

1/4/2021

Dream, Build, Create

Final Report

Jeannine Finton, American Society of Civil Engineers

Paul Dusenbery, National Center for Interactive
Learning/Space Science Institute

Jen Jocz, Education Development Center



This material is based upon work supported by the National Science Foundation under Grant Number DRL-1657593. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

Table of Contents

The Need	2
Event Resources	3
<i>Dream Team</i> Topic Selection	4
<i>Dream Team</i> Engineer Selection	5
Structuring <i>Dream Team</i> Discussions	5
Panels & Panelists	7
Schedule	10
Publicity	10
Registration	11
Screening Attendance Totals	12
Program Evaluation	16
Appendix A: Information About ASCE and NCIL/SSI	18
Appendix B: Discussion Prompts and Questions	19
Appendix C: Ending Slides	20
Appendix D: Promotion Schedule and Examples	21

The Need

Many libraries across the country have closed their doors to in-person programming because of COVID-19 though some have started to re-open with reduced services. During this period, most libraries have offered virtual programming in its place. During this same period schools and parents have also found need for quality online resources as schools move back and forth between in-person, remote, and hybrid models.



Through *Project BUILD* (a [STAR Library Network](#) program), the American Society of Civil Engineers (ASCE) and the Space Science Institute's National Center for Interactive Learning (NCIL) offered the award-winning documentary, *Dream Big: Engineering Our World*, to libraries and to the network of outreach connections established by ASCE which included schools and after-school centers. Currently available on Netflix, and to rent/own through Vimeo and Amazon, the film was available for free on certain dates in November. In addition, 6 panels of young engineers (*Dream Teams*) were recruited, prepared, and met online to share their engaging stories of what it means to be an engineer. Learn more about ASCE and NCIL/SSI in Appendix A.

The overall name of this effort was *Dream, Build, Create*.



Event Resources

The American Society of Civil Engineers provided two resources that formed a solid foundation for this virtual program.

1. [Dream Big: Engineering Our World](#)

ASCE produced and owns the documentary, *Dream Big: Engineering Our World*. *Dream Big* has been shown to over 2 million viewers at giant screen theaters at museums around the world. *Dream Big* was created with the express purpose of increasing interest in engineering as a profession, and evaluations conducted of children, parents, and educators show that it accomplishes this. (Paulsen, C.A. (2018). *Dream Big Evaluation Report*. Concord, MA: Concord Evaluation Group.)



- 88% of children reported that Dream Big inspired or may have inspired them to want to become an engineer.
- The percentage of children who reported that they could envision themselves as an engineer someday also grew – from 67% to 80% after viewing the film – an increase of 19%.
- The percentage of children who reported that they could see a connection between their own interests and the field of engineering increased from 51% to 69% -- an increase of 35%.
- Most participants agreed or strongly agreed that they enjoyed the movie (97%), that they were interested in learning more about engineering after seeing the movie (86%), and that they learned a lot from the movie (84%).

Dream Big is currently available through a Netflix subscription, or for rent/purchase through Vimeo. ASCE made the decision to make the film available for free on select dates through Vimeo.

2. Engineers

ASCE has a large, diverse membership with a strong interest in pre-college outreach who made engaging online engineer panels. Many of the engineers selected for panels are past honorees in the “New Faces of Civil Engineering” program which recognizes both young professionals and undergraduate students. New Faces are selected based on technical expertise, community engagement, and diversity in many forms.

Having the opportunity to engage with live engineers and ask questions is important for youth as they consider careers. According to a survey conducted by DiscoverE in 2019, educators agree that meeting a STEM professional is a valuable opportunity for students to learn about engineering.

- 84% report meeting an engineer or technical professional is an important opportunity for students.
- 84% say an engineer’s or technical professional’s visit helps students learn about engineering careers.
- 74% report students *do not have many opportunities to meet* an engineer or technical professional.

The *Dream, Build, Create* event provided an opportunity for youth to meet engineers who could share their experiences and answer questions.

Dream Team Topic Selection

El Futuro se Diseña: Having the ability to offer the Spanish-language version of *Dream Big: Engineering Our World* prompted the idea of hosting a *Dream Team* in Spanish. The idea was further supported by comments made at a Project BUILD Community Dialog hosted in Greeley, CO in 2017 during which individuals representing agencies dealing with immigrant communities discussed the need for parents to participate along with children in order to build an understanding of engineering as a career. Parents who primarily speak Spanish benefit from experiences conducted in this language.

