



Summative Evaluation:  
**Advocate Grant Program**

Expanded Report  
With Technical Report and Appendices

Prepared for the  
**Society for Science and the Public**

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# EXECUTIVE SUMMARY

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The Society for Science and the Public's Advocate Grant Program provides selected Advocates with funding, resources, and information. The role of the Advocates is to support underserved middle and high school students in the process of advancing from conducting a scientific research or engineering design project to entering a competition. This summative evaluation focuses on the 2016-2017 cohort with 31 Advocates from across the United States and the 517 students supported through the program.

Data for this report includes 31 Advocate surveys, 29 Advocate interviews, responses from an online survey of 244 Advocates' students, and responses from a comparison group of 275 students who had completed research projects and completed a similar survey. An optional technical report provides information on methodology and additional data details.

## Evaluation Findings

### Program Impacts on Advocates

- Advocates gained awareness of the range of competitions, their requirements, and deadlines.
- Advocates developed a sense of camaraderie with others in the student research and competition community.
- Advocates saw the biggest benefits to themselves in terms of relationships.
- Advocates are motivated to help underserved students with projects and passionate about getting students involved in competitions.
- Advocates could benefit from additional support in the competition application process and in working with students on time management, organization, and preparing competition entries in general.
- Most Advocates supported more underserved students this year than last.
- Most Advocates planned to continue supporting underserved students in research and competitions after the program ended.
- Information on competitions and sharing of resources with colleagues were aspects of the program cited most frequently as leading to continuing to support underserved students.
- Advocates saw learning to think scientifically as a benefit to students conducting research and saw improvement of skills as a major benefit to entering competitions.
- Advocates saw a wide variety of benefits to students in the Advocate Grant Program.
- Advocates used stipends to directly and indirectly benefit students.
- An unintended impact of the Advocate Grant Program occurred through the status created by program participation.
- Another unintended impact of the program was that the program created a ripple of impacts within the wider community.

### Program Impacts on Students

- The Advocate Grant Program had a positive impact on student survey respondents.
- Advocate student survey respondents who entered competitions experienced the greatest positive impact.
- The program was particularly successful for student survey respondents from racially underserved groups.
- The Advocate Grant Program appears particularly effective for underserved, younger girls, especially those in rural settings.



- Comparison data indicate high potential impact on underserved, rural, younger girls, particularly those working with Advocates.
- Advocate encouragement was key to students completing their projects.
- Student survey respondents completed projects when required and because of interest in STEM and their topic.
- Advocates were key to encouraging student survey respondents to enter competitions, particularly among rural students.
- Advocate student survey respondents were motivated to enter competitions to explore fascinating questions and because of Advocate encouragement.
- Students reported that learning science was the biggest benefit to entering competitions.
- Students entered competitions because it was required and because they wanted to share their research results.
- Student survey respondents reported that Advocates were most helpful in providing general and procedural help.
- Advocates filled gaps in support by providing help with finding references, finding experts, organizing data, and writing.

### **Additional Findings from the Advocate Perspective**

- Advocates recognized the value in the diversity of Advocates in the program; that is, working in different settings and with different experience levels.
- Seasonal timing of the Advocates' local programs affected the timing of their needs for support from the Society.
- Middle school and high school students and their Advocates had different needs.
- Advocate perspectives on the monthly phone calls and Edmodo differed.
- Advocates provided insights on poverty and inequities in the competition process.
- Students in university research labs required a different approach by Advocates than those used in school settings.
- Advocates offered their ideas on the scale of the program.
- Advocates recommended program improvements.

### **Recommendations**

The evaluation team made the following recommendations for improving the program, described in more detail in the full report.

- Target communication with Advocates to meet their diverse needs.
- Explore ideas for providing additional resources.
- Create a clear definition for low-income that enables Advocates to provide accurate information.
- Create an online reporting and student data tracking system for Advocates.
- Introduce the topic of nudging for discussion and development in the next cohort.

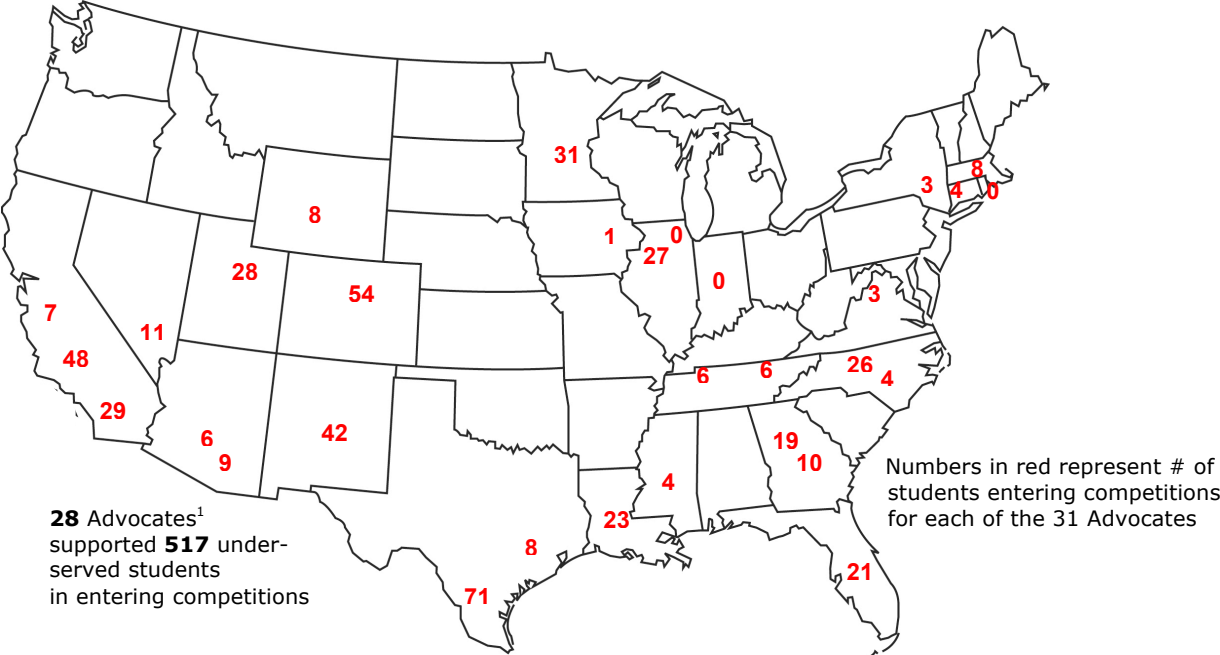
### **Evaluation Team**

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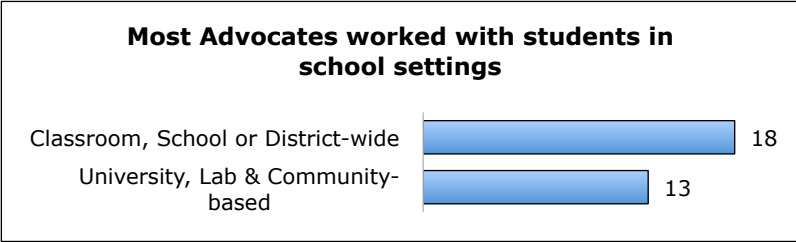
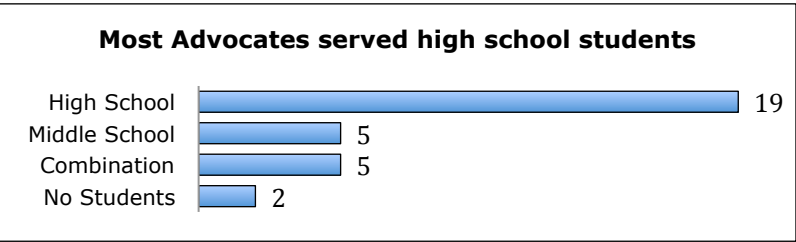
# PROGRAM SNAPSHOT

The Society for Science and the Public selected 31 Advocates for the 2016-2017 Advocate Grant Program cohort. With \$3000 grants, resources, and information from the Society, Advocates assisted underserved students in advancing from conducting a scientific research or engineering design project to entering a scientific research competition. (See Appendix A for details.)

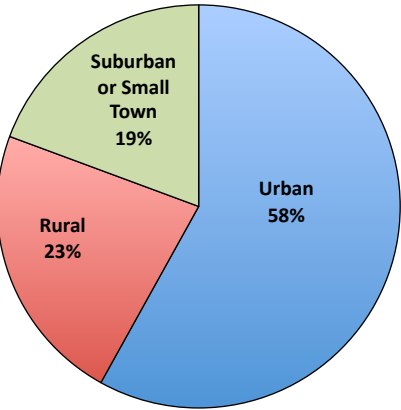
## Advocate Reach Nationwide



## Advocates' Settings



**Most Advocates worked in urban settings**

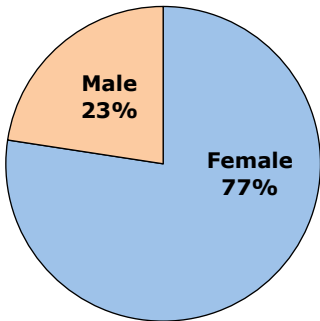


<sup>1</sup> Two Advocates were unable to recruit students. From survey data, a third Advocate appeared to have supported students but did not provide student reporting data.

# CHARACTERISTICS OF ADVOCATES

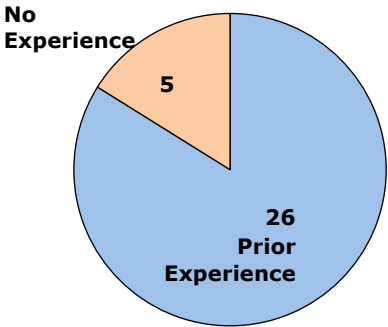
## Most Advocates (77%) Were Female

Slightly higher than the gender mix of middle and high school teachers in the U.S. (62% in 2014), females made up 77% of Advocates.



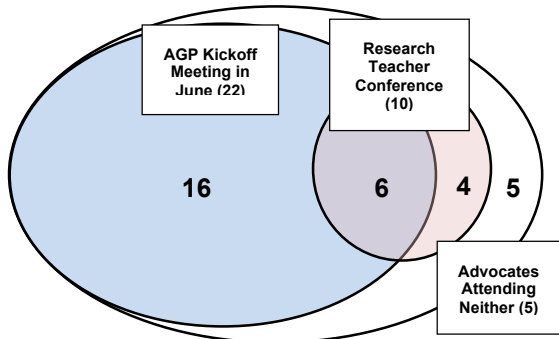
## Most Advocates (84%) Had Prior Competition Experience

Twenty-six Advocates had prior experience with competitions, at least two with experience as a competition participant and one with experience as a parent of a competition participant.



