherwise noted)**



Source: Caregiver Program Survey, Year 2 & 3 Combined

When comparing the two years of the program, caregivers in Year 3 were slightly more likely to *agree* or *agree a lot* that they felt included in program activities and learned about engineering (Figure 21).

**Figure 21. Caregivers in Year 2 were slightly more likely to agree or agree a lot that they felt included in program activities and learned about engineering.**

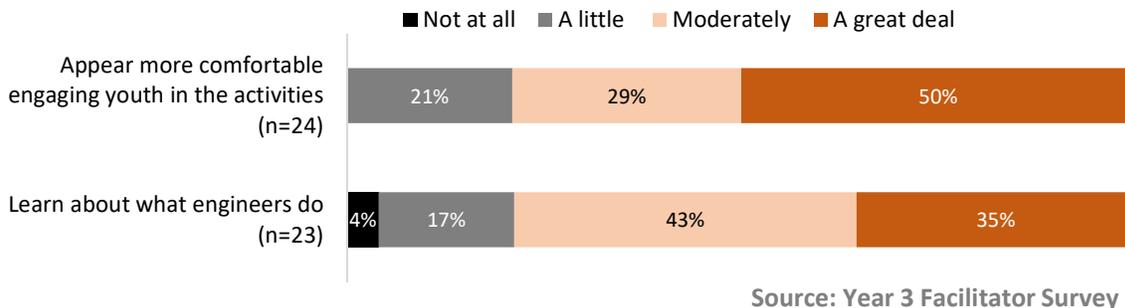


**Program facilitators' views of caregiver outcomes**

Program facilitators were also asked to identify the extent to which caregivers benefited from *Project BUILD* library programs. More than three-quarters felt that, to at least a moderate extent, caregivers appeared to learn about what engineers do and be more comfortable engaging youth in program activities after participating in the library program (Figure 22). Program facilitators further explained that caregivers appeared to be more engaged and comfortable after attending multiple programs.

**Figure 22. Half of library staff and engineers felt that caregivers appeared a great deal more comfortable engaging youth in activities.**

*Survey Question: In your opinion, to what extent did caregivers engaged in Project BUILD/Ready, Set, Create program activities...*



Engineers mentioned that they tried to engage caregivers, both to inform them about what engineers do and also to ensure they had the information needed to support their children in participating in the design challenge. For example, one engineer shared,

**“I had conversations with parents about engineering that we wouldn’t have been able to have. I think that was good for caregivers to be educated as well. When they found out I worked on heavy highway construction, they would ask questions about certain construction projects ongoing right now. It kind of opened out a conversation about this is what I do.”**

Despite these benefits to caregivers, a number of library staff and engineers were hesitant about including caregivers in program activities because they were concerned that the caregivers would take over the activity or because they would prefer to focus on the youth-engineer and youth-youth relationships. Additionally, one program facilitator noted that the caregivers themselves may be hesitant to participate because they want their children to be able to explore on their own. For example, program facilitators shared,

**“I think if you're lucky enough or successful enough to have, you know, a full group of the target age kids and you want them to really get the benefit of working with the engineers.”**

**“At least from my experience, the parents I saw were a little bit overbearing and trying to push their kid in the right direction, instead of just letting them figure it out for themselves.”**

**“It can be challenging to engage parents when their children are older. Because I think that there’s a parent-child dynamic at play. And so a parent will step back so that their child can sort of like explore. And so they don't interfere.”**

## **Section 5: Circulating Kit Implementation and Patron Outcomes**

Libraries were provided with monetary support from the project to purchase STEM-related materials that could be circulated to patrons’ homes. The intent was to provide another opportunity to extend learning beyond the library and help families feel comfortable engaging together in STEM learning activities.

Results in this section are based on Kit circulation which took place at five *Project BUILD* libraries from November 2018-December 2019. Two libraries also participated in the pilot phase of the project from January-October 2018.

In addition to the circulating Kit surveys, a small number of youth (n=24) completed a survey after using the Kits in the library (in-house). Findings from these in-house surveys can be found in Appendix C. Because of the small sample size, these results should be viewed as preliminary.

### **Kit Implementation**

The project team provided library staff with a list of suggested items that library staff could consider circulating and they were encouraged to share information about additional items that they found with other partner libraries. Library staff valued the initial ideas from the project team and other library staff as well as having the materials and activities used in the *Project BUILD* library programs as a starting point for Kit ideas while they investigated other items and sought feedback from patrons and others at their library.

The number of Kits that libraries created ranged from 6 to more than 80 Kits and Kits circulated a total of 1,160 times. The majority of Kits circulated (943 circulations, 81%) were from one library that had over 80 Kits available for circulation.

At the time of the interviews with library staff in winter 2020, one library had not started Kit circulation. They had just received their Kit materials and planned to begin circulation once the Kits were catalogued. Staff turnover was the main factor that delayed their Kit development and rollout.

**Libraries used the Kits in a variety of ways, not just for circulation**

As shown in Figure 23, all libraries circulated their Kits and used them for facilitated in-house patron use (e.g., for use at a program). All but one also used the Kits for un-facilitated use by patrons in the library (e.g., at a free choice activity station) and/or at events in their community where they took *Project BUILD* activities. Although one library had not begun circulating their Kits, they reported that they planned to use their Kits in all of the ways shown in Figure 23.

**Figure 23. All libraries used, or planned to use, their Kits for circulation and facilitated in-house use. (n=6 libraries\*)**

Survey Question: In what ways has your library used your Family Kits? Check all that apply.



Source: Year 3 Facilitator Survey

Although all libraries circulated Kits, this model seemed to be more successful in rural areas. Kits circulated approximately 5-10 times more often at libraries serving rural communities. Libraries in urban areas tended to have greater success utilizing Kit activities inside the library. For example, one rural library had a Snap Circuits Kit that had been used 47 times in the library and a Keva Kit that had been used 25 times.

A number of library staff reported that their patrons were hesitant to check-out Kits because they were worried about losing or breaking pieces, even when the library emphasized that patrons would not be charged for lost or missing items. Additionally, some libraries had many children come to the library after school and were hesitant to check-out the Kit without their caregiver present. However, these libraries had success using the Kits as both facilitated and un-facilitated activities in the library. As one library staff explained,

**"I love the Kits. I think they're 100% successful because they're so well used in the library. It's fun...to see all the creative strategies that young people come up with."**

Libraries also used Kit materials for outreach events such as Parks and Recreation events, public festivals, or school events. For example, one library described taking KEVA planks to an elementary school dance where "the kids went wild for them."

**Simple Kits are popular with patrons and were easier for libraries to maintain**

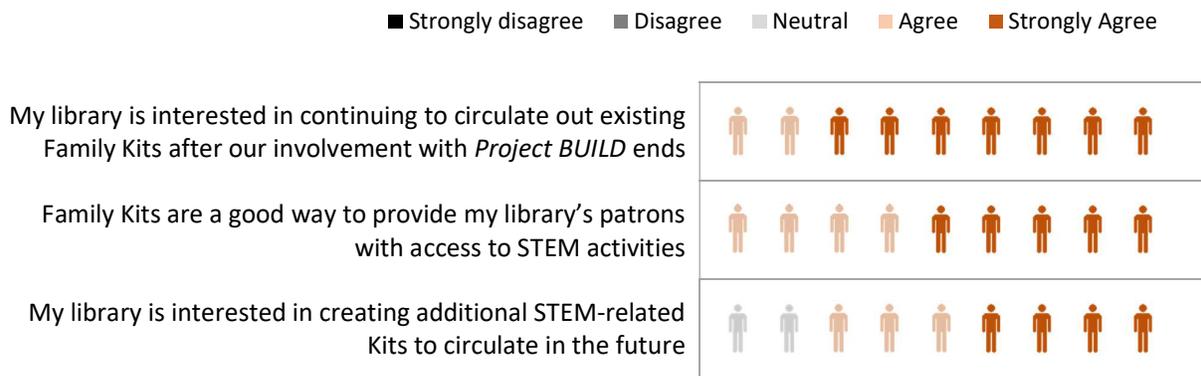
Library staff noted that simpler Kits seemed to be more popular for patrons who checked out the Kit to take home. They felt this might be because simple Kits are less intimidating than more complex Kits for caregivers who may be worried about supporting their children in doing the activities. Additionally, simpler activities such as KEVA planks are able to be used by all ages, which is beneficial for families with young children. They observed that the more complex or bulkier Kits were not checked-out often, but were used often by patrons in the library.

Simpler Kits were also easier for the library to manage because they often had fewer parts that needed to be maintained, were not made obsolete if one part went missing, and component parts were easily available to purchase. For example, one library staff compared two electricity Kits: Snap Circuits and Squishy Circuits. They described that both were popular with patrons, but Squishy Circuits had parts that were easier to replace (e.g., led lights, play dough, modelling clay), making it less staff-intensive to maintain.

**Libraries valued the Kits and are interested in continuing to circulate STEM-related Kits**

All library staff agreed that the Kits were a good way to provide their patrons with access to STEM activities and that they are interested in continuing to circulate their existing Kits (Figure 24).

**Figure 24. Library staff strongly agreed that they are interested in continuing to circulate their Kits. (n=9 library staff)**



Source: Year 3 Facilitator Survey

Library staff described that the Kits were popular with patrons as either a circulation item or for in-library use. Those who were able to observe youth doing the activities either at outreach or in-library events noticed that the activities were engaging, sparked youths’ creativity, and encouraged them to work in groups. As one library staff noted,

**“[The Kits] fostered a lot of engagement and creativity. [Youth] were collaborating to build the highest tower.”**

One library staff also noted that the Kits provided an avenue for equitable access to STEM learning. They explained that underserved families who may not be able to attend a library program at a specific time can still check out the Kits and do them at home on their own time.

Additionally, they noted that many of the activities are very visual in nature and their instruction manuals use diagrams with few words making them more accessible to patrons for whom English is not their first language.