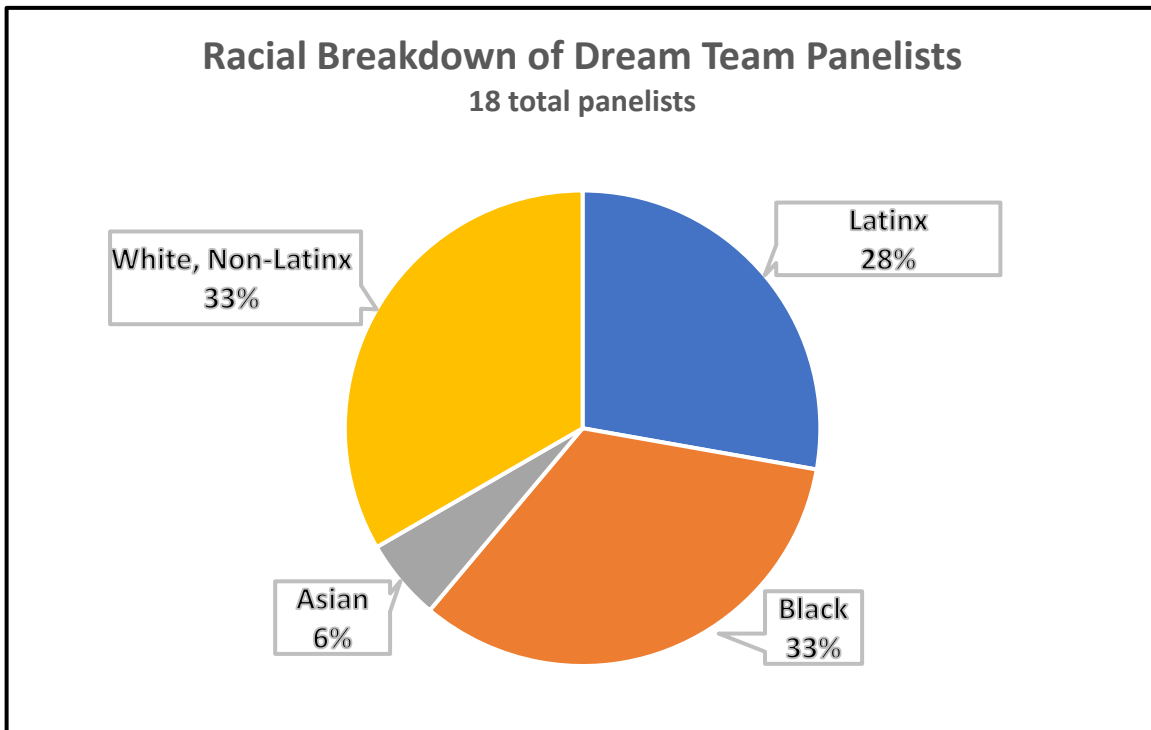
Black Engineers and Women in Engineering: The engineering field also finds that Blacks and women are underrepresented in the profession, hence the decisions to have a Black Engineers *Dream Team* and one on Women in Engineering.

Cities of the Future: ASCE is currently developing a project called Future World Vision, which will be a tool for civil engineers to use in envisioning the world fifty years from now. Cities under development include: Floating City, Mega City, Rural City, Frozen City and Offworld City. Talking about how engineers are already developing these future scenarios provided an opportunity to present engineering as a creative, problem solving profession.

Engineering Extravaganza: This *Dream Team* was envisioned as an opportunity to showcase a variety of civil engineering disciplines and engaging activities.

Dream Team Engineer Selection

Engineers were chosen by ASCE staff and members, members of the Society of Hispanic Professional Engineers, and faculty/alumni networks from Historically Black Colleges and Universities. Panelists were selected because they possessed expertise in the topic, had an engaging personality, and to ensure diversity across all *Dream Teams*. The gender breakdown of the panels were 50% male and 50% female. The racial breakdown is shown in the chart below.



Structuring Dream Team Discussions

Although the topics varied, each *Dream Team* had a similar format. Engineers talked about what led them to engineering, what they love about their work, and how engineering involves creativity and problem solving.

During each *Dream Team* one or more of the panelists modeled a Project BUILD style engineering activity, showing how it can be done at home. Project BUILD activities were technology-rich STEM learning experiences fundamental to the [Engineering Design Process](#). Activities were developed to help participating youth: 1) Solve challenge-focused (real or simulated) problems using an engineering design process and 2) Use age-appropriate

technology to model how engineers build a better world and improve the local community. Different activities were demonstrated at each panel, and information on where to go for more information was part of the closing slides (for examples, see Appendix C).

Each engineer received a list of questions developed from the report “Despite the Odds: Young Women Who Persist in Engineering” (DiscoverE, December 2019) which identified key factors for young women who choose engineering as a career and/or persist in engineering. Although this report dealt with women, the key factors apply across all audiences and formed a foundation for hosts to use in facilitating the discussions.