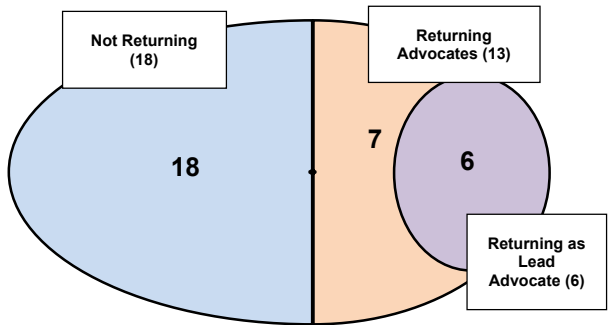
## Advocates Attended Professional Development Opportunities in D.C.

The Society provided two opportunities for professional development in Washington D.C., in addition to phone, email, and online support. Twenty-two attended a kickoff meeting in June 2016. Ten attended the fall Research Teacher Conference, six of which attended both opportunities. The remaining five had scheduling conflicts and did not attend a meeting in Washington D.C.



## Thirteen Advocates Are Returning in the 2017-2018 Cohort

All 2016-2017 Advocates were invited to apply for the 2017-2018 cohort. Thirteen of those who applied were selected to return. Six of the thirteen will return as Lead Advocates, a new role in 2017 to assist the Society by leading a group of 6-7 Advocates in the new cohort.

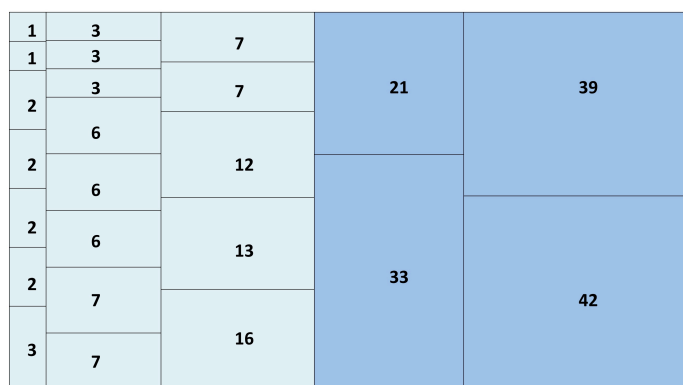


## CHARACTERISTICS OF ADVOCATE AND COMPARISON GROUP STUDENTS

Student data included responses from an online survey. Responses were received from 244 students from 24 Advocates<sup>2</sup> and 275 students in a comparison group from seven teachers. Descriptions of the data samples in this section provide insight into where and how the sampling may influence the findings in this study. A summary of some implications is included at the end of this section.

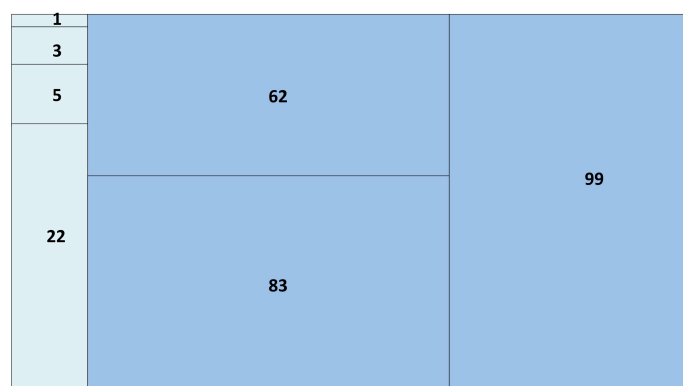
### Over Half of Advocate Students' Surveys Came from Four Advocates

Advocates were asked to share a link to an online survey with all of the students they supported during the 2016-2017 program year. The rectangle to the right represents the 244 students responding from 24 Advocates. The area of each of the 24 smaller boxes is proportional to the number of students responding per Advocate<sup>3</sup>. Over half of responses (darker blue boxes) came from the students of only four Advocates.



### Most Comparison Group Student Surveys Came from Three Teachers

Teachers were recruited from regional science fairs to share a link to a similar survey with their students. The rectangle to the right represents the 275 students responding from seven teachers. The area of each of the seven smaller boxes is proportional to the number of students responding per teacher, showing 89% of responses came from only three teachers.



### Advocates and Teachers Vary in Numbers of Students They Support

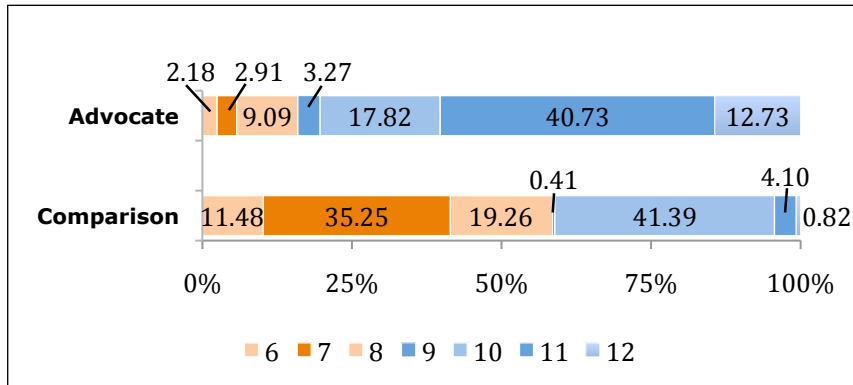
Advocates were expected to support at least three underserved students, though many supported more. Numbers ranged from three to 90 students. Survey response rates varied widely by Advocate. From the 24 Advocates who had students respond to the survey, 47.19% of students served by those Advocates responded. While it may be that this 47.19% was representative of all students that Advocates supported, it could be that students who were more successful and enjoyed the experience at a high level were more likely to respond.

<sup>2</sup> Two Advocates had no students and five additional Advocates had no students respond. Unless otherwise noted,  $N = 244$  for Advocate student data and  $N = 275$  for Comparison Group data.

<sup>3</sup> Treemaps represent parts of a whole with nested rectangles. In this case, the smaller rectangles represent the proportion of students responding for each Advocate or comparison group teacher.

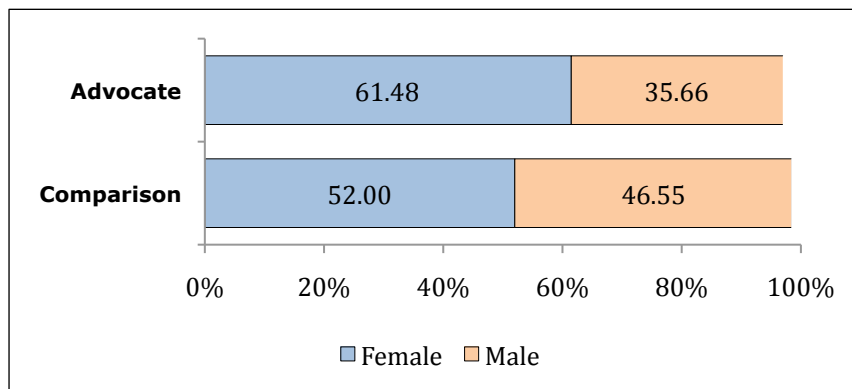
Thirteen teachers responded to an invitation for comparison group participation by providing an estimate of the number of students they would invite to complete the survey. From the seven teachers with students completing a survey, 68.75% of students responded. Excluding one teacher who said he would invite 100 students to participate yet only one student did, the response rate was 91.67%.

### Advocate Student Respondents Were in Higher Grade Levels



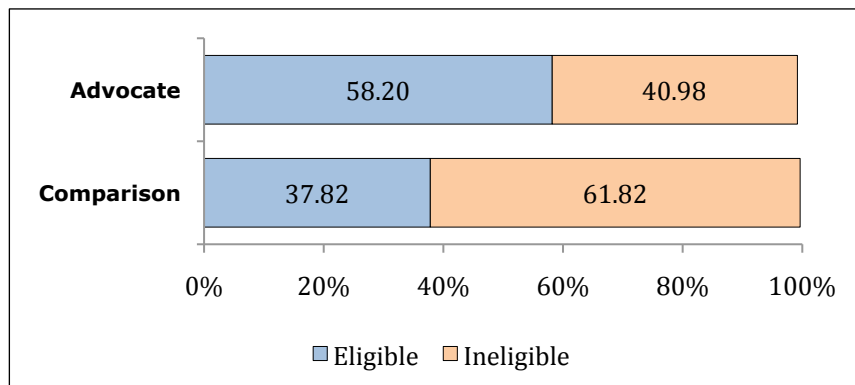
Advocate student respondents were older than comparison student respondents with 84.02% of Advocate students in typical high school grades (blue) and 58.55% of comparison group students in typical middle school grades (orange). This difference was significant.<sup>4</sup>

### Student Respondents' Gender Identities Differed by Group



Gender of Advocates' and comparison student respondents was significantly different ( $p < .05$ ). While both groups had a majority of females, the difference appeared to be due to a higher percentage of females in the Advocate student group than in the comparison group.

### Responses from Advocates' Students Reflect More Racial Diversity



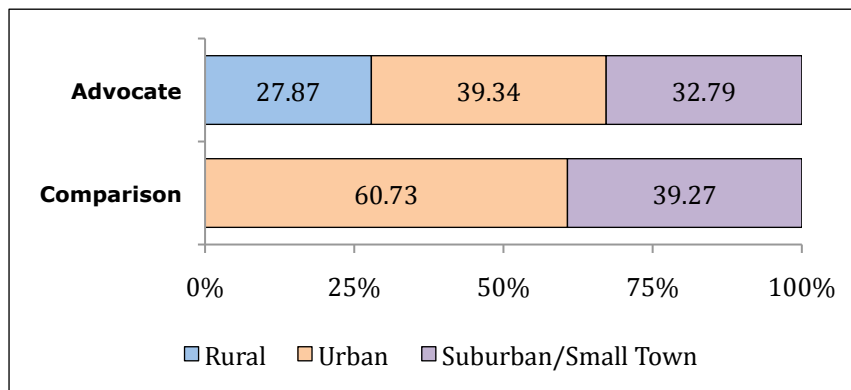
Advocates had higher numbers of student respondents from race and ethnic groups eligible for the program than did the comparison group. This difference was significant. Eligible groups were Hispanic/Latinx, African-American, Native American, or mixed race with at least one of those.

<sup>4</sup> Unless otherwise stated, reported differences are significant at  $p < .001$ .

## Family Income Level Data Were Not Available

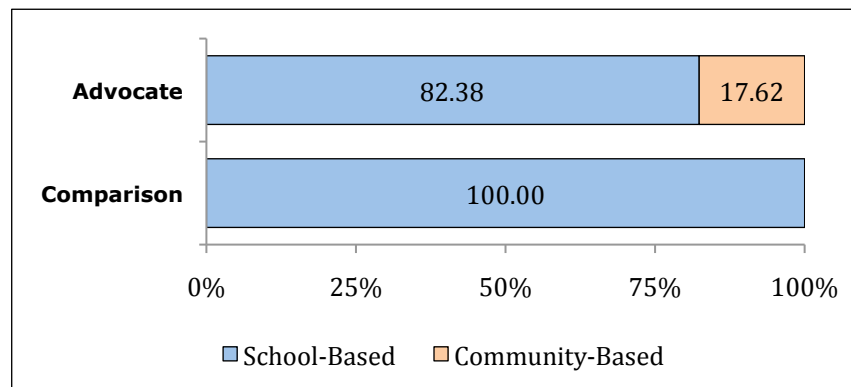
In addition to race, the Society considered students from low-income populations as eligible for the grant program. Advocates in focus groups reported that they did not have access to consistently reliable family income level data. Students tend to be unreliable sources of such data and were not asked about family income on the surveys. Therefore, these data are not reported. (See the technical report for details.)