Because they were popular and beneficial for patrons, most library staff agreed that they are interested in creating additional STEM-related Kits in the future. The main challenges in expanding the Kit program were the staff time and funding needed to create and maintain the Kits, especially if they were to expand the program to all branches in their library district. One library had success holding a fundraiser to raise money for additional Kits. They found that most of the engineering firms in their town, many of which were first time donors, were happy to donate money to fund a Kit, and the library was able to surpass their fundraising goal in less than a week.

“[The Kits are] one of the most successful things we’ve ever circulated. They’re on the shelf an average of a day and a half. Kids love to tell you what they did with them.”

~Public Library Staff

### ***Libraries would like a guide for creating Kits and supplemental materials***

Library staff mentioned that it would be helpful to have a guide describing how to create, publicize, and manage Kits, especially if it shared the experiences of and tips from library staff that have had success circulating Kits. Some things they mentioned that could be useful in a guide include:

- ❖ **Storage:** Suggestions for durable storage containers that work well for circulation to patrons' homes. One library noted that the containers had to be replaced more often than the actual Kit items. Additionally, suggestions for how to store the Kits when space in the library is limited.
- ❖ **Activities:** Ideas for types of activities or materials that are both popular with patrons and easier to maintain. Also, ideas for certain audiences they might want to create specific Kits for (e.g., younger children, educator Kits with materials for larger groups).
- ❖ **Material maintenance:** Tips for managing Kits and finding replacement parts. For example, one library found that they had a lot of success calling the company to request a specific replacement part.
- ❖ **Circulation:** Tips for incorporating Kits into the library's circulation system.
- ❖ **Promotion:** Suggestions for how to promote the Kits so that patrons are aware of them. For example, one library mentioned that they were thinking of cross-promoting at upcoming STEM programs or putting them on display with related books.

Library staff also found they had a need for items to supplement the Kit in order to provide additional explanation about content or facilitation guidance. For example, one library noted that parents were asking for prompts to go with the Kit activities. The library would like to create "inspiration cards" and would find it helpful to brainstorm ideas with engineers and other library staff. Another library mentioned that they would like suggestions for books that they could pair with their Kits.

### **About Circulating Kit Survey Respondents**

This section summarizes findings from the circulating Kit survey which included questions for both caregivers and youth who checked out circulating Kits. Surveys were packaged in the Kits with instructions for patrons to complete the survey and return it to the library along with their Kits. The purpose of the survey was to understand the extent to which caregivers are engaging in Kit activities with youth and to gain an understanding of patrons' experience with the Kits. Where applicable, questions on the circulating Kit survey were worded similarly to questions on the library program survey. Overall, most patrons experienced positive outcomes regardless of which activity they participated in (circulating Kits vs. library programs) with the main difference being that caregivers at library programs were more likely to agree that they learned about engineers or engineering compared to caregivers using the circulating Kit (91% and 64%, respectively). A comparison of all similar library program and circulating Kit survey questions can be found in Appendix D.

Kits were circulated a total of 1,160 times and 191 surveys were returned, for a response rate of 16.5%. A survey was considered complete if the majority of the caregiver and/or youth portion of the survey was filled out. The majority of the surveys (81%) came from one library (henceforth referred to as the "outlier library") which also had the largest number of Kits available for circulation (88 Kits). Results were analyzed both overall and with responses from this "outlier library" removed and are reported here, when applicable. Due to the low number of surveys from other libraries, these results should be viewed as preliminary. Additionally, it should be noted that one library had just begun circulating their Kits at the time this report was written.

Overall, a little more than half (56%) of youth respondents were male. When the outlier library was removed the percentage of males using the Kit increased slightly to 61% (Table 9).

**Table 9. Boys were more likely than girls to use the circulating Kits.**

	% Respondents*	
	Overall (n=186)	With Outlier Removed (n=33)
Female	44%	39%
Male	56%	61%

Source: Circulating Kit Survey

\*Some respondents selected >1 answer if multiple youth used the Kit together. % is based on total number of youth reported to have used the Kit.

Overall, about half (53%) of youth were in the target age-range of grades 2-5. However, when the outlier library was removed, only 22% of Kit users were in the target age range and the percentage of youth above and below the target age increased (Table 10).

**Table 10. Overall, about half youth who used the Kits were in the target age range of grades 2-5.**

	% Respondents*	
	Overall (n=218)	With Outlier Removed (n=37)
Pre-K	6%	3%
Kindergarten	11%	5%
1st	19%	35%
2nd	17%	14%
3rd	15%	3%
4th	11%	3%
5th	10%	3%
6th	6%	19%
7th	4%	14%
8th	1%	3%
Other	<1%	-
% in target age range (grades 2-5)	53%	22%

Source: Circulating Kit Survey

\*Some respondents selected >1 answer if multiple youth used the Kit together. % is based on total number of youth reported to have used the Kit.

Overall, the majority of youth (78%) who returned a Kit survey had not attended a *Project BUILD* library program. When the outlier library was removed, this percentage dropped slightly to 71% (Table 11).

**Table 11. Most youth who used the Kits had not been to a Project BUILD library program.**

Survey Question: Has your child/ren been to any Ready, Set, Create/Project BUILD programs at your library?

	% Respondents	
	Overall (n=184)	With Outlier Removed (n=31)
Yes	17%	23%
No	78%	71%
Unsure	5%	6%

Source: Circulating Kit Survey

Overall, more than half of families (60%) reported that they had previously checked out a STEM Kit from their library, while 40% were checking out a STEM Kit for the first time (Table 12). When the outlier library was removed, the results were similar, with half of families reporting that they were checking out a STEM Kit

for the first time. Since most libraries, including the outlier library, had not circulated STEM-specific activity Kits prior to *Project BUILD*, it is likely that many patrons reporting that they had previously checked out a STEM Kit were checking out multiple *Project BUILD* Kits.

**Table 12. Overall, about two-thirds of families had previously checked out a STEM Kit from their library.**

Survey Question: *Has your family checked out a STEM Kit from the library before?*

	% Respondents	
	Overall (n=172)	With Outlier Removed (n=30)
Yes	60%	50%
No	40%	50%

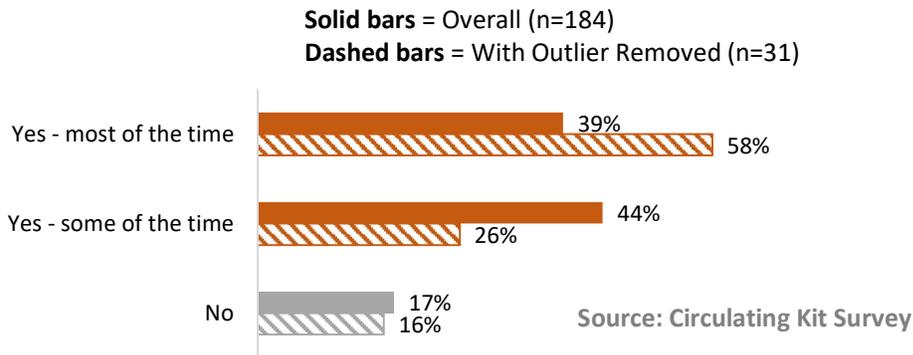
Source: Circulating Kit Survey

### The Influence of Circulating Kits on Caregivers

Overall, most caregivers who completed the survey (83%) reported that they did the Kit activities with youth at least *some of the time*. When the outlier library was removed, the percentage of caregivers reporting that they did the activities with their children *most of the time* increased to 58% (Figure 25).

**Figure 25. Overall, nearly all caregivers did Kit activities with their children at least some of the time.**

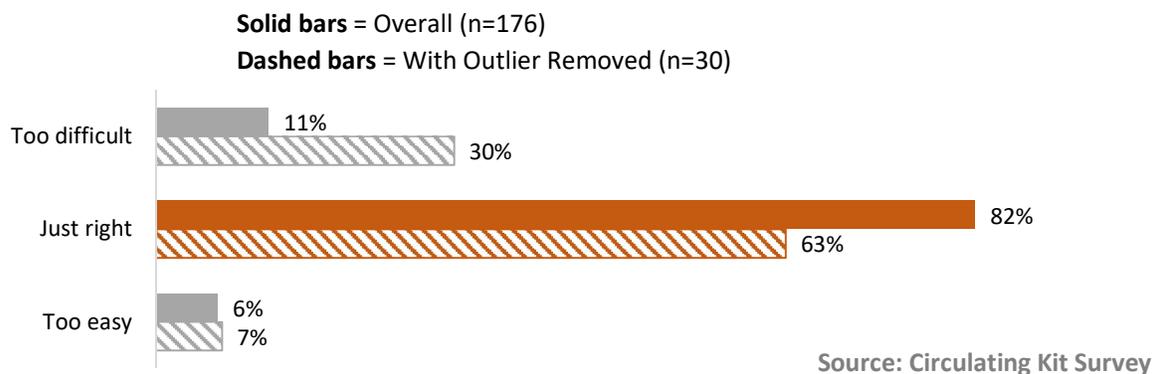
Survey question: *Did you do the activities with your children?*



Overall, most caregivers (82%) felt that the activities in the Kit were of an appropriate level of difficulty. When the outlier library was removed, the percentage of caregivers who felt the Kit activities were *too difficult* increased to 30% (compared to 11% overall, Figure 26). The outlier library had included “inspiration cards” with their Kits and also had a higher percentage of youth in the target age range, which may help explain this difference.