Key factors for young women who choose and/or persist in engineering:

- They demonstrate an interest in and positive attitude about engineering.
- They see value in the field of engineering, believing that engineers work to solve important problems and that becoming an engineer can enable them to contribute to society and help people.
- They demonstrate engineering-related self-efficacy, believing with confidence, that they have the skills and knowledge to do the work of engineers.
- They embrace a STEM identity.
- They have a strong support network.
- They draw upon social and cultural capital, having the ability to draw strength from personal or cultural experience of struggle to overcome obstacles.
- They feel a sense of belonging.

A series of questions/discussion prompts were developed using these key factors (Appendix B). Hosts and panelists reviewed topics in advance and panelists identified questions that they particularly wanted to answer.

Questions from the audience were encouraged. The following are some examples:

- During the Women in Engineering *Dream Team*, the STEM Seniors asked: “What are some more examples of social justice projects that engineers work on?”
- During the Black Engineers Panel, the question was asked “What is the importance of brotherhood and sisterhood in engineering?” The answer to this question reflected on overcoming the stereotype that science, engineering, and math achievement is a solitary endeavor. Pop culture, especially Hollywood films, reinforce this stereotype. “It’s about collaboration; it’s all about working together to solve the problem together...it’s up to us to pass the baton.”
- Other questions across various *Dream Teams* included:
 - How do you think COVID will impact the design of cities of the future?

- Are you satisfied with what you are doing?
- Cuál es tu parte favorita de ser ingeniero? (What is your favorite part of being an engineer?)
- Have you ever given up on a project?
- Did you always want to be an engineer?

Panels and Panelists

Women in Engineering, held Tuesday November 10, 1:00 p.m. EST,
<https://youtu.be/WD2jtYSOZ0Q>

Women in Engineering Dream Team

Bianca Bailey
Agricultural Engineer

Dr. Menzer Pehlivan, Host
Geotechnical Engineer
Featured in Dream Big: Engineering Our World

Sophie Lipomanis
Civil Engineering Student

Top chat replay

- Timothy Alston Lets go Bianca!
- Timothy Alston Represent! U of I and HBCUs
- Noor A. That's so cool Sophie! I'm a mechanical engineering graduate and I'm currently interning where we also work on delay claims for construction related projects.
- STEM Seniors What's the most personally rewarding project you've ever worked on?
- STEM Seniors Thank you!
- Jeanine Finton Try googling Concrete Canoe races to see these. Totally fun!
- Luis Duque // Engineering Our Future Those are really fun!
- Mia Holloway What are some of the types on engineering out there?
- Timothy Alston How was your time at Howard University, and how did going to an HBCU help you?
- STEM Seniors What are some more examples of social justice projects that engineers work on?
- Vikki walters Congratulations Bianca
- Jeanine Finton If you have question that doesn't get answered, please send a message to outreach@aece.org so we can forward it to our speakers

Cities of the Future, held Tuesday November 10, 7:00 p.m. EST
<https://youtu.be/KQNweISFcMA>



Black Engineers, held Thursday November 12, 5:30 p.m. EST
<https://youtu.be/W7Hh0uvzgok>



El Futuro se Diseña/The Future is Designed, held Thursday November 19, 3 p.m. EST <https://youtu.be/utrE8fLhuo8>

El Futuro se Diseña/The Future is Designed Dream Team



 <p>Fernando Ceballos, Host Civil Engineer</p>	 <p>Luis Duque Bridge Engineer</p>	 <p>Isamar Escobar Construction Management</p>	 <p>Angelica Hernandez Mechanical Engineer Featured in Dream Big</p>
--	--	---	--

Engineering Extravaganza, held Tuesday November 24, 4:00 p.m. EST <https://youtu.be/RWXpG48xBlo>

Engineering Extravaganza Dream Team



 <p>Danielle Schroeder, Host Structural Engineer</p>	 <p>Jaffer Almosawy Civil Engineer</p>	 <p>Sarah McEwen Water Resources Engineer</p>	 <p>Brian Phan Transportation Engineer</p>
--	--	--	--

Schedule

Dream Big: Engineering Our World was available for free through private Vimeo links on:

- Tuesday November 10
- Saturday November 14
- Tuesday November 17
- Tuesday November 24

The film was available in English, Spanish, and Closed Captioning.

The Engineer Panels (*Dream Teams*) were held on:

- Tuesday November 10, 1 p.m. ET, Women in Engineering
- Tuesday November 10, 7 p.m. ET, Cities of the Future
- Wednesday November 18, 5:30 p.m. ET, Black Engineers
- Thursday November 19, 3 p.m. ET, El Futuro se Diseña/The Future is Designed (Spanish Language)
- Tuesday November 24, 4 p.m. ET, Engineering Extravaganza

One additional online event, *Chats with Changemakers featuring Avery Bang*, an engineer profiled in *Dream Big: Engineering Our World*, was held on November 20 at 2 p.m. EST. This related program was conducted in partnership with [DiscoverE](#), the National Engineers Week Foundation. Through this partnership, ASCE and DiscoverE cross-promoted the events. However, since *Chats with Changemakers* was conducted by a different organization in a different format it is not included in the final report and evaluation.