## Setting (Urban/Rural/Suburban) Differed by Group



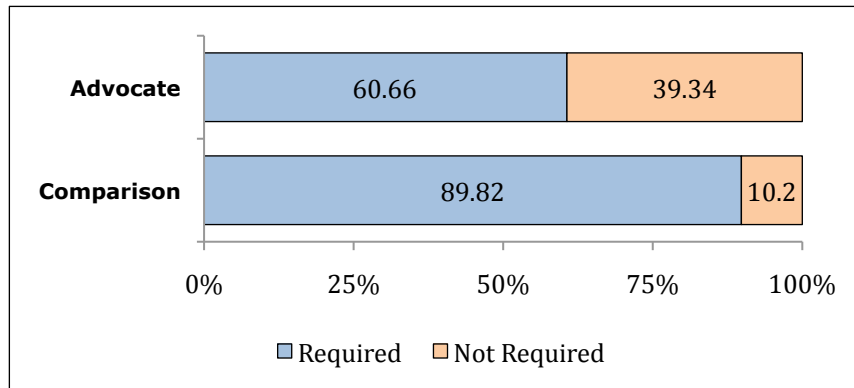
No comparison group students lived in rural settings (see technical report for definitions), compared to 27.87% of Advocate student respondents who lived in rural settings. More comparison group respondents lived in urban settings than did Advocate student respondents.

## All Comparison Group Respondents Were in School Settings



Advocates supported students in various settings. Advocate student respondents included 17.62% with support in university, lab, or community-based settings. All comparison group respondents were supported through teachers in their schools.

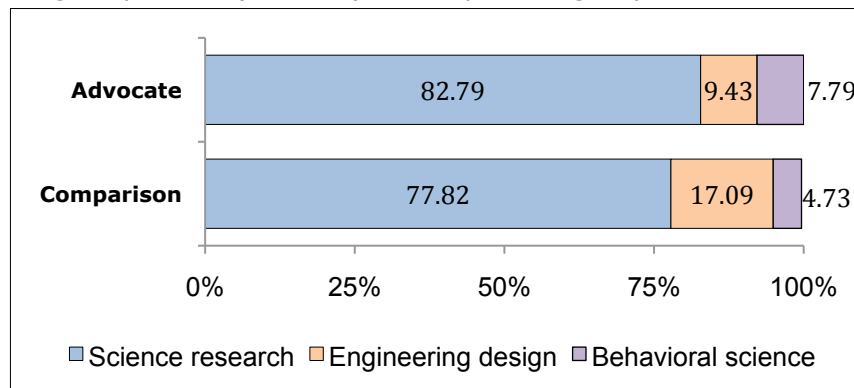
## More Comparison Group Students Reported Required Research Projects



Students are often required to complete projects for a grade or course. More comparison group respondents than Advocate student respondents reported that their project was required during the 2016-2017 year.

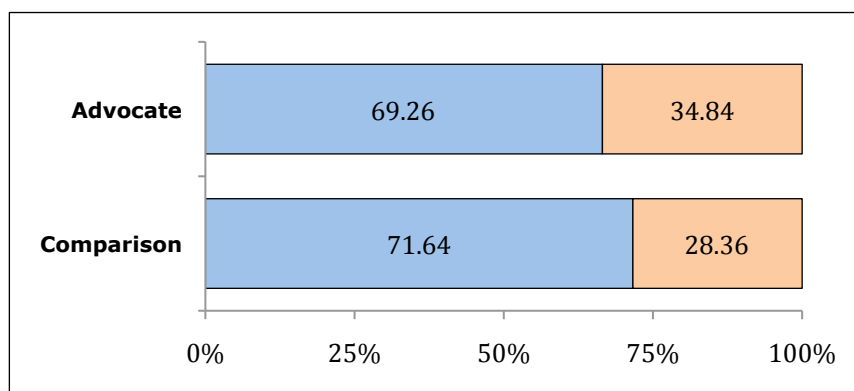
## Student Respondents' Research Project Types Differed by Group

A higher percent (17.09%) of comparison group students worked on engineering design



projects than did Advocates' students (9.43%). This difference was significant ( $p < .05$ ). Yet, large majorities of both groups worked on science research projects giving a solid basis for comparison of experience.

## More Comparison Group Respondents Entered Competitions



More comparison group students entered their projects in competitions than Advocate student respondents. Competitions include local, regional, state, national, and international competitions. This difference was significant but not large.

## **Over Twice as Many Advocate Student Respondents Entered Society Competitions**

The Society for Science and the Public sponsors three national competitions: Broadcom MASTERS, Regeneron STS, and Intel ISEF. More Advocate student respondents entered these competitions (7.79%) than comparison group students (3.27%). This difference was significant ( $p < .05$ ). Students in both groups also competed in regional and state-affiliated science fairs, though comparison data were not available.

## **Advocate Student Respondents Had Less Prior Research and Competition Experience**

Students provided information on their prior experience with research projects and competitions. Differences between Advocate and comparison group respondents were significant. Advocate student respondents had less experience with research projects and competitions. The mean number of research projects per year was 0.39 for Advocate student respondents and 0.73 for comparison group respondents (closer to one project per year). The mean number of competitions entered per year was 0.29 for Advocate student respondents and 0.42 for comparison group respondents. Grade level was taken into account in calculating results.

## **Summary of Comparisons**

Advocate student survey respondents were older, included a higher percentage of females, and were more racially diverse than the comparison group respondents. Comparison students completed more engineering design projects and were more often required to complete projects than the Advocate student respondents. Advocate student respondents included rural students as well as students working in labs and community settings; comparison student respondents did not. Thus, the samples are not directly comparable.

In general, the findings appear fairly sound. Yet, it remains possible that other factors account for the differences between the two samples.



## FINDINGS

The Advocate Grant Program evaluation team identified intended and unintended program impacts on Advocates and their students, along with impacts of conducting a scientific research or engineering design project and entering those projects in competitions. With large numbers of students representing a small number of Advocates and a small number of comparison group teachers (see page 5), additional research and evaluation will be needed before findings can be generalized beyond the 2016-2017 program.

Intended impacts include 23 Advocate impacts and 25 student impacts (listed in Appendix B, pages 64-65 of the expanded report). Impacts covered changes in awareness, interest, attitude, skills, and behavior<sup>5</sup> as summarized here:

Impact Category	Advocates	Students
Awareness & Understanding	Range & requirements of competitions; competition benefits; recognition by peers; Society as a resource	STEM content & opportunities; scientific research process; competition benefits
Engagement & Interest	Motivation to recruit underserved students to enter competitions	STEM education & careers; entering competitions
Attitudes	Comfort with competition applications; camaraderie with other research teachers; passion for getting students involved; confidence in guiding students	STEM enjoyment; self-esteem; perceived value of research & competitions
Skills	Ability to support students with research and competitions	Writing; presentation; organization
Behavior	Advocates support underserved students who would not otherwise enter competitions	Underserved students (who would not otherwise have done so) participate in competitions

### Program Impacts on Advocates

The following impacts of the program on Advocates are based on online surveys of all 31 Advocates and follow-up interviews with 29 Advocates<sup>6</sup>. Survey questions asked Advocates to respond to statements about their awareness, ability, attitude, and motivation *Before* and *After* their participation in the program. Advocates were also asked for numbers of students supported during the program year and the previous year to gauge increases. Open-ended survey questions and interview questions asked for additional information and insights.

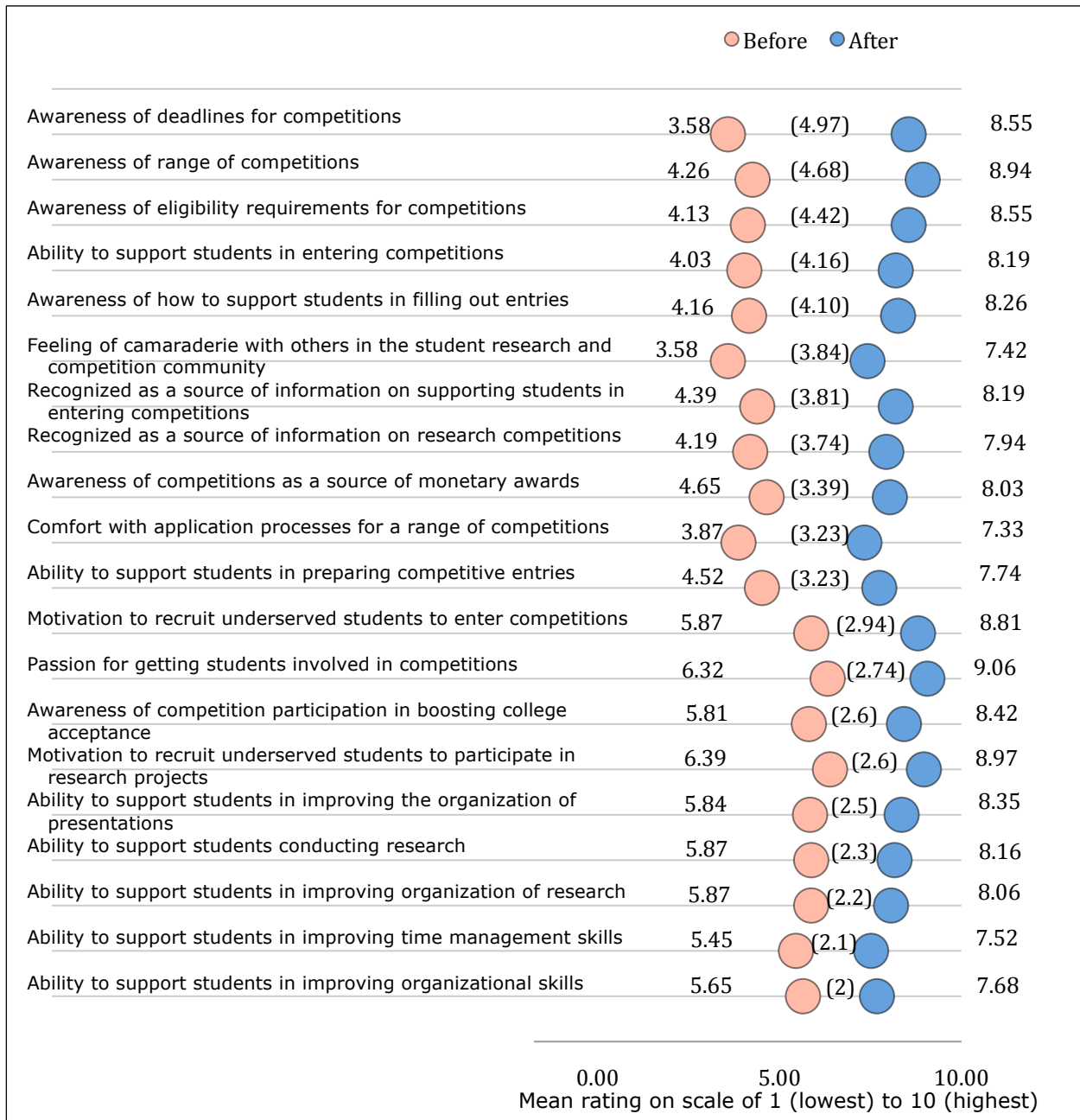
#### Advocates gained awareness of the range of competitions, their requirements, and deadlines

On the survey, Advocates were asked to rate 20 statements regarding their awareness, motivation, recognition, and etc. *Before* and *After* their participation in the Advocate Grant Program on a scale of 1 to 10, with 10 as the highest level. (See Appendix C of the

<sup>5</sup> Impact categories come from *Framework for Evaluating Impacts of Informal Science Education Projects* (2008) edited by A. Friedman retrieved from <http://www.informalscience.org/framework-evaluating-impacts-informal-science-education-projects>

<sup>6</sup> Two Advocates did not respond to requests for interviews.

expanded report for survey questions.) *Gain* scores were then calculated by subtracting *Before* from *After* scores. In the figure below, statements appear in order with the greatest to the lowest *Gain* scores (with *Gain* in parentheses between *Before* and *After* scores).