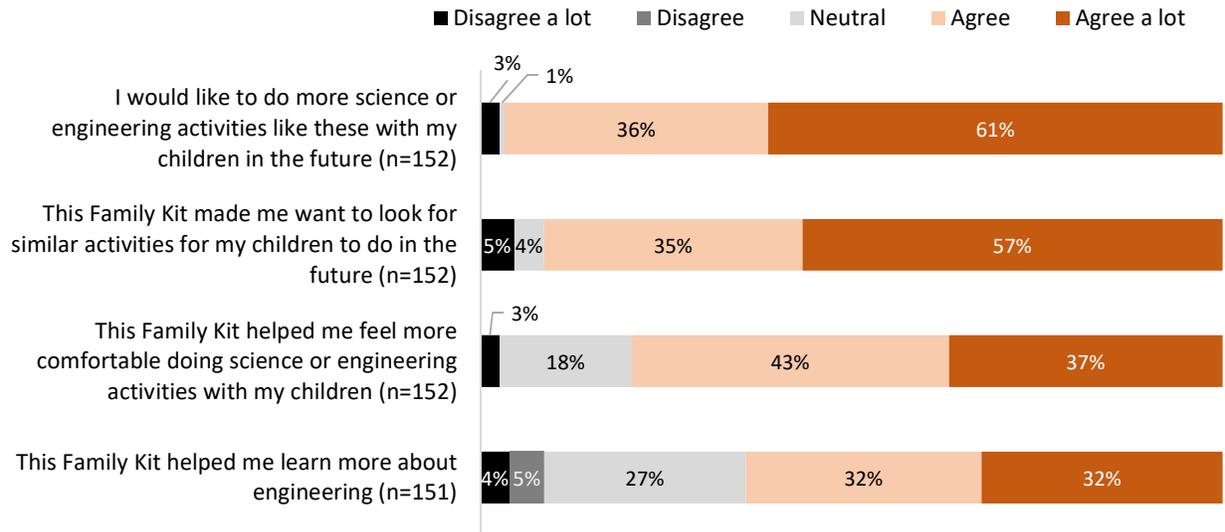
**Figure 26. Overall, most caregivers felt the Kit activities were appropriately challenging.**

Survey Question: *The activities in this Family Kit were...*



Caregivers who reported participating in Kit activities with their children were generally positive about their experience with the circulating Kits. As shown in Figure 27, more than 90% *agreed* or *agreed a lot* that the Kit made them want to look for similar activities for their children to do and that they would like to do similar STEM activities with their children in the future. The majority of caregivers (80%) also agreed that the Kit helped them feel more comfortable doing STEM activities with their children. A smaller but still substantial number of caregivers (64%) agreed that the Kit helped them learn about engineering.

**Figure 27. Overall, most caregivers want to look for similar activities and do them with their children again.\***



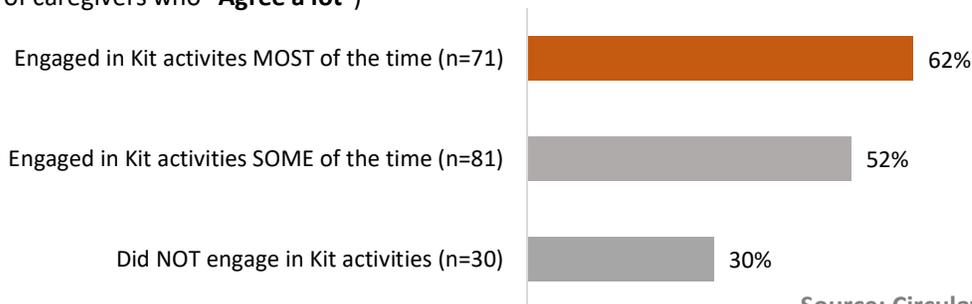
\*Only includes responses from caregivers who reported participating in activities with their children at least some of the time

Source: Circulating Kit Survey

Because caregivers are often important gatekeepers to youths' continued engagement with STEM activities, one goal of the circulating Kits was to actively engage caregivers in completing activities with the youth in order to encourage future engagement in similar learning activities. With this in mind, caregiver responses to the statement "This Family Kit made me want to look for similar activities for my children to do in the future" were compared based on whether they did or did not engage in the Kit activities with youth. Results indicate that the higher the level of engagement caregivers had with the Kits, the more likely they were to *agree a lot* that they would want to look for similar activities for their youth to do in the future (Figure 28).

**Figure 28. The more caregivers engaged in Kit activities, the more likely they were to want to look for similar activities for their children to do in the future.**

"This Family Kit made me want to look for similar activities for my children to do in the future"  
(% of caregivers who "Agree a lot")



Source: Circulating Kit Survey

In open-ended comments, caregivers were most likely to mention that they want more Kits and gave examples of additional topics for STEM Kit content such as chemistry, physics, coding, and robotics. A few also mentioned that they would like to see more STEM-related programming at their library.

Some caregivers noted that the Kits were engaging and educational for their children and helped enhance their interest in STEM and STEM-related activities. For example, caregivers shared,

**“My daughter really liked it and she wants to do all that the library has. She loved it.”**

**“It's a challenge to bridge science/engineering into fun topics. The Kits make it easy to spark interest!!!”**

**“The instruction booklet gave great insight on problem solving and helpful hints. This kept my son working for hours and when we're outside he observes different civil engineering problems with buildings.”**

A few caregivers also noted that their children created a number of different designs, including their own creations. For example, caregivers mentioned,

**“The multiple, endless ideas that came pouring out when one project was in motion.”**

**“The kids had fun playing with the squishy circuits. They enjoyed making different things with the lights and sounds.”**

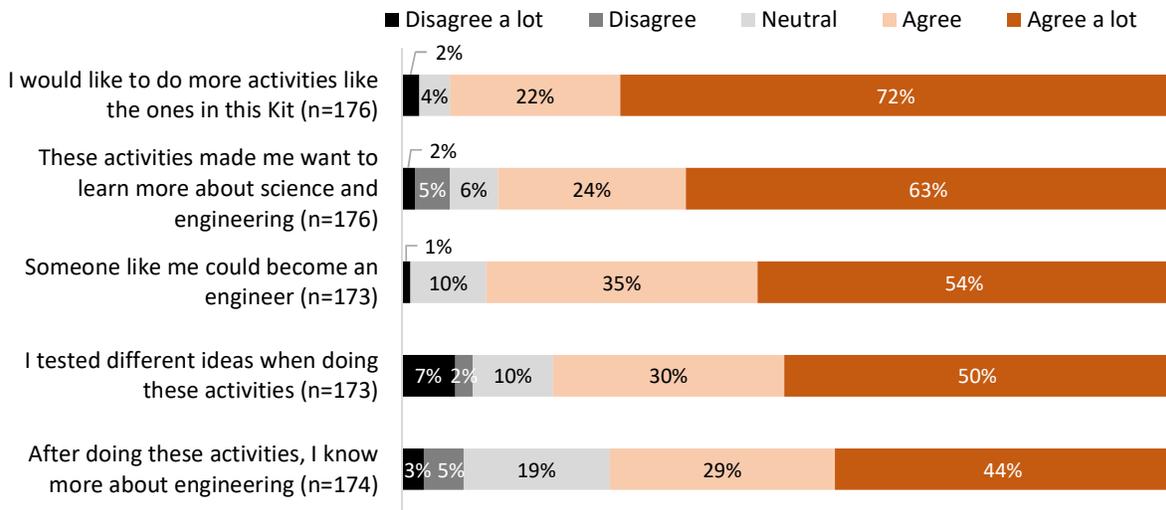
**“The children seemed to be excited to also create their own designs.”**

Finally, a few caregivers mentioned that they would like more instructions and support for how to start with the Kit activity such as an introductory program at the library, online videos, or written instructions.

### The Influence of Circulating Kits on Youth

Overall, youth had a positive experience with the Kits. Nearly all (94%) expressed agreement (*agreed or agreed a lot*) that they would like to do similar activities in the future (Figure 29). Additionally, most youth agreed that the Kit made them want to learn more about science and engineering (88%) and that someone like them could become an engineer (89%). A slightly smaller percentage of youth agreed that they tested different ideas when using the Kit (80%) and that the Kit helped them learn about engineering (73%).

**Figure 29. Overall, most youth want to do more activities like the Kits and learn more about science and engineering.**

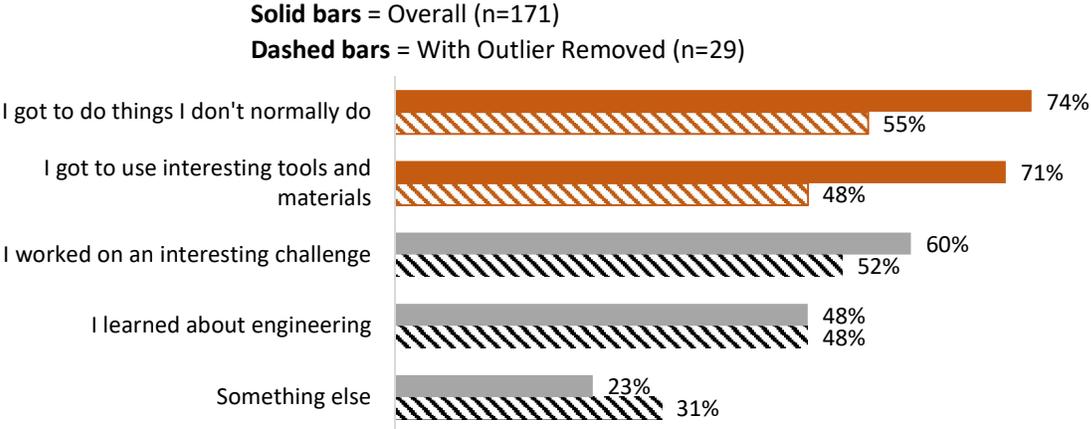


Source: Circulating Kit Survey

As shown in Figure 30, more than 70% of youth reported that they enjoyed the Kit activities because they got to do things they don't normally do and use interesting tools and materials. Many (60%) also enjoyed that they got to work on an interesting challenge. When the outlier library was removed, youth were less likely to select that they enjoyed the Kits because they got to do things they don't normally do and use interesting tools and materials.