Publicity

Information about *Dream, Build, Create* was distributed through ASCE, *STAR Net*, and DiscoverE networks including blog posts, newsletter articles, and social media (Appendix D). Publicity included program dates, and the link to the registration information.

SSI shared information through its monthly *STAR Net News* publication (8,000), Facebook (2,600), and on a [STAR Net blog](#).

ASCE shared the information through ASCE News Weekly (82,000), Twitter (54,000 followers), and LinkedIn (167,000 followers) and [an ASCE News Weekly article](#).

[DiscoverE](#) shared the information with 45,000 on their email lists, 30,000 social media followers.


Registration

By registering, participants received the log-in URL and password for the private Vimeo viewings of Dream Big. This information was to be freely shared with others. For example, a single librarian could register then share the information with thousands of library patrons. They also received the list of *Dream Team* Panels and the log-in URLs. After registering, participants received follow up emails with reminders about the upcoming events.

Information collected during registration included:

- First and Last Name
- Email
- Are you a: librarian, teacher, parent/caregiver, or other. If other please describe
- How many people will you share this link with?
- Age/Grade level of the people with whom you will share the link (check all that apply):
Pre-K, Lower Elementary, Upper Elementary, Middle School, High School, College, Adults, Seniors, Homeschool
- Organization
- City
- State
- Zip Code
- How familiar are you with civil engineering topics: Very familiar, somewhat familiar, familiar, not familiar?
- Willingness to receive a post-program survey

There were a total of 881 registrants, who indicated that they would share the program links and passcodes with 470,903 individuals.



"Thank you for offering this high-quality programming to smaller libraries that may not ordinarily have access to a diverse array of engineers for children to be inspired by!"

~Library staff

Screening Attendance Totals

Dream Team Panels, Screenings as of December 2, 2020. For security purposes, the *Dream Team* panels were broadcast as private meetings. Because of this, geographic analytics are unavailable.

Title	Views
Women in Engineering	352
Cities of the Future	194
Black Engineers	242
El Futuro se Diseña/The Future is Designed	93
Engineering Extravaganza	54

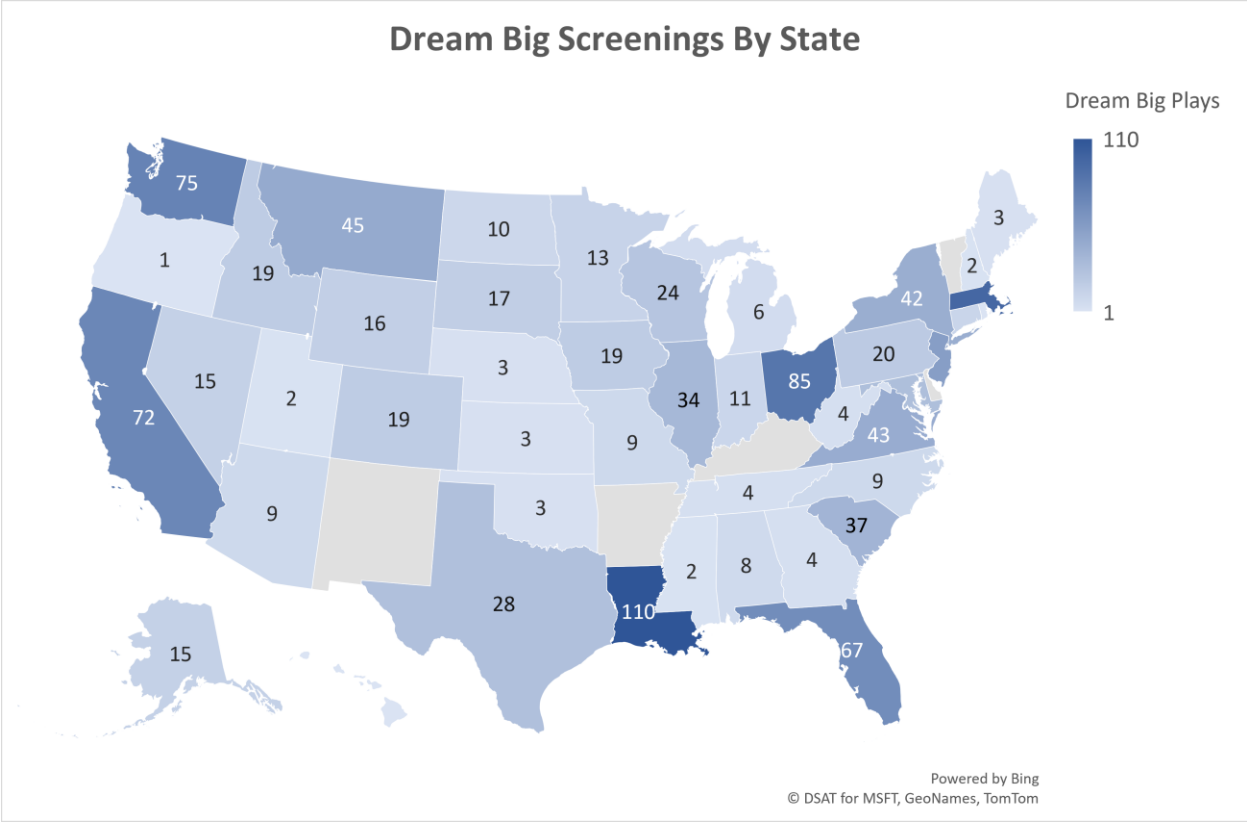
Dream Big: Engineering Our World, Screenings by Date.