As the figure shows, the greatest gains are in areas related to the competitions, and in general, those were the areas in which Advocates started the program with lower scores. The greatest gains were in awareness of competition deadlines, the range of competitions, eligibility requirements, and the ability to support students in filling out competition entries. This indicates that the Advocate Grant Program was particularly successful helping Advocates maneuver the process of competition entry, an important desired outcome of the program. (See Appendix A of the expanded report for anticipated impacts.)

## Advocates developed a sense of camaraderie with others in the student research and competition community

In focus groups and interviews, many Advocates discussed how they felt isolated in their work but were amazed to find the sense of community in the meetings in Washington, D.C. Several also talked about the community developed through the Edmodo online platform. This can also be seen in the item "Feeling of camaraderie with others in the student research and competition community" in the figure on the previous page. This item had the lowest *Before* score (3.58) for the 20 items and a very high *Gain* of 3.84. The moderate *After* score (7.42) indicates that there is still room for the program to continue to increase Advocates sense of community.<sup>7</sup>

I feel connected. It lowers my stress level so that I can get more kids eligible. And just reading all the posts in Edmodo and what everybody's doing -- just ideas -- because we're all in the same boat, we're all dealing with ... the underserved kid.

– Advocate 65

## Advocates saw the biggest benefits to themselves in terms of relationships

In open-ended survey questions, Advocates were asked to list the biggest benefit they saw from their participation in the program. Frequently cited benefits focused on relationship. (The number of Advocates mentioning the benefit is in parentheses on this and all following lists of Advocate responses.)

- Increased feeling of camaraderie and recognition that others are involved in the same processes and struggles with supporting student research and competitions (10)
- Support from other advocates (6)
- Resources for supporting student research (4)
- Support from Society staff (3)

Comments made by Advocates in interviews also focused on relationship. When describing the community of Advocates, several mentioned other Advocates by name and described how they had connected during the year by email to share resources or ask questions. Many complemented Society staff by name, saying how helpful staff had been or noting that the staff made the Advocates "feel like a priority" (Advocate 15).

The other one is the Edmodo where everybody was posting ... and you could see what they're doing. Some of them they had really good ideas and so I contacted them and asked a few questions for some of the Advocates and so that was helpful too.

– Advocate 49

Some Advocates described how the Edmodo platform supported their sharing, as seen in the quote by Advocate 49 above. Some Advocates reported in interviews that overly personal comments or photos appeared to them as unprofessional. In summary, several Advocates did not find this tool comfortable or useful. The quote to the right demonstrates this sentiment.

I recognize that [Edmodo is] a good viable thing. ... I don't like to share on those sorts of things and so it's just not in my nature to participate in that sort of activity.

– Advocate 24

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<sup>7</sup> Advocates were assigned case numbers using random numbers from 10 to 99. Case numbers are provided for all quotes.

Perhaps the biggest part of the program in creating relationship among Advocates was the Kickoff meeting in June 2016<sup>8</sup>. Most Advocates who attended referred to it in interviews as a central piece of their understanding of the program and connection with other Advocates.



### **Advocates are motivated to help underserved students with projects and are passionate about getting students involved in competitions**

Advocates started the program with the highest mean on the item: “motivation to recruit underserved students to participate in research projects” (6.39 on the 10-point scale as seen in the figure on page 11). A “passion for getting students involved in competitions” was rated as high *Before* the program and had the highest mean for *After* the program (9.06). The program is attracting Advocates who are motivated to help underserved youth with research and design projects and Advocates who are passionate about competitions. From the data, it appears that the program then leads to an increase in that motivation and passion among participating Advocates.

Several Advocates responded at the highest level (10) for *Before* and *After* the program; this resulted in zero gain. Five Advocates gave this response for “motivation to recruit underserved students to participate in research and design projects” and for “motivation to recruit underserved students to enter competitions.” Five Advocates (only two of the previous five) gave the same response (10-10=0) on “passion for getting students involved in competitions.” For these Advocates, there was no gain since they already had high motivation and passion.

Only two Advocates indicated negative *Gain* scores – one Advocate on all three items and one on the two motivation items. Neither Advocate attended opportunities in Washington, D.C., neither was working with students in their own classroom, and both had challenging years, particularly in terms of communication with students. It appears that their own situations led to the decrease in motivation and passion rather than the program.

Several Advocates described things competing for teachers’ time. The passion and motivation may be there, but it appears that participation in the program provided needed resources and in some cases a needed nudge.

I don’t know how else to put it. ... [This program] is a push that this is important, this is a priority and I need to keep it prioritized. – Advocate 15

<sup>8</sup> All photos in this report were provided by the Society for Science and the Public.

## **Advocates could benefit from additional support in the competition application process and in working with students on time management, organization, and preparing competition entries in general**

Items on the survey with low *After* means as shown on the previous figure indicate areas in which the Advocate Grant Program could offer more assistance. Even though scores are high, there is room for increase. Starting with the lowest *After* mean (in parentheses), these areas are as follows:

- Comfort with the application processes for a range of competitions (7.33)
- Feeling of camaraderie with others in the student research and competition community (7.42)
- Ability to support students in improving time management skills (7.52)
- Ability to support students in improving organizational skills (7.68)
- Ability to support students in preparing competitive entries (7.74)

On “comfort with the application processes,” the *Before* mean was very low and there was an increase on the *After* mean. Yet, Advocates could still use more support with the processes. Survey results also indicate that Advocates could benefit from ideas and best practices in supporting student skill building.

While open-ended survey responses and interviews indicated a sense of camaraderie among Advocates, the *Before* and *After* survey responses include room for improvement. Some Advocates spoke to this in the interviews with a few suggesting video conferencing platforms (instead of audio-only calls) and creating other opportunities to get to know each other better.

## **Most Advocates supported more underserved students this year than last**

Advocates were asked on the survey to provide the number of students they supported in 2015-2016 and 2016-2017 for the following questions:

- a. How many underserved students did you support who would not have otherwise participated in research and design projects?
- b. How many underserved students did you support who would not have otherwise entered competitions?
- c. How many students did you support in entering competitions?

For each question, the number of students in 2015-2016 was subtracted from those reached in 2016-2017 to calculate the difference. Most Advocates reported an increase in numbers from the previous year to the current year. The average increase in number of underserved students supported in research and design projects was 6.68. The average increase in underserved students supported who went on to enter competitions was 5.00. For all students, not just those underserved, the average increase in supporting students through entering competitions was 8.35. Most of the seven Advocates who reported a decrease in numbers also provided an explanation. These included changes in teaching assignments and timing of the survey (i.e., before some students entered competitions). Among those who didn't provide an explanation, changes in class size may be the reason since numbers were high in both years with only minor fluctuations. (See the technical report for details.)

## Most Advocates planned to continue supporting underserved students in research and competitions after the program ended

On the survey, 25 Advocates indicated they planned to continue to support underserved students in entering competitions in the following year. Of the 25, thirteen will be Advocates in the 2017-2018 cohort and the remaining twelve will continue without Society support. When asked why or why not they planned to continue, those not planning to continue cited changes in their position or situation, or indicated they could not continue unless they had the financial support of the program. Reasons for continuing are listed below. Some Advocates gave several answers and two left the answer blank.

- Learned the value of competitions for students (5)
- Will continue and will expand reach (5)
- My students deserve to have their work seen & passion grow (3)
- To share information with students who wouldn't otherwise know about competitions and resources available to them (2)
- I'm more comfortable with the process (2)
- It's part of my program (2)
- If I don't, no one else will (1)
- I became a teacher or advocate to bring STEM to underserved students (1)
- I want to return to the Research Teacher Conference as a veteran leader (1)
- I enjoy it (1)
- Excited about next year already (1)
- AGP increased my desire to reach more underserved youth (1)
- I learned more about underserved students and the need (1)

We ended up with only two projects being entered. But just having done that, I'll at least be able to double that next year and probably more. ... It was very difficult to motivate students to do things you yourself didn't know how to do yet. I didn't know what I was doing; it was hard to expect them all to do it. So, that's what I had to realize.

- Advocate 15

Though the reasons varied widely for continuing to support underserved students in research projects and entering competitions, the fact that 25 (80.65%) plan to continue the work is a clear indication that the positive impacts of the program on students will extend to more students in the future.

## Information on competitions and sharing of resources with colleagues were aspects of the program cited most frequently as leading to continuing to support underserved students

A follow-up question on the Advocate survey asked: "If you plan to continue, what parts of the Advocate Grant Program have helped you to do so?" The most frequently cited aspects of influencing plans to continue supporting underserved students in entering competitions are below.

- Knowing about competitions, eligibility, dates, etc (11)
- Sharing of resources by colleagues (8)
- The stipend helped financially (7)
- Support from Society staff (5)
- Professional development and training on competitions and scientific research (4)
- The status that comes with being an Advocate (2)
- Knowing what resources are available (1)

I have learned that slowing down and reflecting is beneficial. Also, I have to justify my program in monthly conference calls.

- Advocate 25



- Knowing the benefits for students (1)
- Having the goal to support 3-5 underserved students (1)
- AGP causes Advocates to pause and reflect on practice (1)
- Encouragement to keep working with underserved youth (1)
- The resources available from the Society, like *Science News* (1)

Many Advocates reported that the knowledge and experience gained with the competitions and with supporting student research will enhance their continued support of underserved students.