**Figure 30. Youth especially enjoyed that they got to do something new and use interesting tools and materials.**

Survey question: Which of the following things did you enjoy about these activities?



Sums to >100% because youth could select >1 answer

Source: Circulating Kit Survey

A few youth selected “something else” and noted that they enjoyed that they learned STEM content specific to the Kit (e.g., coding, electricity) and that they got to build or create something. For example, youth shared,

- “I learned more about how electricity flows”
- “I learned what’s conductive and what’s not”
- “I made robotic fingers”
- “I got to build things”

## Areas of Consideration

The following recommendations emerged based on findings from the summative evaluation or were offered by participating library staff or engineers. The project team may wish to consider:

### **Reviewing project goals and exploring alternative mechanisms for project activity implementation.**

Library staff implemented project activities in various ways that varied from the initial project plan. The team may wish to consider reviewing the goals and outcomes of the various project components to clarify participant expectations and identify where variations on implementation are and are not helping to meet those objectives. Specifically,

- ❖ One library did not host their own *Community Dialogues*, instead participating in conversations already taking place in their community. Given the existence of similar dialogues in many communities, the project team may consider ways to emphasize to library staff how hosting *Community Dialogues* can have unique benefits that are different from other community conversations. However, given the strain on staff-time limiting the ability of libraries to host multiple *Community Dialogues*, the team may also wish to review their expected outcomes for *Community Dialogues* and consider ways that library staff can build on the momentum from a single dialogue through other, less time-intensive mechanisms (e.g., participating in other community conversations, facilitating asynchronous conversations through a community discussion board).
- ❖ Some libraries faced circumstances that made in-house Kit use more successful than circulation; however, others found that their circulating Kits were very popular with patrons and a great asset to their library. In the future, the project team should consider its goals for Kits, as well as the group of libraries they are working with, to determine the best model for Kit implementation (i.e., circulation-only, in-house only, or a combination of the two).

Considering where and why variations occurred, in light of project goals, can help the project team shape expectations and design supports and resources for future participating libraries and ASCE branches.

### **Developing additional professional development resources, training, and support.**

Overall, library staff and engineers felt supported by the project team; however, some specific supports that they would like to see developed further include:

- ❖ A start-up guide and/or on-boarding process for new libraries and ASCE branches including the goals of the project and a suggested set of roles and responsibilities for each partner. This would be useful at the beginning of a collaboration as well as when staff turnover occurs. A simplified version of a guide could also be useful for lead engineers to share information with and recruit additional volunteers.
- ❖ A guide for libraries interested in creating circulating Kits. Specific items they would like to see addressed in such a guide can be found on page 37 of this report.
- ❖ Additional training and support around STEM education for library staff to increase library staffs' confidence and comfort running programs (e.g., a way for library staff to get feedback on program ideas or have their questions answered, more general training on STEM education in libraries and how it can tie in to library staffs' strengths).
- ❖ Clarify the expectations around library staffs' contributions to the engineering-related aspects of the library programs. Some library staff may want to feature the engineers at programs to take advantage of their presence. The team may wish to review the goals for the project and consider the ways in which the involvement of engineer volunteers helps and hinders the development of library staffs' skills to independently conduct engineering-related activities.
- ❖ Provide a detailed outline of all responsibilities, time commitment, and deliverables early on in the project so that library staff can plan their time and bring in support staff if necessary.
- ❖ Help library staff and engineers reach additional patrons through *Project BUILD* activities. For example, it may be useful to tie-in programs to high profile events (e.g., Engineer's Week) or existing programs at the library that already have an audience (e.g., STEM story time, STEM family nights).

Events outside of the library (e.g., community events or festivals) may also be a way for library staff and engineers to reach new audiences. It may also be useful to engage library staff and engineers in a conversation about the benefits of engaging a smaller group of youth so that they see the benefit of the program even if attendance is low.

### **Brainstorming ways to support the partnership between library staff and professional engineers, especially in more rural areas.**

Library staff and engineers valued their partnership, but felt it was sometimes difficult to schedule time to connect in-person for programming, especially when the library was not located in a major urban area. This has a few implications that the team may wish to consider, including:

- ❖ Ways to facilitate connections between library staff and engineers beyond the initial in-person workshop
- ❖ Facilitating connections between libraries and other professional engineers if a library is not located near an ASCE branch

### **Developing additional engineering-related activities.**

Library staff and engineers found the library programs and Kits to be effective at engaging patrons in engineering-related activities. Some additions that the team could consider developing, or supporting libraries in developing and sharing, to further strengthen the project activities include:

- ❖ Additional library program activities to provide more options and reduce program stagnation
- ❖ Additional Kit resources (e.g., inspiration cards, simple instructions, book lists)
- ❖ Outreach activities that can be used outside of the library

### **Re-thinking how library staff support caregiver engagement at their programs.**

In general, caregivers benefited from engaging in library program activities. However, some library staff and engineers found it difficult to engage caregivers and there was some concern that caregivers might take over the activity, interfering with youths' ability to explore with peers and interact with the volunteer engineers.

The team may wish to consider ways to encourage caregiver engagement while also providing opportunities for youth to explore their own. For example, libraries could be encouraged to:

- ❖ Host family STEM nights or STEM Saturdays in addition to youth-only programs.
- ❖ Administer a handout to caregivers that explains what youth did at each library program, how it connects to engineering, and suggestions for other activities they can do to follow-up with the topic. This could be a more detailed version of the existing take home activities that were created by the project team for this project.

If caregivers are expected to stay at library programs, help library staff come up with strategies to let them know the goals of the program and learn ways they can support their child without taking over (e.g., a handout with a few "guide on the side" prompts).

### **Considering ways to strengthen the engineering education and career pathway component of the project**

Library staff and engineers provided suggestions for ways to strengthen the engineering education and career pathway component of the program. These included incorporating a recap activity at the end of each program reiterating the real-life connections of what they did and additional activities to continue learning; provide time for engineers to share the story of how they became interested in engineering; and continuing to engage diverse engineer volunteers, encouraging engineers to share about their work in an age-appropriate manner, and making real-world and local connections. See page 25 for details about library staffs' and engineers' recommendations.

Future projects should also continue to incorporate design challenges with tools and materials that allow for open-ended, hands-on design and exploration through iterative design and encourage library staff to include similar tools, materials, and activities in their Kits. Youth, especially girls, enjoyed the tools and materials

that they had the chance to use, and library staff and engineers felt that these materials, combined with the open-ended design challenges, provided multiple entry points that engaged most youth.

## Conclusion

In summary, the majority of participating library staff, engineers and library patrons involved in *Project BUILD* activities benefited from their experience.

Library staff were able to better understand the needs of and serve underserved audiences through hosting *Community Dialogues*, utilizing *Project BUILD* materials in the library and at outreach events in their community, making adaptations to *Project BUILD* activities to demonstrate local connections (e.g., sharing pictures of local bridges or buildings), and working with a diverse groups of engineer volunteers at library programs to help showcase that everyone can be an engineer.

Library staff and engineers found the partnership to be valuable and want to continue the partnership and/or pursue similar collaborations with other libraries or professional groups in the future. Library staff appreciated the enthusiasm and dedication of their engineer partners and valued their content knowledge and experience, which helped library staff feel more comfortable providing engineering-related programming for their patrons. Engineers valued that the library staff provided expertise in presenting programs to young children; access to new, diverse audiences; and took the lead on program planning, promotion and set-up, making it easy for engineers to volunteer. Library staff and engineers also benefitted personally by increasing their interest, knowledge, and confidence in facilitating engineering-related programs for youth.

Youth participating in *Project BUILD* activities (Kits and library programs) reported enjoying the activities, especially that they got to use do things that they don't normally do. The majority of youth indicated that they want to continue to do and learn more about engineering. Caregivers engaging in *Project BUILD* activities with their youth reported high levels of comfort and interest in continuing to look for and do engineering-related activities with their children.

Finally, it is notable that there were similar levels for participation for boys and girls and few differences in youth outcomes when comparing responses by gender. However, girls were less likely than boys to agree that someone like them could become an engineer.

## Appendix A: Evaluation Instruments

### Youth Survey – Library Programs

**Which programs have you attended? Please include this program. (Mark in circle)**

- Span-tastic Bridges     Designed to Survive     Clean-Up Our World  
 Power From Nature

**1. What grade are you in? (Mark in circle)**

- Kindergarten     1<sup>st</sup>     2<sup>nd</sup>     3<sup>rd</sup>     4<sup>th</sup>     5<sup>th</sup>     6<sup>th</sup>     7<sup>th</sup>  
 Other: \_\_\_\_\_

**Gender?**  Female     Male     Other:

**Please tell us how you feel about the following (Circle choice)**

2. I would like to do more activities like the one I did today.     

3. Today's activity made me want to learn more about science or engineering.     

4. After today's activity, I know more about what engineers do.     

5. Someone like me could become an engineer.     

6. It can take many tries to solve a problem.     

**7. Which of the following things did you enjoy about today's activity? (You may choose more than one answer. Mark in circle):**

- I worked on an interesting problem.     I met an engineer.  
 I got to do things I don't normally do.     I worked with other people.  
 I got to use interesting tools and materials.     None of these things.  
 I learned how engineers solve real-world problems.  
 Something else: \_\_\_\_\_

**8. Which of the following things would an engineer do for his or her job? (You may choose more than one answer. Mark in circle):**

- Test ideas     Think up different ideas  
 Work alone     Use their creativity  
 Solve problems     Help make people's lives better  
 Something else: \_\_\_\_\_  
 None of these things

**OPTIONAL: To help us better understand your experience across different library programs like this one, please tell us more about yourself.**

**Race/Ethnicity? (Please check all that apply.)**

- American Indian/Alaska Native     Native Pacific Islander  
 Hispanic/Latino/Latina     Asian  
 Black/African/African American     White  
 Other: \_\_\_\_\_