Date	English/Closed Caption	Spanish	Total
Tuesday, November 10	322	6	328
Saturday, November 14	216	9	225
Tuesday, November 17	383	6	389
Tuesday, November 24	333	10	343
Totals	1254	29	1285



"People respond very positively to something like this simply being available in the community -- it changes their perception of what kind of town we are and what opportunities are out there for their kids."

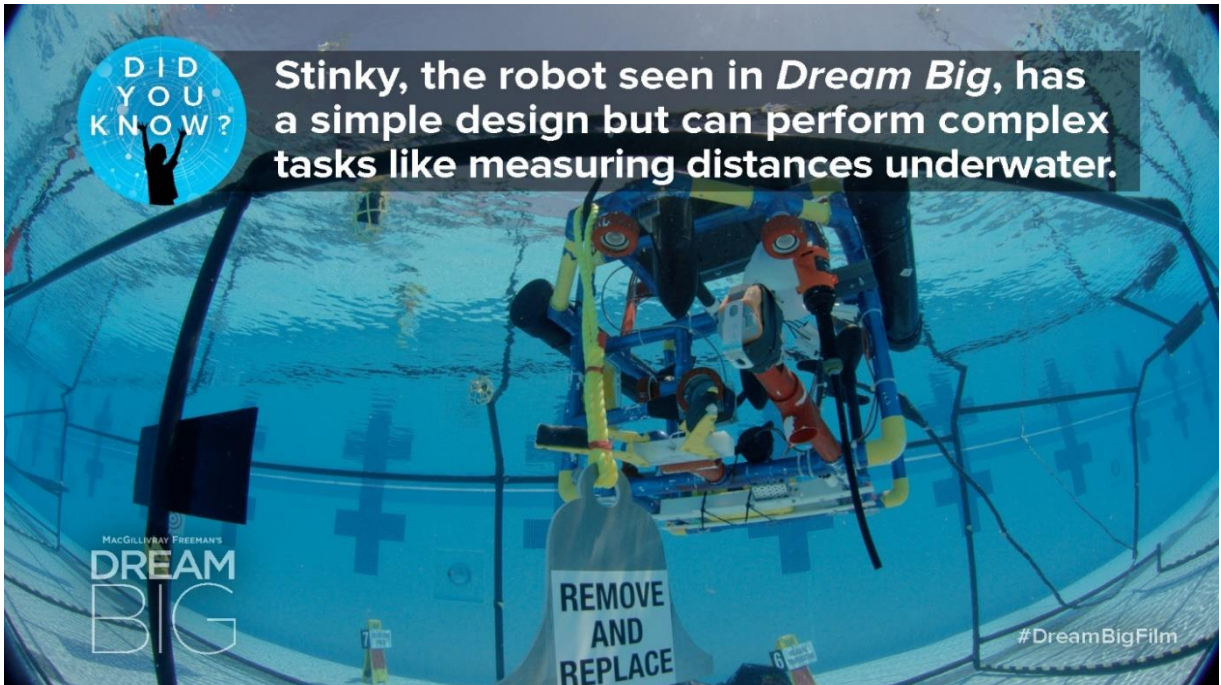
~Library staff



State	# Views	State	# Views	State	# Views	State	# Views
Alabama	8	Indiana	11	Nebraska	3	South Carolina	37
Alaska	15	Iowa	19	Nevada	15	South Dakota	17
Arizona	9	Kansas	3	New Hampshire	2	Tennessee	4
California	72	Louisiana	110	New Jersey	54	Texas	28
Colorado	19	Maine	3	New York	42	Utah	2
Connecticut	12	Maryland	29	North Carolina	9	Virginia	43
Dist. Of Columbia	3	Massachusetts	96	North Dakota	10	Washington	75
Florida	67	Michigan	6	Ohio	85	West Virginia	4
Georgia	4	Minnesota	13	Oklahoma	3	Wisconsin	24
Hawaii	1	Mississippi	2	Oregon	1	Wyoming	16
Idaho	19	Missouri	9	Pennsylvania	20	Unknown	181
Illinois	34	Montana	45	Rhode Island	1		