### **Advocates saw learning to think scientifically as a benefit to students conducting research and saw improvement of skills as a major benefit to entering competitions**

Advocates described what they saw as the biggest benefits to students in conducting research and entering competitions on open-ended survey questions. Fifteen Advocates identified learning to think scientifically as the biggest benefit to research, with eleven describing improvement in skills and seven pointing to the increase in confidence. Thirteen Advocates cited improved skills and nine identified confidence building as a benefit of entering competitions. As one Advocate put it on the survey, research “builds their confidence and gives them experience that is more authentic than class assignments that are for a grade” (Advocate 40).

Designing a research experiment requires a student to use a set of reasoning skills that few other activities require. These skills can be used in so many other places in their lives. Additionally, research is difficult and I think students need the chance to fail. These projects give students a framework to work and re-work a problem that they care about.

- Advocate 39

### **Advocates saw a wide variety of benefits to students in the Advocate Grant Program**

Advocates reported how they saw their students benefiting from the Advocate program. Survey responses varied widely. Benefits mentioned by more than two Advocates included the following:

- Awareness of competitions as an option (5)
- Financial support translated into food, transportation, and non-research supplies that directly benefited the students (5)
- Access to resources to produce quality project (5)
- Students see they are taken seriously by the Society & wider network (3)
- Help with plans for future & opens opportunities (3)
- Increases student confidence (3)
- Provides students with access to science and the associated advantages (3)

The students were able to see that there was a wider network of support and competition out there that take us all seriously through Advocate support and competition.

- Advocate 22

Advocates saw benefits from different aspects of the program – funding, resource access, Society support. Benefits identified from student surveys are described in the Program Impacts on Students section of this report.

## **Advocates used stipends to directly and indirectly benefit students**

The survey asked how Advocates used the program stipend of \$3000. In the interviews following the surveys, some Advocates mentioned that they had not received their full amount of the stipend at the point they responded to the survey. Some were still completing the program. Two did not have students and were not receiving stipends. Thus, the following uses of the funds received, as described by the Advocates on the survey, may be incomplete.

- Supplies to support student research (14)
- Food for students during meetings and other group times (12)
- Entry fees for competitions (5)
- Clothes for students to wear at competitions or t-shirts for group identity (5)
- Travel to competitions (4)
- Dinner or other food as a special occasion outside of research work (3)
- Transportation for field trips to colleges, labs, etc. (3)
- Rewards and awards for students (2)
- Travel for Advocate to conference (1)
- Advocate transportation to meet with students (1)
- Student travel to meetings through bus passes (1)
- Computers and wifi for students in a rural setting (1)

## **An unintended impact of the Advocate Grant Program occurred through the status created by program participation**

In interviews, some Advocates described the value in being able to tell people they were an Advocate. This status opened up additional resources as one Advocate explained:

*I had my world opened up to a whole new area of legitimacy from even just the title and just the support. ... I found that by saying that I was an SSP Advocate, and then describing what Society for Science and the Public actually was and what they do, a lot more resources actually opened up. There were a lot more companies and places that were willing to sit there and say okay, this is an actual serious thing. This is actually associated with a larger thing.... By being able to say that you're representing something much larger, it allows for, especially in rural areas, for those people that have these resources to say, okay so we can actually help be part of something much larger too. – Advocate 22*

This status applied to students as well. One Advocate reported how impressed her students were when she asked them to quiet down because she was on a call with Washington, D.C. Other Advocates described how their students felt proud of being part of the program and connected to the Society.

## **Another unintended impact of the program was that the program created a ripple of impacts within the wider community**

In the fall focus groups, some Advocates mentioned a ripple effect of the program and their work; that is, their Advocate work affected other teachers and organizations. To follow-up on this unintended program impact, Advocates were asked on the survey about the impact of the program on their school or program. Most Advocates identified one or more impacts, though five did not see an impact and one did not respond to the question. Advocates identified the following impacts.



- Increased support for the research program (8)
- More teachers became aware of opportunities related to competitions (7)
- Participation in the program helped secure more funding for university, school district, or school (5)
- The school recognized and bragged about the students (5)
- Plans to expand and grow the program (4)
- Gave confidence or status to the Advocate to approach administration for support (2)
- Others are applying for AGP (2)
- Others recognize the Advocate as knowledgeable and as a leader (2)
- Changes in judging of projects in competitions (1)
- Created a dedicated space (1)
- Increased admission of STEM majors to the university (1)
- Provided more or new opportunities for students (1)

The people I met [are] inspiring in the work that they are doing to enable their communities to have more access to science research, science competitions.  
- Advocate 63

Advocates described other ripple effects in their interviews. For example, one Advocate stepped in to help with a regional and a state science fair when the two directors left their positions. Using the status of the Advocate role, the connections with the Society, and the knowledge of the competition process, this Advocate provided the connections between the new directors who lacked experience and the Society’s resources. Other Advocates were creating school science fairs where none previously existed.

Another Advocate, who will be a Lead Advocate in the 2017-2018 cohort, described building a local network of teachers who are “comfortable asking me questions about science fairs, research and other things like that” (Advocate 11). Other Advocates described similar situations where other teachers in their building were looking to them as experts, including an English Language Learner science teacher. One Advocate took a new science teacher under her wing to support her with getting students ready for the science fair.

Teachers who saw my students succeeding are now seeing that it can be done and it can be successful. ... This small step of having 3 students enter fairs has caused a domino effect of making a wider impact on our district. The ultimate goal would be, after implementing it in the high school, to get it going in the middle schools.  
- Advocate 83

Some Advocates taught research classes; however, a few that were teaching general non-research based classes convinced their administrations to add such classes. In one case, the Advocate wasn’t sure who would teach the new course but knew it would be offered. In other cases, the Advocate would be teaching the course.

One Advocate was able to create a teen maker space at her community library.

Thus, not only did the Advocates impact their own group of students, many Advocates had a positive impact on students in their school and region.

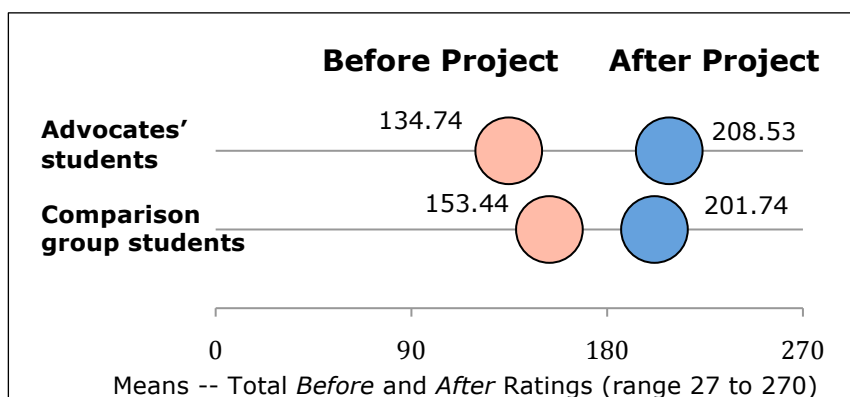


## Program Impacts on Students

Student survey questions asked about awareness, interest, attitudes, and skills. In addition to other questions, students were asked to rate 27 items on a scale of 1 (lowest) to 10 (highest) for *Before* and *After* the program. *Gain* scores were calculated by subtracting *Before* ratings from *After* ratings. (See technical report for surveys.) Total *Before*, *After*, and *Gain* scores were computed based on the 27 survey items with totals ranging from 27 to 270. The Total *Gain* score is a useful indicator of overall impact on students. Total *Gain* scores of Advocate and comparison group student respondents show higher gains among the Advocate student group.

### The Advocate Grant Program had a positive impact on student respondents

A good indicator of impact is a comparison of Total *Gain* scores among different groups in the study. The mean Total *Before* ratings among Advocate student respondents was lower than those in the comparison group ( $p < .001$ ). This confirms one of the assumptions on which the Advocate Grant



Program is based. Furthermore, the mean for the Total *After* rating (i.e. after the research experience) of the Advocate student respondents was slightly higher than the comparison group mean, though not significantly different. The resulting mean Total *Gain* score for the Advocate group (67.42) was significantly higher ( $p < .001$ ) than that of the comparison group (43.08). This indicates that the Advocate Grant Program appears to have brought the group of Advocate students up to a level comparable to the comparison group by late spring.

### Advocate student respondents who entered competitions experienced the greatest positive impact

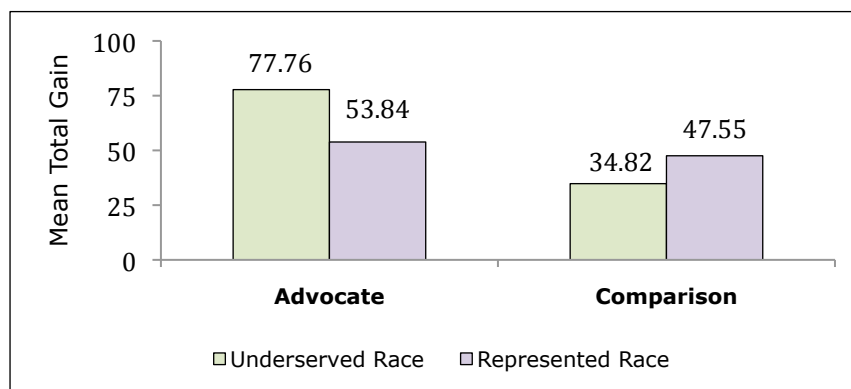
When exploring the overall level of program impact on student respondents with and without Advocates and those who entered and did not enter competitions, the most substantial impact (using an ANOVA) appears to have been on students in the Advocate Grant Program who entered competitions ( $p < .001$ ). This was confirmed in the cluster analyses described below (page 20).

Competing at a school level or a district level ... is so good for them. Like it totally boosts their confidence. It makes them see themselves in a different way. They start to identify as a successful science student or a successful student.  
- Advocate 39

### The program was particularly successful for student respondents from racially underserved groups

Among all students from eligible underserved racial/ethnic groups who entered a competition, there was higher gain among students with Advocates than those comparison group students without Advocates ( $p < .05$  using the ANOVA cited above). (See page 6 above for racial diversity information.)

As shown in the figure, among Advocate student respondents, those from underserved racial/ethnic groups had a higher Total *Gain* score than did those from represented groups. In contrast, in the comparison group, students from underserved



racial/ethnic groups had a lower Total *Gain* score than students from represented groups. This means that the Advocate Grant Program appears to have been more successful on this important target audience.

**The Advocate Grant Program appears particularly effective for underserved, younger girls, especially those in rural settings**

Cluster analysis allows for deeper exploration of the data. Using *Gain* scores and key influencing variables for the Advocate student respondents, clusters point to key groups with the highest and lowest potential for impact. (Details on the clusters and additional clusters are included in the technical report.)

The “Middle School - High Impact Cluster” ( $N = 29$ ) had the highest *Gain* score mean (167.55, which was 2.5 times the overall mean of 67.42). Students in this cluster were the youngest (mean age 14.31), more likely to have entered a competition, entered more competitions, and earned more awards on average than students in other clusters. More students in this group were female, from underserved ethnic groups, and lived in rural areas. Two Advocates accounted for 26 of the 29 students in this group (90%)

The “High School - Low Impact Cluster” ( $N = 25$ ) was the group with the lowest *Gain* score mean (12.60). Students in this cluster tended to be in grades 10-11. They were the opposite of those in the “Middle School - High Impact Cluster” in that they were less likely to have entered a competition, entered fewer competitions, earned fewer awards on average than students in other clusters, and were more likely to have been required to complete their projects.