**First Name** \_\_\_\_\_ **Last Name** \_\_\_\_\_

**Home ZIP Code:** \_\_\_\_\_



## Youth Drawing Activity

### Administration Note:

EDC will facilitate the drawing activity during a site visit to a partner library during the Fall/Winter of 2019

### Goal:

To capture youths' view of the program they just participated in and what they would want a future program to be like

### Before You Begin:

Hand out a blank sheet of paper and colored pencils/crayons to each participant

### Introduction:

*"Hi, my name is <name> and I work with the people who created some of the activities you did today. We're going to do a quick drawing activity so that you can share your thoughts with us. This will help us make the program better in the future."*

### Drawing #1 (5 minutes):

*"Everyone take your piece of paper and fold it in half."*

<Hold up a piece of paper and demonstrate folding it in half>

*"First, on the left side, I'd like you to draw a picture of what you did today. I'll give you about 5 minutes to draw and you can raise your hand if you have any questions."*

<Give them a 1 minute warning>

### Drawing #2 (5 minutes):

*"Great! Now I'd like you to imagine that you're in charge of designing the next program. On the other half of the paper, draw what you would want to do at the next program. Any questions? Ok, let's get started!"*

When one minute is left, say: *"You have about one minute to finish up your drawing. I'd like to take a photo when you're done so that I have a record of all your great thoughts, so please raise your hand when you're done. If you'd rather I not take a picture of your drawing, that's totally ok, just let me know and I won't take a picture."*

### End:

*"Thanks again for sharing your ideas with me. If I haven't taken a picture of your drawing yet, please raise your hand so I can do that."*

# Library Staff Interview Protocol

## Introduction

*Thank you for agreeing to participate in this interview. As part of the evaluation of Project BUILD/Ready, Set, Create, evaluators from EDC are talking with representatives from public libraries and ASCE branches who are participating in the project. I want to emphasize that the purpose of this interview is not to evaluate you or your work, but to capture your feedback about the implementation and outcomes of the project in order to inform how this type of programing could be best implemented in the future.*

*For those of you who have participated in interviews in the past, some of these questions might sound familiar. We're interested in hearing how things have gone since last year, if anything has changed, and to get some further insight into your experiences with the project.*

*Responses from these interviews will be summarized and shared with the Project BUILD/Ready, Set, Create project team. We won't use your name or your organization's name in any reports. To facilitate our note-taking, we ask your permission to audio record our conversation.*

## Community Dialogues

1. In what ways has your library benefited from hosting Community Dialogues?
  - **Prompt:** In what ways did the Community Dialogue strategy help your library better understand or meet the needs of your community (including reaching underserved audiences)?
  - **Prompt:** Have you made new community partners as a result of the Community Dialogues? If so, how have you worked with them following the Community Dialogues?
2. In what ways, if at all, can you see your library using the Community Dialogue strategy in the future?
  - **Prompt:** In what ways do you see any barriers or challenges that may prevent your library from hosting additional Community Dialogues?
3. Are there any resources that you would have found useful? Did you use the Community Dialogue Guide and, if so, what did you think (how did you use it, what did you find useful, what would you change)?
  - **Prompt:** What suggestions would you offer other libraries interested in hosting Community Dialogues?
4. Aside from Community Dialogues, what other strategies did your library use to ensure *Project BUILD* activities met the needs of your community (for example, promotion or outreach to specific audiences, adaptations or modification to *Project BUILD* activities)?

## Circulating Family Kits

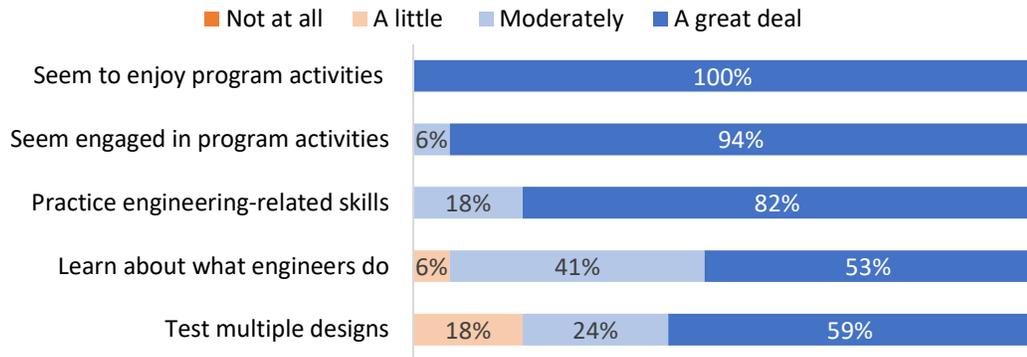
5. What major successes did you see with your Family Kits? In what ways did you see them working well (e.g., through circulation, use in the library, at outreach, etc.)?
  - **Prompt:** Did any Kit activities seem to be especially popular or work well for circulation? Were there any that were not as popular or didn't work very well?
6. What were the challenges you faced with your Family Kits?
  - **Prompt:** Were there any resources or supports that you would have found useful regarding Family Kits that could be incorporated in the future? For example, resources to help you choose what went into your Kit, circulation tips, Kit management strategies, etc.
7. How can you see yourself using these types of Family Kits in the future?
  - **Prompt:** Are there any barriers or challenges that may prevent your library circulating STEM kits in the future?

## Library Programs

Back in December, we sent out a survey to library staff and ASCE volunteers asking them to reflect on and share their thoughts about their experience with Project BUILD. Although we're not finished collecting responses, I wanted to share some preliminary results from that survey with you so that you can think about how the findings resonate with your own experiences at your Project BUILD programs.

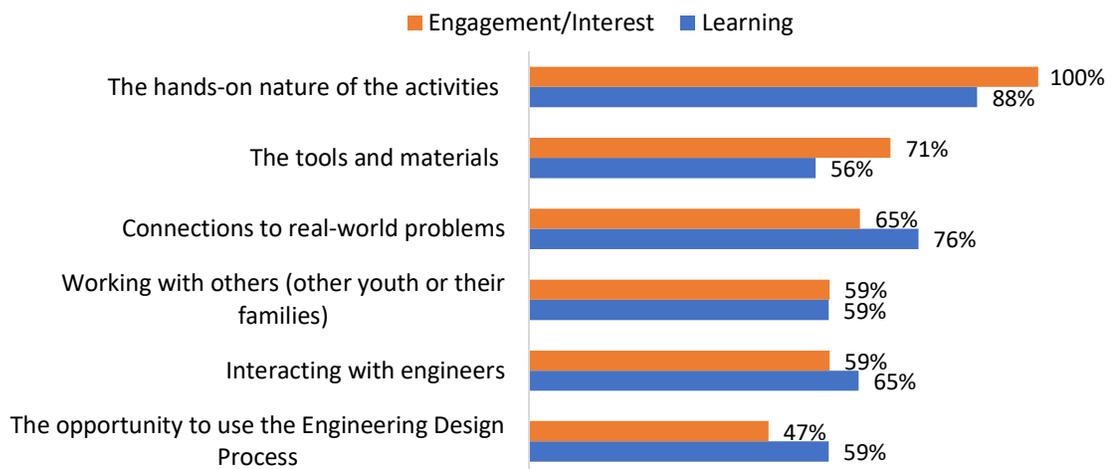
8. Preliminary survey results regarding how youth benefitted from Project BUILD library programs are shown below. From your experience, what youth benefits especially stood out to you during your programs? Do you have any stories about student learning or engagement that you would like to share?

**Preliminary Findings (not for distribution): All program facilitators felt that youth enjoyed program activities and seemed engaged in program activities. (n=17)**



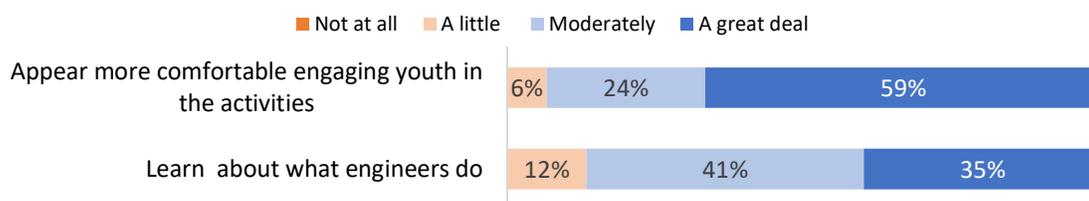
9. Preliminary survey results regarding the extent to which different elements of Project BUILD programs influenced youths' engagement, interest, and learning are shown below. From your experience what aspects of the program were especially influential on youth interest, engagement, or learning at your programs? Did you observe anything that makes you think these program elements were especially influential?

**Preliminary Findings (not for distribution): Program facilitators felt the hands-on nature of the programs influenced youths' engagement and learning a "great deal". (n=17)**



10. Preliminary survey results regarding caregiver engagement at programs are shown below. Are there any specific benefits for caregivers that you would like to share? Were there any specific strategies that you used to engage or support caregivers at your programs?

**Preliminary Findings (not for distribution): Program facilitators felt that caregivers appeared more comfortable engaging youth in the activities. (n=17)**



11. Is there anything else you would like to mention about your *Project BUILD* programs or how library staff/ASCE volunteers could be better supported in facilitating these types of programs in the future?

**Library/ASCE Partnership**

12. Now that we're at the end of the project, thinking about your overall experience with your ASCE partners, what were the two (or more!) most valuable things about your collaboration with your partner ASCE branch?
13. Please describe how you planned your programs with your partner ASCE branch. Did you change anything from previous years and if so, why and how did it go?
- **Prompt:** What challenges did you face working with your partner ASCE branch and how were you able to work through these challenges?
  - **Prompt:** What suggestions do you have for other libraries looking to form this type of collaboration?
14. If you already have plans to work with your partner ASCE branch or other professional groups in the future, please briefly describe what you will be doing. If you don't have anything planned, is there something you would like to do in the future?