Dream Big Screenings By Country

Country	English Screening	Spanish Screening	Country	English Screening	Spanish Screening
United States	1148	22	United Kingdom	1	
Canada	73		Malaysia	1	
Puerto Rico	19	4	India	1	
Columbia	5	4	Oman	1	
Czech Republic	2		Hungary	1	
Mexico	2	1	Singapore	1	



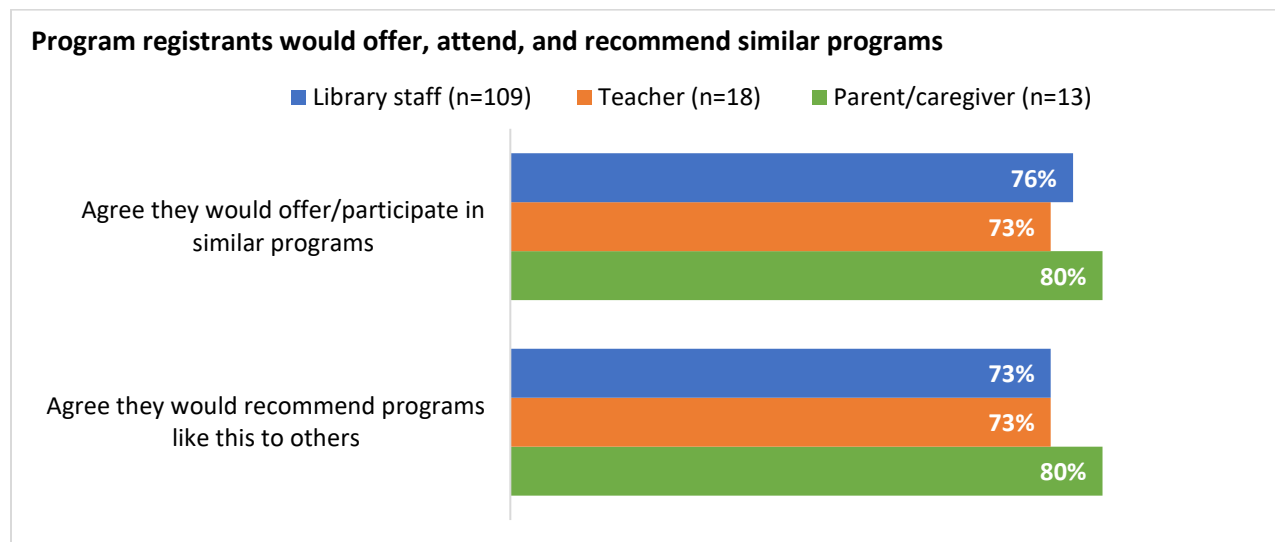
“Kids, in a small town, need mirrors to see what their life is like where they live, but they also need windows to see what’s out there. And I think having people talk to them like an engineer, gives them the window to see what’s out in the world and available.”

~Library staff member

Program Evaluation

The external evaluation of *Dream, Build, Create* was conducted by Education Development Center (EDC). Through surveys and focus groups, the evaluation aimed to examine how program registrants and participants experienced the program and benefited from it. Feedback was also gathered about what engineering-related activities they would be interested in in the future.

Dream, Build, Create was well-received overall. Although a few individuals noted challenges with technology or the timing of activities, the majority of library staff, teachers, and parents/caregivers who registered for the program agreed that they would be interested in similar programs in the future and would recommend them to others.



Source: *Dream, Build, Create* Evaluation Report (EDC)

Program registrants felt that the *Dream, Build, Create* event provided a valuable opportunity to connect viewers with diverse engineers. The combination of the film and panels highlighted the variety of activities that engineers do, including that they are creative problem solvers and help make the world better. It also showcased diversity in the engineering profession, providing an