The “High Start - Low Impact” cluster ( $N = 23$ ) was average in every way except for their low *Gain* score mean (27.61). A closer look, however, indicates that they started high (high *Before* scores) with little room to show increase. They tended to be suburban 10<sup>th</sup> graders with a mix of races and genders.

From these clusters, it appears that young, rural, underserved girls had the greatest potential for impact from Advocates. Those students who already had the characteristic program outcomes before beginning their projects had lower potential for impact. And, students who did not enter competitions showed lower levels of impact.

## Comparison data indicate high potential impact on underserved, rural, younger girls, particularly those working with Advocates

The previous finding was confirmed by cluster analysis with all student respondents (comparison and Advocate) who completed research projects, regardless of whether or not they entered competitions.

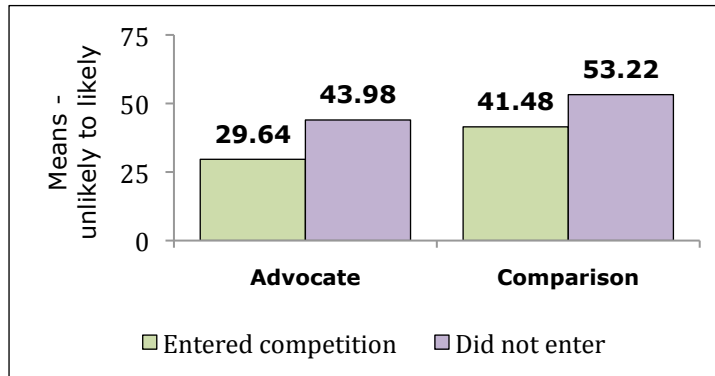
A new cluster that included comparison students, “Middle School - High Impact Cluster” ( $N = 37$ ), had the highest *Gain* score mean (163.65, which was three times the overall mean of 53.92). Students in this cluster were young (mean age of 14.22), more likely to have entered a competition, entered more competitions, and earned more awards on average than students in other clusters. This group included more female, rural, and Advocate Grant Program students than the other clusters. Two Advocates accounted for 26 of the 37 students in this group (70%).

The “Freshmen - Lower Impact Cluster” ( $N = 84$ ) had the lowest *Gain* score mean (27.94). Students in this cluster tended to be high school freshmen females. Students in this cluster were the opposite of those in the Middle School - High Impact Cluster in that they were less likely to have entered a competition, entered fewer competitions, and earned fewer awards on average than students in other clusters.

Thus, it appears that the greatest potential program impact is with younger, rural girls working with Advocates, though other groups of students clearly benefit.

## Advocate encouragement was key to students completing their projects

All students were asked how likely they would have been to complete their STEM project if their Advocate or teacher hadn't encouraged them, using a 0-100 point scale with 0 as very unlikely. Among students with and without Advocates and those entering and not entering competitions, an ANOVA indicated differences were significant ( $p < .001$ ) for both groups (Advocate and comparison) and for entering a competition (Yes/No). Student



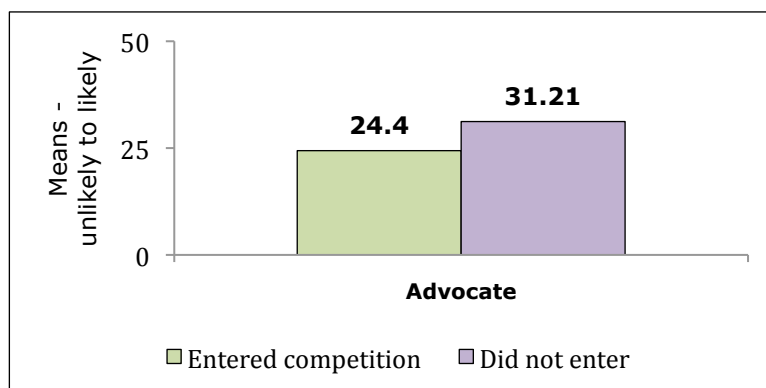
respondents with Advocates who entered competitions were most unlikely to have completed their project without support. This again points to the finding that the greatest positive effect was on students with Advocates who entered competitions.

## Student survey respondents completed projects when required and because of interest in STEM and their topic

All students were asked, “Why did you do a STEM project?” The top response was because it was required. For student respondents who entered competitions (Advocate and comparison), the next most popular response was interest in STEM in general and in their research topic in particular. Advocate students who didn't enter competitions had fewer responses in general; they listed science and topic interest as their second most frequent responses. Very few responses were provided by comparison group students who didn't enter competitions other than “required to complete the project” (76%).

## Advocates were key to encouraging student survey respondents to enter competitions, particularly among rural students

Advocate students were asked how likely they would have been to enter their STEM project into a competition if their Advocate hadn't encouraged them (0-100 scale with 0 as very unlikely). Differences were not significant (using an ANOVA) for race, gender, or middle vs. high school. Thus, Advocates were equally effective in encouraging students to enter across these groups. Advocate students reported they were only 24.4% likely to have entered without their Advocate's encouragement.

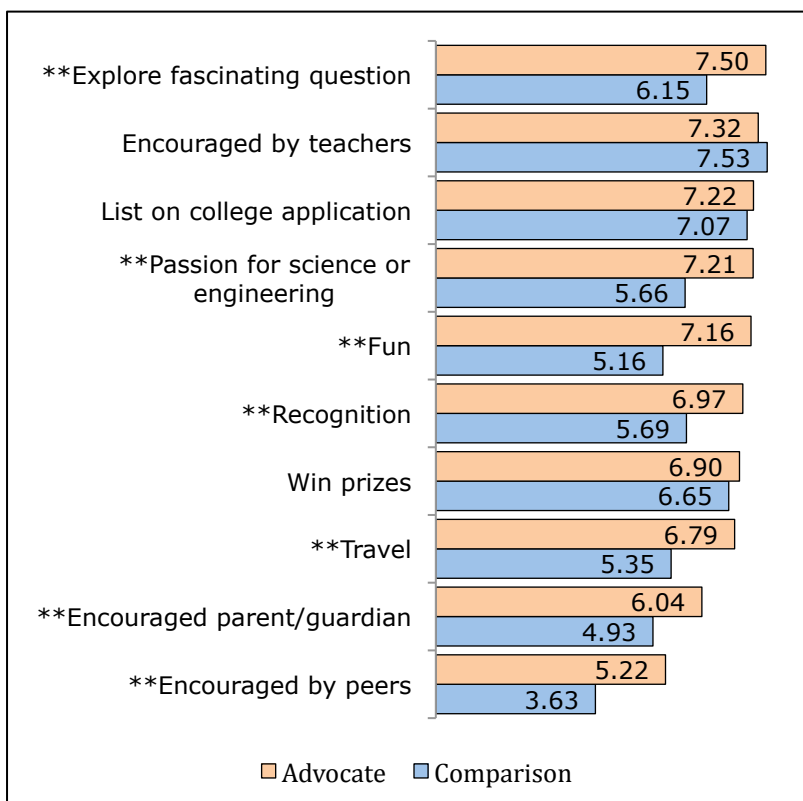


Differences were significant ( $p < .05$ ) between rural students and non-rural students who entered a competition, with the mean for rural student respondents at 18.74 versus 30.15 for non-rural respondents.

One of my sixth grade [rural] boys, he was like, "You know what? I was thinkin' I was going to be a football player, but if that doesn't work out I could probably be a scientist."  
 – Advocate 25

## Advocate students were motivated to enter competitions to explore fascinating questions and because of Advocate encouragement

Student respondents who entered competitions were asked to rate the importance of several possible reasons for entering a competition using a scale of 1-10 with 10 as very important. Seven items (\*\* on figure) were significantly different ( $p < .001$ ) between Advocate and comparison students who entered competitions. Advocate student respondents rated all items higher than did comparison students. The top three most important reasons among Advocate students were "Explore a fascinating question," "Encouragement from teachers," and being able to list the competition on college applications. Among comparison students





the top three reasons were encouragement from teachers, listing on a college application, and an "Opportunity to win prizes that include scholarships and other monetary awards." Required to enter was not an option on this section of the survey.

### Students reported that learning science was the biggest benefit to entering competitions

Regardless of whether or not they entered a competition, all students were asked: "What do you think are the benefits of entering a STEM competition?" For students, the top response to this open-ended question was to learn more or to better understand the science related to their project. This was similar to *exploring a fascinating question* in the rating question above. For Advocate student respondents who entered competitions, the second most popular response was developing new skills.

The benefits of entering a STEM competition would be to learn from other students and looking at all the other projects would give you an idea of what you could do next.

– Student 53

Winning awards was third. Comparison group students who entered competitions saw these in reverse with awards second and skills third. Student respondents of both groups (Advocate and comparison) who did not enter competitions and responded to the question reported awards second most often and college acceptance third.

It appears that Advocate students entering a competition were more likely to see learning content and skills as greater benefits to entering competitions than tangible benefits like awards. Comparison students and Advocate students who didn't enter competitions, on the other hand, were more likely to give higher value to awards and college acceptance than learning skills. Thus, it appears that the Advocate Grant Program instills an appreciation for learning the application of STEM research skills in addition to learning STEM content for students who go on to enter competitions.



Thus, it appears that the Advocate Grant Program instills an appreciation for learning the application of STEM research skills in addition to learning STEM content for students who go on to enter competitions.

### Students entered competitions because it was required and because they wanted to share their research results

Student respondents who entered competitions were asked why they did so. The top response to this open-ended question among all students was because it was required, with 21% of Advocate students and 56% of comparison group students saying this. Advocate students also mentioned they entered to share their results with others (16%), to earn awards (14%), and were encouraged to enter by an adult (13%). For comparison group students who entered competitions, the next most popular responses (after being required) were because it was fun (9%), to share their work (7%), and they were encouraged by an adult (6%).

[I entered] to try to show people my work and its significance in the real world, as well as try to get scholarship money for college.

– Student 120

Thus, students appear more likely to enter competitions because doing so is required, particularly for comparison students. However, more Advocate students seemed interested in sharing their work through competitions than comparison students.

## Students reported that Advocates were most helpful in providing general and procedural help

Advocate students were asked in what ways their Advocate was most helpful. The top survey response was providing general and procedural help. The next most frequent responses by students entering competitions were encouragement and motivation, followed by providing supplies. In contrast, students who did not enter competitions cited help in selecting a topic, researching the topic, and finding references. It is unclear whether this difference between those entering and not entering competitions suggests that those with more encouragement actually entered competitions or whether it suggests that those who didn't enter recognized more help from their Advocate on the research that is a precursor to the competition.