**Personal Benefits of *Project BUILD* Participation**

15. As part of this project, you had a budget that you could use for various project-related expenses. What did that money allow you to do that you wouldn't have otherwise been able to do? Why did you decide to use it for that purpose?
- **Prompt:** Was the amount provided too much, too little, or just right? Please explain your answer.
16. Thinking to the future, what elements (e.g., program activities, library/ASCE partnership, circulating Family Kits, Community Dialogues) of the *Project BUILD* could other libraries benefit from? What would you suggest expanding to other public libraries/ASCE branches?
17. Is there anything that would be challenging to expand to other libraries/ASCE branches and why would that be a challenge?
18. Is there anything else you would suggest for how the project could help make youth more aware of engineering educational/career pathways? For example, changes or additions to the activities, additional professional development, etc.
19. Do you have any final comments about your experience with *Project BUILD* or suggestions for how the project could be improved in the future?

# Engineer Interview Protocol

## Introduction

Thank you for agreeing to participate in this interview. As part of the evaluation of Project BUILD/Ready, Set, Create, evaluators from EDC are talking with representatives from public libraries and ASCE branches who are participating in the project. I want to emphasize that the purpose of this interview is not to evaluate you or your work, but to capture your feedback about the implementation and outcomes of the project in order to inform how this type of programing could be best implemented in the future.

For those of you who have participated in interviews in the past, some of these questions might sound familiar. We're interested in hearing how things have gone since last year, if anything has changed, and to get some further insight into your experiences with the project.

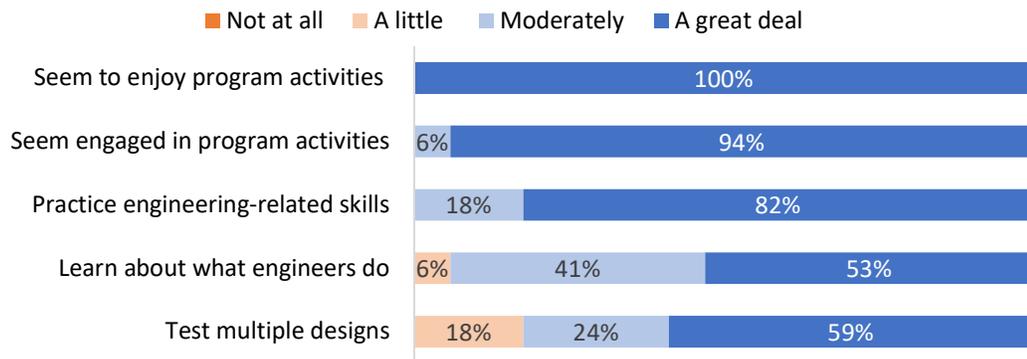
Responses from these interviews will be summarized and shared with the Project BUILD/Ready, Set, Create project team. We won't use your name or your organization's name in any reports. To facilitate our note-taking, we ask your permission to audio record our conversation.

## Library Programs

Back in December, we sent out a survey to library staff and ASCE volunteers asking them to reflect on and share their thoughts about their experience with Project BUILD. Although we're not finished collecting responses, I wanted to share some preliminary results from that survey with you so that you can think about how the findings resonate with your own experiences at your Project BUILD programs.

1. Preliminary survey results regarding how youth benefitted from *Project BUILD* library programs are shown below. From your experience, what youth benefits especially stood out to you during your programs? Do you have any stories about student learning or engagement that you would like to share?

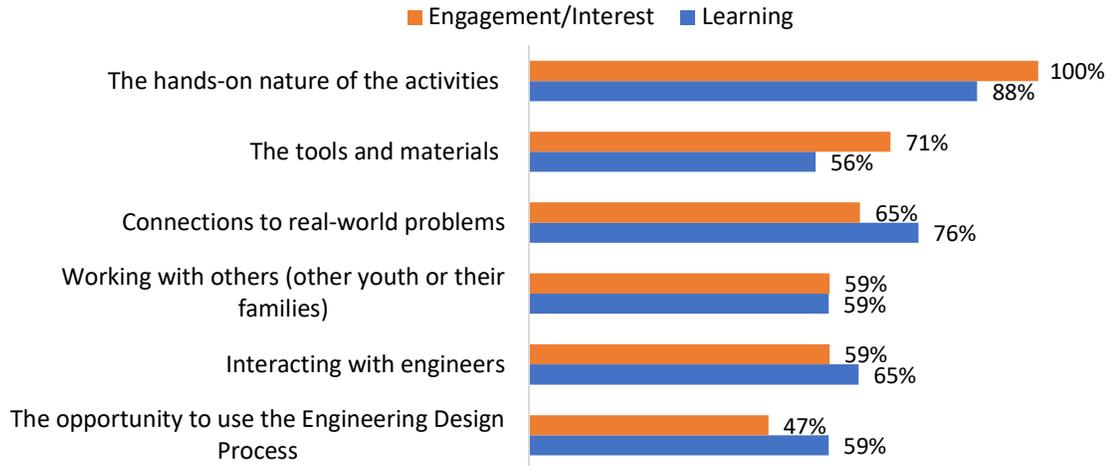
**Preliminary Findings (not for distribution): All program facilitators felt that youth enjoyed program activities and seemed engaged in program activities. (n=17)**



2. Preliminary survey results regarding the extent to which different elements of *Project BUILD* programs influenced youths' engagement, interest, and learning are shown below. From your experience what aspects of the program were especially influential on youth interest, engagement, or learning at your programs? Did you observe anything that makes you think these program elements were especially

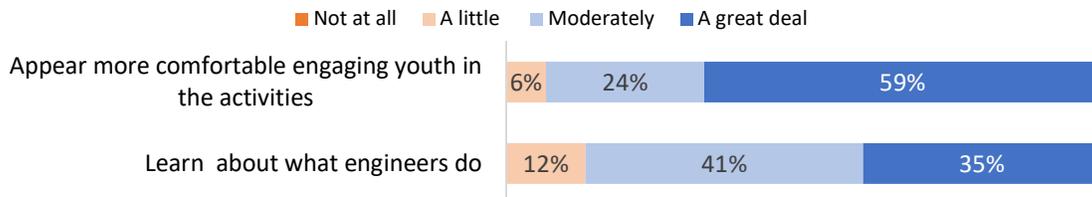
influential?

**Preliminary Findings (not for distribution): Program facilitators felt the hands-on nature of the programs influenced youths' engagement and learning a "great deal". (n=17)**



3. Preliminary survey results regarding caregiver engagement at programs are shown below. Are there any specific benefits for caregivers that you would like to share? Were there any specific strategies that you used to engage or support caregivers at your programs?

**Preliminary Findings (not for distribution): Program facilitators felt that caregivers appeared more comfortable engaging youth in the activities. (n=17)**



4. Is there anything else you would like to mention about your *Project BUILD* programs or how library staff/ASCE volunteers could be better supported in facilitating these types of programs in the future?

### Library/ASCE Partnership

5. Now that we're at the end of the project, thinking about your overall experience with your library partners, what were the two (or more!) most valuable things about your collaboration with your partner library?
6. Please describe how you planned your programs with your partner library. Did you change anything from previous years and if so, why and how did it go?
- **Prompt:** What challenges did you face working with your partner library and how were you able to work through these challenges?
  - **Prompt:** What suggestions do you have for other ASCE branches looking to form this type of collaboration?
7. If you already have plans to work with your partner library or other public libraries in the future, please briefly describe what you will be doing. If you don't have anything planned, is there something you would like to do in the future?

### **Personal Benefits of *Project BUILD* Participation**

8. Thinking to the future, what elements (e.g., program activities, library/ASCE partnership) of the *Project BUILD* could other ASCE branches benefit from? What would you suggest expanding to other public libraries/ASCE branches?
9. Is there anything that would be challenging to expand to other libraries/ASCE branches and why would that be a challenge?
10. Is there anything else you would suggest for how the project could help make youth more aware of engineering educational/career pathways? For example, changes or additions to the activities, additional professional development, etc.
11. Do you have any final comments about your experience with *Project BUILD* or suggestions for how the project could be improved in the future?

## Library Staff and Engineer Survey

### About this Survey

*Thanks for participating in Project BUILD/Ready, Set, Create! Evaluators from Education Development Center (EDC) are interested in learning about your experiences implementing Project BUILD/Ready, Set, Create activities. Your survey responses will help us understand how the program is working and inform the project's activities in the future.*

*The survey should take 10-15 minutes and you may skip any questions that you do not wish to answer. The evaluation team keeps your individual responses confidential. Survey results will be reported to the Project BUILD project team in aggregate form and any identifying information will be removed before results are shared with the project team.*

*Thanks for your feedback!*

***By clicking Next, you acknowledge you have read and understand the information above.***

### About You

1. What is your role in *Project BUILD/Ready, Set, Create*?
  - Library representative
  - ASCE section/branch representative
2. Were you new to this project in 2019?
  - Yes
  - No
3. (if answer to Q2 is “yes”) As someone new to the project, what has been useful in helping you learn about and implement Project BUILD activities?
  - Are there any additional resources or supports that you would have found useful?

### Implementing Project BUILD/Ready, Set, Create Activities

#### Community Dialogues – (Entire section is for Library reps only)

4. Were you involved in helping to host any of your library's Community Dialogue(s)? (If “no”, skip to Question 9)
  - Yes
  - No
  - Unsure
  - My library did not host any Community Dialogues
5. During the time your library has been involved with *Project BUILD*, how many total Community Dialogues did your library host? (If “None”, skip to Question 9)
  - None
  - 1
  - 2
  - 3
  - 4
  - 5
  - More than 5
  - I do not know

6. How useful do you feel the Community Dialogue strategy was for helping your library...

	Not at all useful (1)	Slightly useful (2)	Moderately useful (3)	Very Useful (4)	Not applicable
Learn about the STEM education needs of my community					
Think about strategies to reach underserved audiences					
Begin to identify potential community partners					

7. How likely is it that your library will conduct additional Community Dialogues in the future?

- Very likely
- Somewhat likely
- Not likely

8. Use this space to describe anything else you'd like to mention about your Community Dialogues or how this component of the project could be improved in the future.