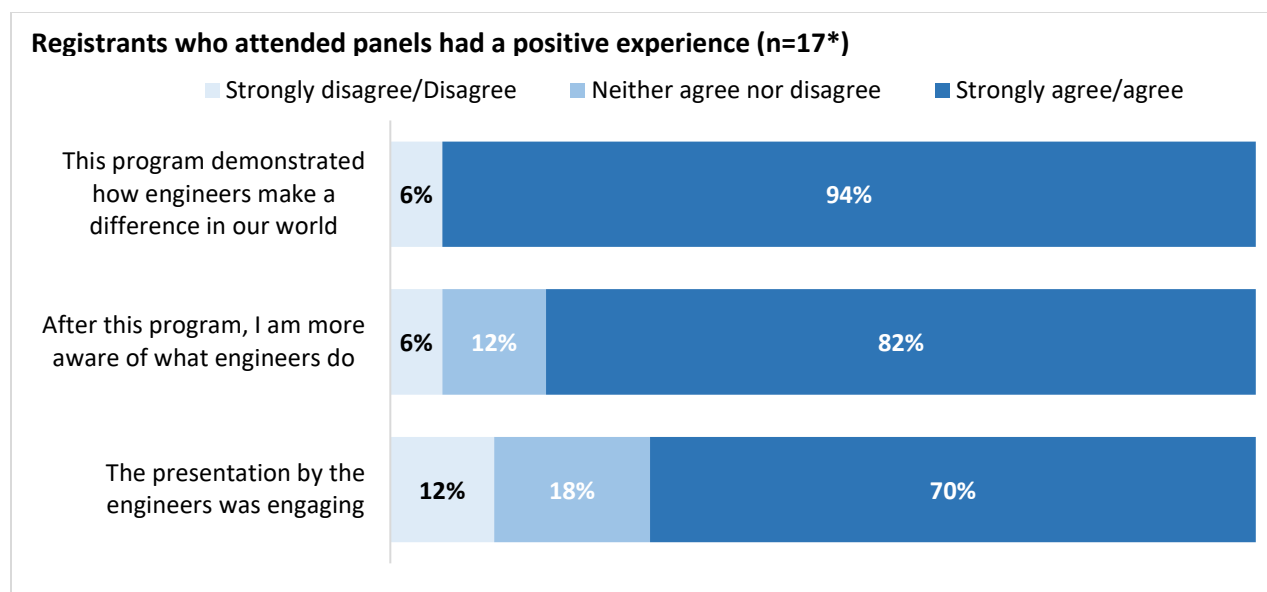
“I think it’s really, really valuable to see that this is a stepping stone that will allow you to get to hear where you can solve real world problems and find real world solutions...The other thing is to see how many different directions engineering can go. From micro engineering to building bridges and everything in between.”

~Library staff member

inspiring and eye-opening opportunity for youth so that they could see future possibilities that they may not have previously known about or

considered. This was especially important for participants from groups traditionally underrepresented in STEM who may not have previously seen people who look like them in the engineering profession. Additionally, rural communities, which made up a large percentage of program registrants, benefited from access to engineers that are less likely to be located in their local communities.

Program registrants who personally watched the *Dream Team* panels (n=17) had a positive experience themselves. All but one agreed that the program demonstrated how engineers make a difference in our world. The majority also agreed that they are more aware of what engineers do (82%), and that the engineers were engaging (70%).



Source: *Dream, Build, Create* Evaluation Report (EDC)

*Asked only of respondents who attended at least one *Dream Team* panel. Due to low numbers, responses to this question were not disaggregated by type of attendee (library staff, teacher, parent/caregiver).

Although many library staff, teachers, and parents/caregivers had previously offered or participated in hands-on engineering activities in the past, these rarely involved direct interaction with engineers. They would be interested in additional engineering-related activities, especially at-home activities and virtual demonstrations, to participate in during the upcoming [Engineers Week](#) in February. However, they would also value virtual programs post-COVID because of the access it provides to engineers that they may not otherwise be able to engage with. Teachers especially would be interested in additional *Dream Team* panels and screenings of *Dream Big*. Therefore, virtual programs such as these appear to have value beyond the COVID-19 pandemic because of the access they provide to diverse engineers who can put a face to the profession and show that anyone can be an engineer.

Appendix A: Information About ASCE and NCIL/SSI

About the American Society of Civil Engineers

ASCE represents more than 150,000 members of the civil engineering profession in 177 countries. Founded in 1852, ASCE is the nation’s oldest engineering society. ASCE stands at the forefront of a profession that plans, designs, constructs, and operates society’s economic and social engine – the built environment – while protecting and restoring the natural environment. ASCE is divided into geographic units that cover the entire globe. Attracting youth to the profession is one of the ASCE’s top priorities. To this end, ASCE maintains a robust pre-college outreach program. It has an active volunteer network that matches engineers with needs at local schools and community organizations like public libraries, and supports them by providing training at annual Multi-Region Leadership Conferences and disseminating training videos and 100+ civil engineering outreach activities through the [ASCE Pre-College webpages](#).

About the Space Science Institute’s National Center for Interactive Learning (NCIL)

The Space Science Institute’s [National Center for Interactive Learning](#) (NCIL) is dedicated to developing and implementing projects and initiatives that improve informal STEM education and the evaluation/research foundation on which they are based. NCIL works with national partners to develop STEM exhibition for public libraries, science centers, and museums; conducts professional development for informal STEM educators; and creates educational games and apps that can be deployed on websites, mobile devices (e.g. smartphones and tablets) and multitouch tables and kiosks. The STAR Library Network ([STAR Net](#)) is a hands-on learning network for libraries and their communities across the country that focuses on helping library professionals build their STEM skills by providing “science-technology activities and resources” (STAR) and training to use those resources. *STAR Net* resources include the [STEM Activity Clearinghouse](#), blogs, webinars, workshops and meetups at library conferences, partnership opportunities, information about upcoming national STEM events, and the *STAR Net* online newsletter.