## Advocates filled gaps in support by providing help with finding references, finding experts, organizing data, and writing

Both Advocate and comparison group students responded to survey questions about who helped them most in several specific areas. Options included: their Advocate, a teacher, club sponsor or after school staff, university professor, older student, family, or no one helped. Higher percents of students reported that the Advocate or comparison group

teacher helped with selecting a STEM topic, identifying procedures, explaining the research/engineering process, meeting deadlines, identifying competitions to enter, interpreting competition rules, filling out applications, and providing transportation to competitions. Yet, in help with supplies and equipment, Advocate students listed their Advocate as a primary support while comparison group students listed family members. When asked about help finding references, finding experts, organizing data, and writing, Advocate students reported help from their Advocate while comparison students reported no one helped. Thus, it appears that Advocates fill a role for their students that is either filled by family members or is left unfilled for comparison students.



## **Additional Findings from the Advocate Perspective**

Advocates provided additional insights on the program in interviews and on open-ended survey questions. These go beyond the impacts described above and include ideas for program improvement.

### **Advocates recognized the value in the diversity of Advocates in the program; that is, working in different settings and with different experience levels**

Advocates came from a wide variety of settings and experience levels (see pages 3-4). Some worked with three students and others worked with 20 or more. Some came with experience in teaching student research, while others did not. Some had supported students in competitions in the past, while others had never even been to a science fair. At times this diversity of Advocates led to challenges, but overall the Advocates appreciated the diversity.

The challenges appeared in the timing of the monthly calls, the timing of support, and the need for support geared directly to the Advocate's setting or experience level. These are described in sections below.

The advantage of the diverse group appeared as the community of Advocates shared ideas, resources, and best practices. One university-based Advocate described it this way:

*I think the variety of settings are great and it's nice hearing about each other's challenges and how each other can overcome these challenges and helping each other overcome some of those challenges. And I think that while like some of the high school programs can provide a breadth of experience to many, many students, you know all the students who are interested at the school, I think the university programs can provide perhaps a more concentrated experience than to a handful, so that the impact isn't as spread out over as many students but can be concentrated in some of the students that we really want to target. I think that the program does a great job of hitting all those bases. So I love taking part and I love being a part of it. – Advocate 24*

### **Seasonal timing of the Advocates' local programs affected the timing of their needs for support from the Society**

Advocates who are classroom teachers and those who run summer programs expressed different challenges. Everyone who attended the June Kickoff meeting in Washington D.C. was excited and energized by it. However, some classroom teachers were frustrated that they didn't know enough before school let out for the summer to recruit students in May for the fall. This group of Advocates wanted more information on the program before June. Some Advocates in classrooms felt the information on the competitions in the June meeting came before they really had enough of the complete picture of the student research and competition process to maximize the benefit of the information presented in the Kickoff. This group of less experienced Advocates wanted the information on competitions to be spread out more throughout the year.

By contrast, for the Advocates running summer programs who didn't usually continue working with students in the school year, one challenge came in getting their summer students ready for competitions while they still had their students' attention even though most of the competitions were later in the school year. This group of Advocates wanted



information early and weren't that interested in the information that came out after they were done with the research process.

### Middle school and high school students and their Advocates had different needs

Most Advocates worked with high school students. Three of the five Advocates working only with middle school students wanted more support geared directly to middle school student research and competitions. They felt they didn't need much information on things like working with animals in research or the high school level competitions; they needed more information on how to begin to get students on track for more complex studies later, when the students reach high school. These Advocates were inspired by their high school colleagues but wanted more opportunities to address challenges faced by middle school student research. For example, one Advocate wanted to know how to motivate middle school students since putting a competition on a college application was foreign to them.

I don't have a lot in common with someone's who's teaching middle school. We're in two different worlds.  
– Advocate 57

To address this issue, one Advocate suggested middle school Advocates spend more time together at the Kickoff meeting and in separate calls, perhaps with a Lead Advocate experienced with middle school. Another Advocate spoke to the value of having students (and Advocates) look at the projects of older students at the science fair. One Advocate working across age groups described high school students mentoring middle school students to create "a bridge between the middle school and high school" (Advocate 39) as a way to motivate younger students and expose them to the possibilities in the future.

That was really fun, to see the progression. ... They were able to see in seventh grade this is what the research looks like. ... And they're like, "What? We can do that when we get in high school? We'll work with actual scientists?" ... They were just pumped.  
– Advocate 25

Middle school Advocates commented on the balancing act between good research and maintaining student interest. One Advocate working with middle and high school students described the challenge this way:

*I think with middle school ... I was always up against that idea of trying to temper the idea of good practice with the kids like, good science, good technique, or whatever you want to call it in a competitive project, and then also at the same time not stymieing their enthusiasm. ... I think that's a real challenge, especially any young kid, is to try to help a student mold a project, direct a project, but at the same time allow them to fail because they can grow from failing. You don't want them to fail too much because you want them to do it again, right? ... Directing those projects I think are especially hard for younger kids. - Advocate 11*

This same Advocate described the challenges of working with high school seniors who were often directing their energy toward college applications, AP coursework, senior class activities, or even other competitions. Advocates working with different ages of students needed support in different areas.

## Advocate perspectives on the monthly phone calls and Edmodo differed

Some Advocates found the monthly phone calls extremely helpful; however, others did not. One Advocate said the calls “never felt super-inclusive” and would have preferred actually seeing the other Advocates. One commented on the chaos of too many people on the phone trying to talk at the same time while another commented on the value of being the only one to show up for the call and getting personal attention.

The Advocate’s experience with student research and competitions made a difference in how Advocates valued the calls and Edmodo posts. Most of those with less experience found the calls important. One Advocate even suggested more frequent calls in the beginning for Advocates with little or no prior experience.

Advocates’ use of social media in general may have influenced their use of Edmodo. Some found it very valuable and used it often, while other Advocates reported never seeing enough value to take the time to use it. Some of these Advocates found informal posts focusing on personal information unsettling and found the volume of “trivial” posts by some overwhelming. By contrast, one Advocate suggested requiring all Advocates to comment on monthly discussion topics to encourage the more experienced Advocates to engage and to provide more information to the less experienced Advocates.

## Advocates provided insights on poverty and inequities in the competition process

Many Advocates were keenly aware of the challenges their students faced with access to the research process and to competitions. They saw the Advocate Grant Program as a significant resource to address equity, whether the challenges were due to family income level, race/ethnicity, or geographical location. One Advocate described her rural situation:

*When you have kids that come from a small town, a lot of times, the kids in rural areas do not realize that they can do the same thing as their big-city counterparts, and in many cases, they don’t realize that their work is as valuable as the big city counterparts. So being able to see these kids that nobody ever had any aspirations for them to reach, where they, in effect, they probably would not be going to college if it weren’t for these competitions and to be able to see these kids that had already been told that they’d probably become great janitors, going on to colleges and being able to get scholarships out of that. Just seeing their accomplishments is probably the most amazing part of the work. – Advocate 22*

Another Advocate from a rural setting (where “the cows outnumber the people”) also had students bused in from an urban setting. This Advocate recognized the challenge in recruiting racially underserved students into a research club that originally attracted predominately white AP and honors students. After recruiting African American and Hispanic students into the club, the Advocate realized the group was “bimodal.” The AP and honors students had experience with research and the underserved group did not.

I think the old science fair model was ... joining the science fair or science club if you’re in AP, if you’re in honors. And the underserved aren’t [in AP or honors], the black, Hispanic generally aren’t, and therefore, you’ve got to put in a special effort if you want to encourage anyone from that particular group. – Advocate 77

Another Advocate had a similar aha moment regarding existing bias in student research participation:

*It hit me that all these major science fairs, you know, there were students who were in the high percentile. These were students who were winning at Intel, they were winning at Broadcom, and most of these were what they called the magnet-type students. ... And I realized that I can bring my mid-level students into the science research game, get them involved, get them excited, whereas, generally, the perception is a kid has to be smart and a high achiever to be able to do it. This is not the case. They have to be motivated, they should have a passion, and I guess that's what made an impact on me. – Advocate 94*

In situations of poverty, students couldn't afford basic supplies for their projects so Advocates bought boards, other supplies, and covered registration fees. One Advocate described a student that couldn't afford \$1.00 ice cube trays for her project. Another pointed that there wasn't even a Wal-Mart in their town and students wouldn't be able to get boards. Advocates also provided food for meetings to work on research projects, with one even buying enough so the students could take some home to hungry siblings.

Transportation was another challenge. In settings of poverty, particularly the rural settings, students had no way to stay after school (no activity bus) or get to libraries or competitions without Advocate support. One Advocate spent considerable time driving rural students home after meeting with them since there were no other options.

Advocates taking racial minority students to science fair competitions described inequities such as being the only people of color in the room.

*I go to the state science fair this year and I looked around and out of over 200 high school students, I only counted six [students of color], and out of those six, four of them were my students, and I'm like, really? Then I finally understood what this program was all about, how people are not encouraging everybody in this world. And, I think that it made me understand things a little bit more when I started looking around that other teachers are not encouraging underserved and underrepresented groups. – Advocate 82*

Several Advocates purchased clothing for their students to wear to the competitions. One bought blazers for the students to wear and for the school to keep for future years, a sort of science fair team uniform. The Advocate described the situation this way:

*I would tell them, hey, do you have like a blazer, a suit jacket, some pants, some shoes? And they would bring me what they had and it was nothing that would be appropriate for their competition. And I know from experience that in other years, you know, we would just let the kids wear whatever they could afford to wear. And as soon as they got to that state competition and they see all these kids from the very affluent schools that are wearing Armani suits, for example, and they feel like they don't fit in. And it kind of, you know, it's a knock against their confidence. And this year we were actually able to purchase some little blazers for the girls and some blazers for the boys and I mean they fit in with the kids and, you know, they didn't feel like they looked different from everybody else. – Advocate 60*

Other Advocates used program funds and funds from other sources to cover travel costs when students won at the local level and could progress to compete at the state or national level. Many students could not afford to participate without the help. When considering the

expense and the chances of winning, many students would have stopped without the Advocate's help. Funds were needed for transportation, hotels, and food, for the student with a parent or Advocate or both.

### **Students in university research labs required a different approach by Advocates than those used in school settings**

Because most high school students in university labs are working as part of a team on a project directed by a professor or graduate student, the challenge for Advocates and their students became creating a science fair project as part of their lab work. One university-based Advocate described the situation and expressed surprise at the students' response.

*Summer research is not the same as when kids go to like a community college and do research. We're doing research in [an institute] and for a lot of the students, they are doing research that is part of a greater project that their mentor is asking them to participate in. The challenge for some of them was how do you take a part of that project and translate it into something that is in science fair language. .... Some of them are going to end up being co-authors in abstracts and publications but this was for them. And with a competition it was for them. And I was surprised that some of them were not as excited about it as about the research. I was surprised. Because this is theirs. You know what I mean? Like the science competition is theirs. It's not their mentor's, it's not the coordinator's, it's theirs. – Advocate 70*

### **Advocates offered their ideas on the scale of the program**

Advocates volunteered ideas on the size of the Advocate Grant Program. Several Advocates who supported three to five students questioned whether the Society should have selected them since they couldn't reach as many students as some of the classroom teachers with over 40 students. If the Society wanted the largest impact, these Advocates reasoned that the Society should select Advocates with large numbers of students. At the same time, some teachers with large numbers described the challenges of being spread so thin. As described above, the diversity of the program benefited Advocates and students.