**Family Kits (Entire section is for library reps only)**

9. Were you involved in creating or circulating your library's Family Kits? (if "no", skip to Question 15)

- Yes
- No
- Unsure
- Our library has not created or circulated any Project BUILD Family Kits

10. How many *Project BUILD* Family Kits does your library currently have (the total available to be checked out by patrons)?

11. In what ways has your library used your Family Kits? (check all that apply)

- For circulation to patrons' homes
- For **un-facilitated** patron use in the library (e.g., items freely available at an activity station)
- For **facilitated** patron use in the library (e.g., during a library program)
- At outreach events
- Other (please describe)

12. Please describe if any specific Family Kit activities were more or less popular than others.

13. Please indicate the degree to which you agree or disagree with the following statements on a scale from Strongly Disagree (1) to Strongly Agree (5):

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Family Kits are a good way to provide my library's patrons with access to STEM activities.					
My library is interested in continuing to circulate our <b>existing</b> Family Kits after our involvement with <i>Project BUILD</i> ends.					
My library is interested in creating <b>additional</b> STEM-related kits to circulate in the future.					

14. Use this space to describe anything else you'd like to mention about your *Project BUILD* Family Kits or how this component of the project could be improved in the future.

**Patron Experience (for both Library and ASCE reps except where noted)**

15. Over the entire time you have been involved with the project, how many total *Project BUILD/Ready, Set, Create* library programs have you facilitated or helped to facilitate? (if "None" is selected, skip to Question 22)

- None
- 1-2
- 3-4
- 5-6
- 7-8
- More than 8

16. In your opinion, to what extent did **youth** at *Project BUILD/Ready, Set, Create* programs...

	Not at all (1)	A little (2)	Moderately (3)	A great deal (4)
Learn about what engineers do				
Practice engineering-related skills				
Test multiple designs				
Seem engaged in program activities				
Seem to enjoy program activities				

17. To what extent do you feel the following program elements of *Project BUILD/Ready, Set, Create* influenced **youths' engagement or interest** in the program activities?

	Not at all (1)	A little (2)	Moderately (3)	A great deal (4)
The hands-on nature of the activities				
The tools and materials				
Connections to real-world problems				
The opportunity to use the Engineering Design Process				
Interacting with engineers				

Working with others (other youth or their families)				
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18. To what extent do you feel the following program elements of *Project BUILD/Ready, Set, Create* influenced **youths' learning**?

	Not at all (1)	A little (2)	Moderately (3)	A great deal (4)
The hands-on nature of the activities				
The tools and materials				
Connections to real-world problems				
The opportunity to use the Engineering Design Process				
Interacting with engineers				
Working with others (other youth or their families)				

19. In general, to what extent were **caregivers/parents** engaged in program activities? (select one) (If “no caregivers/parents stayed...” or “At least some....” is selected, skip to Q23.)

- No caregivers/parents stayed for the programs.
- At least some caregivers/parents stayed but were NOT engaged in program activities.
- Only a few caregivers/parents stayed and were engaged in program activities.
- About half of caregivers/parents stayed and were engaged in program activities.
- All or nearly all caregivers/parents stayed and were engaged in program activities.

20. In your opinion, to what extent did **caregivers engaged in Project BUILD/Ready, Set, Create program activities...**

	Not at all (1)	A little (2)	Moderately (3)	A great deal (4)
Learn about what engineers do				
Appear more comfortable engaging youth in the activities				

21. (For ASCE reps only) In what ways were you able to incorporate your personal experience and knowledge of engineering into *Project BUILD/Ready, Set, Create* programs?

22. Use this space to describe anything else you'd like to mention about *Project BUILD/Ready, Set, Create* library programs or how this component could be improved in the future.

### ASCE/Library Partnership

23. Please indicate the degree to which you agree or disagree with the following statements on a scale from Strongly Disagree (1) to Strongly Agree (5):

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
(library reps) Collaborating with my partner ASCE branch has benefited my library					

(ASCE reps) Collaborating with my partner library has benefited my ASCE branch					
(library reps) I and/or my library would like to continue collaborating with my partner ASCE branch or other professional societies in the future					
(ASCE reps) I and/or my ASCE branch would like to continue collaborating with my partner library or other public libraries in the future					

24. What did you learn about working with public libraries/professional engineers that would be helpful for other professional groups/public libraries to know?

**Wrap-up**

Thinking about how you felt before your participation in *Project BUILD/Ready, Set, Create* and how you feel now, please indicate the degree to which the following statements were/are true for you on a scale of Strongly Disagree (1) to Strongly Agree (5).

25. I am interested in leading (library reps)/co-facilitating (ASCE reps) engineering-related library programming with youth in grades 2-5.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
How I felt BEFORE participating in <i>Project BUILD</i>					
How I feel NOW					

26. I am knowledgeable about how to lead(library reps)/co-facilitate(ASCE reps) engineering-related library programming with youth in grades 2-5.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
How I felt BEFORE participating in <i>Project BUILD</i>					
How I feel NOW					

27. I am confident about how to lead (library reps)/co-facilitate (ASCE reps) engineering-related library programming with youth in grades 2-5.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
How I felt BEFORE participating in <i>Project BUILD</i>					
How I feel NOW					

28. (library reps only) How likely is it that you and/or your library will conduct additional engineering-related programming for youth in grades 2-5 in the future?

- Very likely
- Somewhat likely
- Not likely

29. (ASCE reps only) How likely is it that you and/or your ASCE branch would volunteer to co-facilitate engineering-related library programming with youth in grades 2-5 in the future?

- Very likely
- Somewhat likely
- Not likely

30. In what other ways did **you personally** benefit from your overall experience in *Project BUILD/Ready, Set, Create*?

31. Please add any final comments or describe any other ways *Project BUILD/Ready, Set, Create* could be improved in the future.

**By clicking the Next button, you will submit your survey. Once you click Next, you cannot revisit your survey questions.**

## Appendix B: Youth Drawing Activity Pilot – Sample Drawings

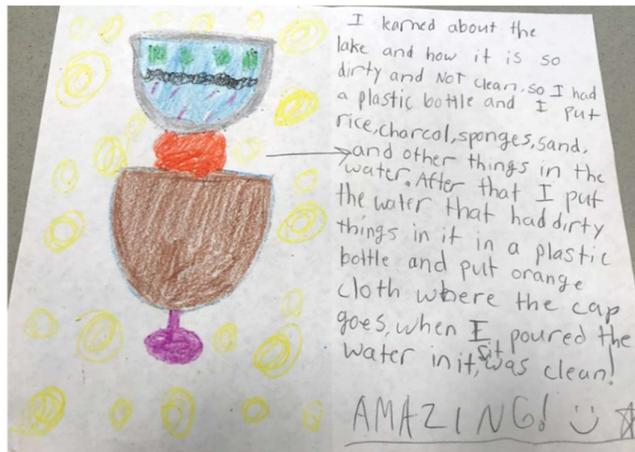
In Year 3 of the project, a member of the evaluation team conducted site visits with two different partner libraries to facilitate and pilot a youth drawing activity. Youth were asked to draw two pictures (1) a picture of what they did at the library program they had just participated in and (2) a picture of a future library program activity that they would want to participate in. The purpose of the drawing activity was to test an evaluation tool that would allow youth to express their views of the program in a manner that was more engaging than a traditional survey and did not depend as heavily on reading ability. A total of 24 drawings were collected.

Both library programs featured activities tied to the theme *Cleanup Our World*. Most youth drew something representing a hands-on element of the program (e.g., the water filters they created or the water that they dirtied and then cleaned up) and some specifically mentioned “experimenting”. Drawings of future activities varied, but some tied into what they did that day (e.g., making recycled bracelets, building an eco-friendly house, cleaning up a lake). Examples of student drawings can be found below.

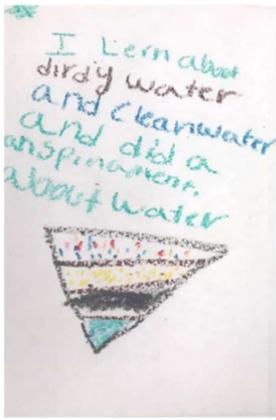
These pilot findings suggest that the aspects of the program that stood out to students were:

- ❖ **The topic:** Youth wanted to do more activities related to helping the environment
- ❖ **The hands-on, building aspects of the program:** Youth often drew the items that they created during the program
- ❖ **The opportunity to “experiment”:** Some youth noted ways that they create multiple designs and “experimented” during the program to solve the design challenge

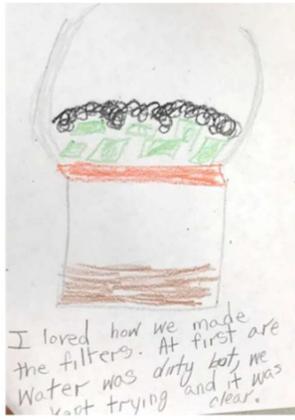
**Figure B1. Example youth drawings representing what they did during the program**



*“I learned about the lake and how it is so dirty and not clean. So I had a plastic bottle and I put rice, charcoal, sponges, sand, and other things in the water. After that I put the water that had dirty things in it in a plastic bottle and put orange cloth where the cap goes. When I poured the water in it was clean. AMAZING!”*

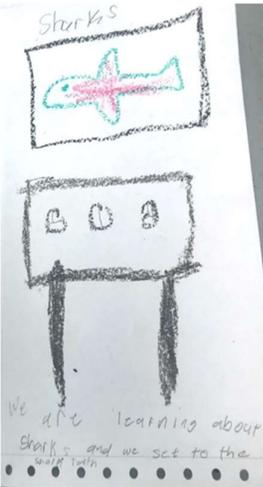


"I learn about dirty water and clean water and *did an experiment* about water"



"I loved how we made the filters. At first our water was dirty, but *we kept trying* and it was clear."