[Project BUILD](#) (a *STAR Net* program) was funded by the National Science Foundation. It engages youth (grades 2-5), their families, librarians, and professional engineers in an informal learning environment with age-appropriate, technology-rich STEM learning experiences fundamental to the [Engineering Design Process](#). **Ready – Set – Create Learning Experiences** were developed to help participating youth: 1) Solve challenge-focused (real or simulated) problems using an engineering design process and 2) Use age-appropriate technology to model how engineers build a better world and improve the local community.

Appendix B: Discussion Prompts and Questions

Adapted from Key Factors for young women who choose engineering and/or persist in engineering according to *Despite the Odds: Young Women Who Persist in Engineering* (DiscoverE, December 2019).


Young people who chose engineering and/or persist in engineering...

- **Demonstrate an interest in and positive attitudes about engineering**
 - When you were a child what did you like to do?
 - Did any of those activities encourage your belief that you could become an engineer?
 - Favorite classes/hobbies?
- **See value in the field of engineering** (Believing that engineers work to solve important problems and that becoming an engineer can enable them to contribute to society and help people)
 - How do you see engineering as a way to make the world a better place?
 - What do you like best about your work?
- **Demonstrate engineering-related self-efficacy** (Believing, with confidence, that they have the skills and knowledge to do the work of engineers)
- **Embrace a STEM identity** (Science, Technology, Engineering, Mathematics)
 - When did you start thinking you could be an engineer?
- **Have a strong support network**
 - Sometimes there aren't as many women/blacks/Latinx in engineering fields. What kinds of support networks have helped you?
 - What did your parents think about you deciding to be an engineer? Where there any other family members who supported you?
 - Have you had any mentors? Where did you get your mentors from?
- **Draw upon social and cultural capital** (having the ability to draw strength from personal or cultural experience of struggle to overcome obstacles)
- **Feel a sense of belonging**

General Questions

- How did they use their degrees in their neighborhoods or community or for humanity?
- "Coolest," project they were able to work on that built their confidence.
- What were their engineering classes like?
- What was the biggest dream they had upon attaining an engineering degree?
- What are some of their hobbies and how do they relate to engineering?

Appendix C: Ending Slides, Women in Engineering Example



HOW DID WE DO?

Please take a moment and answer a short 5-question survey

<https://Go.edc.org/Dream>



ENGINEERING ACTIVITIES AT HOME

Today's Activity: Water Pollution Clean Up
Download at <http://discovere.org/at-home-engineering>

More Engineering Activities

- ❖ Create at Home: Edible Destruction, <http://clearinghouse.starnetlibraries.org/collections/DesignedToSurvive/Project-Build-Family-Guide-Edible-Destruction.pdf>
- ❖ Build at Home: Daylight in a Bottle, <http://www.starnetlibraries.org/wp-content/uploads/2017/12/Project-Build-Family-Guide-Daylight-in-a-Bottle.pdf>
- ❖ Build at Home: Make Life Easier with Your Own Zipline!, <http://clearinghouse.starnetlibraries.org/collections/SpantasticBridges/Engineering-Family-Guide.pdf>



DREAM, BUILD, CREATE

Thank you for attending.

For more information
contact Outreach@asce.org

Appendix D: Promotion Schedule and Examples

Promotional Schedule

STAR Net Newsletter

October 7—[Libraries Invited to Bring Engineering and Engineers to Their Community: A Virtual Program during November 2020](#)

ASCE Dream Build Create Social Media Promotion Schedule and Results

October 22 - ASCE News Weekly: 82,000

- [ASCE “Dream Teams” to bring Dream Big, outreach to the digital classroom](#)

Oct. 26 – [Promotional Post #1](#)

- 1.8% engagement rate, 2,907 impressions, 50 engagements (6 link clicks)

Nov. 3 – [Promotional Post #2](#)

- 0.9% engagement rate, 3,209 impressions, 30 engagements (3 link clicks)

Nov. 9 – [Promotional Post #3](#)

- 0.9% engagement rate, 10,145 impressions, 88 engagements (10 link clicks)

Nov. 12 – [Black Engineers Panel Promotion](#)

- 0.7% engagement rate, 3,856 impressions, 28 engagements (6 link clicks)

Nov. 19 – [Spanish-speaking Engineers Panel Promotion](#)

- 0.8% engagement rate, 3,651 impressions, 30 engagements (2 link clicks)

Nov. 24 – [Engineering Extravaganza Panel Promotion](#)

- 0.8% engagement rate, 3,494 impressions, 28 engagements (2 link clicks)