**Figure B2. Example youth drawings representing what they would like to do at future programs**



Learning about sharks



Lego cars



Cleaning up a lake



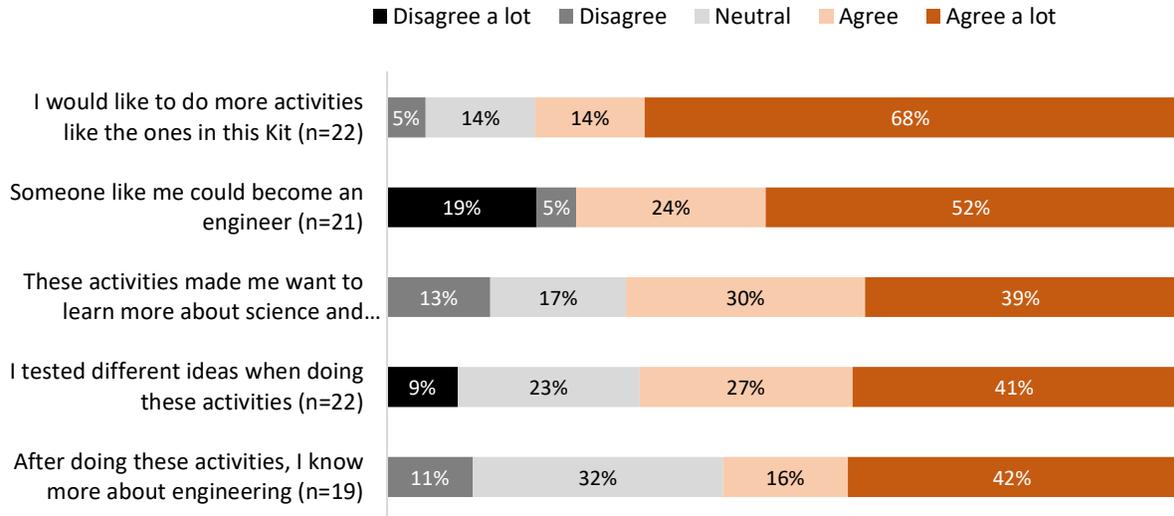
Water filters...with candy!

## Appendix C: In-library Use of Circulating Kit Activities

A small number of youth (n=24) completed a survey after using the Kits in the library; therefore, the following results should be taken as preliminary.

Overall, most youth (82%) that used the Kits in the library agreed that they would like to do similar activities in the future and many (76%) agreed that someone like them could become an engineer. A smaller percentage, but still the majority, agreed that the activities made them want to learn more about science or engineering (69%) and that they tested different ideas when doing the activities (68%). Finally, a little more than half (58%) agreed that the Kit helped them learn about engineering.

**Figure C1. Most youth who used the Kit in the library want to do more activities like the Kits.**

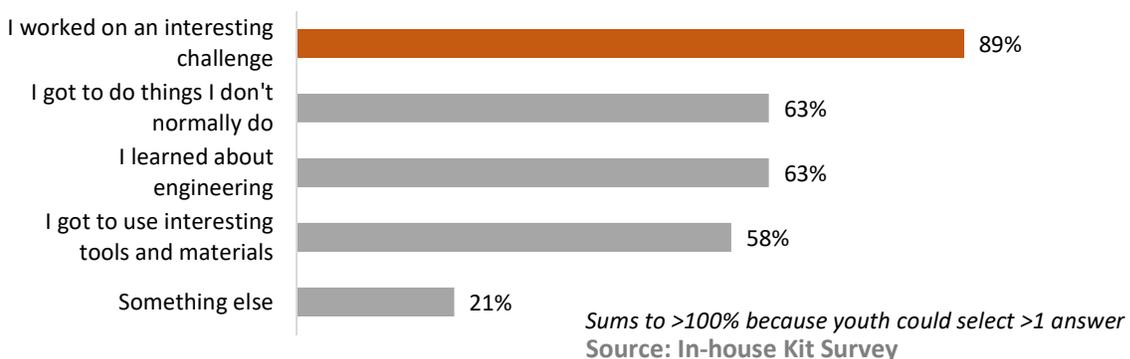


Source: In-house Kit Survey

Youth that used the Kits in the library were most likely to select that they enjoyed that they got to work on an interesting challenge (89%).

**Figure C2. Youth who used the Kits in the library enjoyed that they got to work on an interesting challenge.**

Survey Question: Which of the following things did you enjoy about these activities?



Youth also shared the following about the Kits:

**“I think it was educational”**

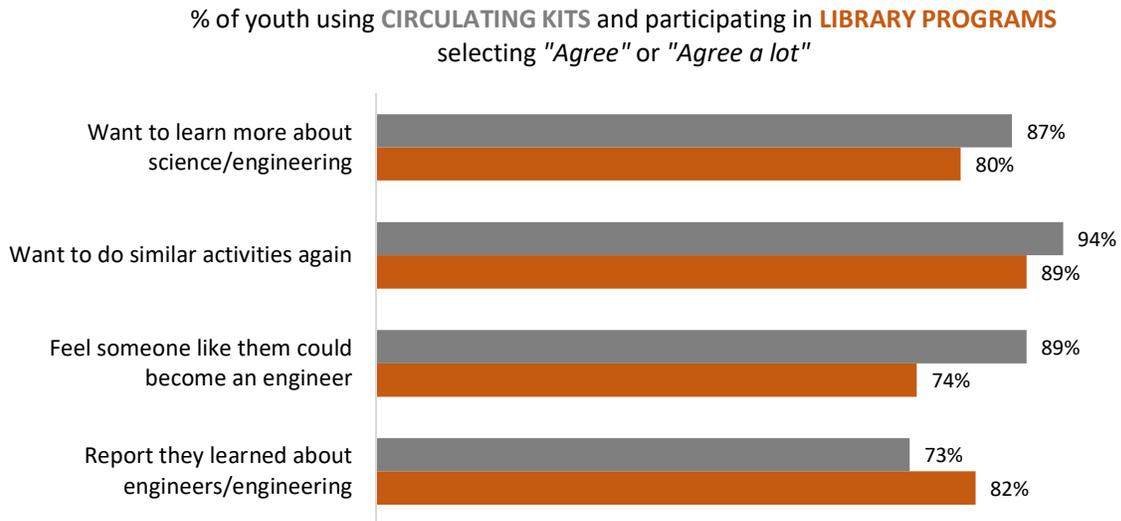
**“It was very interesting”**

**“It’s fun to build all the things”**

## Appendix D Patron Outcomes - Library Programs & Circulating Kits

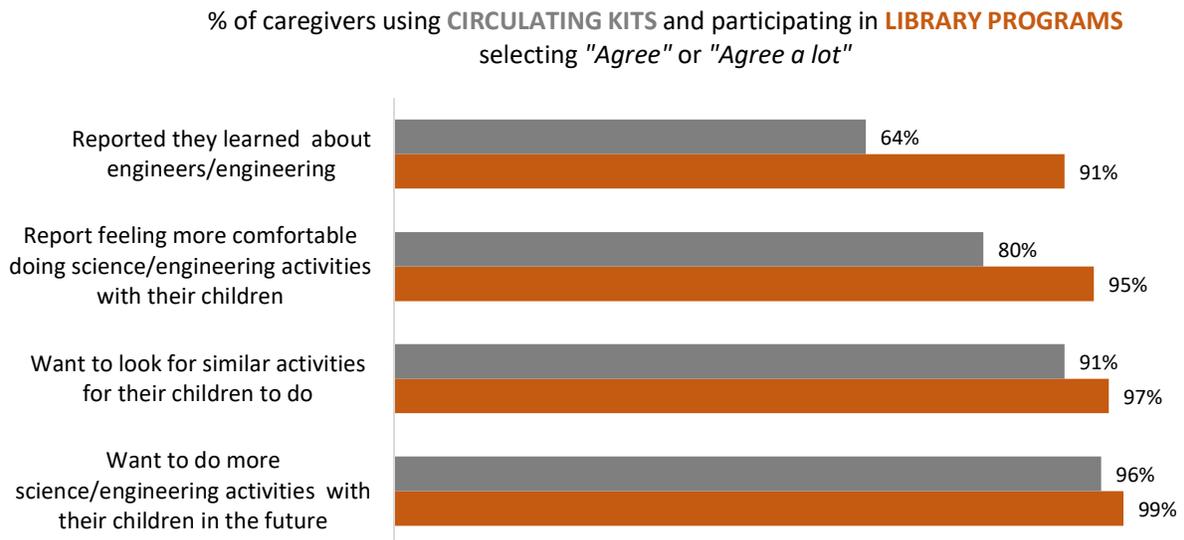
Overall, most youth and caregivers experienced positive outcomes regardless of which activity they participated in (circulating kits vs. library programs). However, youth at library programs were more likely to report that they learned about engineers and engineering, while youth using the Kits were more likely to report an increased interest in future STEM learning activities and feeling as if someone like them could become an engineer. Caregivers at library programs were slightly more likely to report feeling comfortable doing STEM-related activities with their children and were much more likely to agree that they learned about engineers or engineering.

**Figure D1. Youth at library programs were more likely to report learning about engineering while youth using the Circulating Kits were more likely to report interest in engineering pathway activities.**



Source: Circulating Kit Survey & Youth Patron Survey, Year 1 & 2 Combined

**Figure D2. Caregivers at library programs were more likely to report learning about engineering while youth using the Circulating Kits were more likely to report interest in engineering pathway activities.**



Source: Circulating Kit Survey & Caregiver Patron Survey, Year 1 & 2 Combined