One university-base Advocate explained, "by hopefully being a better-informed mentor now, then the impact down the line is something" (Advocate 63). Thus, regardless of the number of students, the Advocate can currently support, a large number of students could be impacted long-term.

Advocates also spoke to the size of the Advocate cohort. Two Advocates suggested the Society hire more staff to accommodate more Advocates if the program expanded. One of these acknowledged that the Lead Advocate role beginning in the next cohort might "be a good way to spread some of the tasks around."

*I just feel that if it gets too, too big, it may -- it's fine now, but if it gets too big, then it would be a weakness not to maybe hire one more person to, I don't know, put an additional staff member to take on some of the load, because that's something I anticipate, but it's not a weakness at this point, but if you grow too much, too fast, at times it can slow you down. – Advocate 94*

## Advocates recommended program improvements

Advocates offered ideas for improving the program. Those that were shared by more than one Advocate or addressed concerns raised by more than one Advocate are provided here.

### Provide face-to-face opportunities for connection among Advocates

Several Advocates wanted to see the people with whom they were talking in the monthly video conferencing calls. A couple took this further and suggested creating opportunities to meet in person regionally, perhaps even visiting each other's classrooms or programs. After follow-up questions, it became clear that without the Society providing funding or making the arrangements, this would not happen. These Advocates would not create their own site visits or gatherings.

I think that one of the things that would help with the program would be like, for example, instead of having the phone calls maybe we could have a web call where we can actually see each other. I think that would improve our communication.  
- Advocate 49

### Create an agenda and record the monthly calls

One Advocate suggested using an agenda for the calls to help Advocates come to the call prepared for discussion. Some Advocates who couldn't make it to a monthly call wanted access to a recording of the call to listen later or a transcript to read. At least one Advocate thought there could be other calls with good information that were being missed by participating in only one group's call. One admitted that she would only listen to recorded calls on topics of interest.

### Create a database of Advocates

Several Advocates described the status within their community that came from being an Advocate and the status students felt in having a connection with the Society through their Advocate. Others spoke of the connections they forged with other Advocates. One Advocate pulled these ideas together and suggested a database of Advocates (current and past) to continue to allow Advocates to connect with each other as a national network of people committed to supporting underserved students in scientific research. This "added value benefit" might even "be used by students in the future as a source of potential work experiences and internships, or whatever" (Advocate 63).

### Build the intellectual capital of the program by collecting best practices

Several Advocates suggested having topics or questions to initiate discussion online and/or on the monthly calls. One suggested having next year's Lead Advocates post best practices on Edmodo on a regular basis. Another Advocate suggested collecting responses on what's going well and what's not to create a database of some sort so future Advocates could access information about topics. Many wanted to have access to an online database of best practices, possibly even videos of students. Using the expertise of Advocates was suggested as a good place to start compiling information to share.

### Extend the length of the program

Advocates described building their capacity to support underserved students in research and competitions. Those starting with little or no experience needed more than one year to get going. For some Advocates, the timing of their programs and the competitions meant

students would be entering competitions next year. For these reasons, a few Advocates suggested changing the Advocate Grant Program to an 18 month or two-year program.

#### Provide access to scientific articles

Many Advocates expressed gratitude for the *Science News* resource in supporting student research. In a focus group and in interviews, a few Advocates reported the need for even more access to science information for their students and described their frustration with the “exorbitant rates” for scientific journal articles. One Advocate suggested the Society reach out to sources of journal articles like Research Gate or JSTOR to get a shared subscription or access for Advocates to obtain articles their students request.

#### Provide connections with university professors

Advocates in classrooms, particularly in rural areas, expressed the need to find mentors for their students. With limited or no local access to experts in science topics, Advocates were willing to establish online connections for their students. Some thought the Society could help make connections since they felt professors would take their requests more seriously if the Society opened the door.

#### Change the timing of the stipends and clarify the process

Several Advocates on limited budgets themselves expressed frustration with having to pay for supplies, food, registration fees, travel, and other expenses first and then wait for the stipend. They understood the need to tie the stipends to the reports and work but were still frustrated. They recommended changing the timing on the stipends, though none had a better idea of how to handle the process. Several thought the new STEM Action and Research Grants the Society began offering would help.

Other Advocates made recommendations on the timing of the stipends based on their lack of understanding of the process. For example, one Advocate was waiting to be asked to complete the third report, and thus waiting to be able to get a stipend, while at the time of the interview several Advocates had already completed their final reports. Thus, some Advocates may need clarification or reminders of the process mid-year.

## RECOMMENDATIONS

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Advocates offered the recommendations described in the Findings section based on their own personal experiences. Many of their ideas could be incorporated into the program. This section of program recommendations draws on data from all Advocates and student survey respondents to provide overall program recommendations.

### Target communication with Advocates to meet their diverse needs

The benefit of having a diverse group of Advocates brings challenges in meeting their diverse needs. The following ideas address the needs identified from Advocates. The key is to determine the purpose of the meeting or online discussion and pick a process that helps serve that function.

- Utilize video conferencing technology for meetings with Advocates instead of voice only. (Of course, include a voice-only option for those Advocates unable to access webcams or other needed technology.) This will allow for fuller communication (e.g. body language, facial expression) as well as establishing an attitude of being mentally present. Video also allows the facilitator to watch for people with questions or whose attention is dragging. Chat features allow participants to engage even while someone else is speaking.
- Arrange some calls based on groups of Advocates; e.g. middle school Advocates, rural Advocates, those with little competition experience. Each of these groups has some specific needs. Gathering them together around a common issue allows joint problem solving and allows those with previous experience to share strategies and successful practices. Sending out the topic with a brief exercise (e.g. written questions to cue focus and response) can enrich sharing and reflection.
- Arrange for some calls based on topics of interest; e.g. animal research, supporting students in university labs.
- Arrange for some calls that include a diverse group of Advocates to discuss issues common to all or where people in different work settings can provide insight for those in other work settings. For example, if school-based Advocates have students working in university labs, then Advocates in that setting can provide insight into the experience of students and offer suggestions about how to communicate with lab managers.
- Set up a Doodle or similar poll to arrange topic or group specific call times to meet the needs of the most Advocates. Schedules vary widely with some Advocates available during working hours and others so heavily scheduled they can only participate in the evenings. For some, even weekend groups may be necessary to prevent isolation after the positive conference experiences.
- Send out agendas or discussion questions prior to calls. As noted above, advance preparation on the part of both the call facilitator and participants can pay off in richer communications.
- Record calls or video conferences and provide access to the recording to all Advocates. Recorded calls and video conferencing, available online, can provide a bank of resources. Recordings are another way to involve heavily scheduled Advocates and build community and camaraderie.

- Post discussion questions or writing prompts on Edmodo periodically to encourage Advocates to share challenges and best practices; e.g. how are you recruiting your students, how do you keep students motivated, what are good strategies to guide students to appropriately challenging topics and research questions.
- For Edmodo posting, develop an FAQ or rules of the road that outlines professional behavior. Some Advocates found informal posts focusing on personal information unsettling; this discouraged their use of this mode of communication, limiting camaraderie and sharing. Developing some guidelines and boundaries could help develop a friendly, but professional tone and make this resource more useful for all.
- Recognize that Advocates in summer programs may not see students again after the end of the program. Some of these Advocates observed they had much less influence on students after they left internships or summer programs. Yet, current year competition application guidelines may not be available during the time these Advocates have the time and attention of students. Developing ways to address this issue could include providing access to previous year application procedures or recommending that Advocates create closed online groups during the summer to send out information after the internship.

### **Explore ideas for providing additional resources**

The Advocates recognize the status of the Society and see it as an avenue to leverage additional resources. Using this status to access group discounts on supplies, software licenses, or scientific journal access would benefit the Advocates and their students. This status could be used to support Advocates in connecting with scientists either directly or by allowing Advocates to use the status as they reach out to scientists on their own. The Society, with the help of next year's Advocates, could explore needs and options.

In addition, group discussions and Edmodo threads can be used to allow Advocates to share successful ways they have found funding for additional supplies and resources. In interviews, Advocates noted they made requests to PTOs, school boards, and local businesses. Funding request strategies and documents would be valuable to share with new Advocates. Helping Advocates plan for obtaining additional resources during the term of their Society funding could help them develop more sustainable programs.

### **Create a clear definition for low-income that allows Advocates to provide accurate information**

Since low-income is defined in many ways, and since Advocates may not be able to get income data on their students, clear definitions that match the data available to Advocates are needed. The Society may need to work with Advocates in a variety of settings to determine the definitions and eligibility criteria. If data are available to school-based Advocates, low-income could include students on the free or reduced-price meal plan at school. Other criteria may be needed for non-school based Advocates, such as Medicaid eligibility or living in an area recognized as low-income.

### **Create an online reporting and student data tracking system for Advocates**

Even though Advocates were given templates for reporting, not all Advocates followed them. Use of an online system (using survey software or online forms) would streamline the



process. If Advocates were able to update the data for each of the three phases instead of starting a new report, student data would be simpler to track and accuracy would most likely improve. The first year of such a system should be considered a pilot with feedback requested from Advocates and Society staff members about what worked and what did not. Revisions based on feedback would improve the system. Some consideration could be given to see if the system used for online applications could be adapted for this purpose.

### **Introduce the topic of nudging for discussion and development in the next cohort**

The topic of nudging<sup>9</sup> could be introduced to Advocates at the Kickoff conference, with breakout groups to elicit appropriate nudges for Advocates and students. The highest risk to this strategy is for Advocates and students to perceive themselves as coerced or “acted up” rather than seeing external influences as helping them develop internal motivation. Some aspects of the program must be required (e.g. reporting, minimum numbers of competing students), but nudges toward greater levels of engagement could be useful to challenge Advocates. Inviting Advocates to develop specific ways to increase levels of participation is one way to help them take ownership of their experience.

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<sup>9</sup> See *Nudge: Improving Decisions About Health, Wealth, and Happiness* by Richard H. Thaler and Cass R. Sunstein. Yale University Press, New Haven, CT. 2008.

## Final Thoughts

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Evaluation of the Advocate Grant Program addressed several questions. Most importantly:

- To what extent did the program accomplish its goals?
- To what extent and in what ways does the program experience influence the intended impacts?

### The program met its goal

The primary goal of the Advocate Grant Program was to assist underserved students (underrepresented ethnicity, low-income) by identifying Advocates who could support these students in advancing from conducting a scientific research or engineering design project to entering scientific competition(s).

Program objectives for the 2016-2017 cohort were the following:

- Society staff members identify and support 31 Advocates
- Advocates recruit and support at least three underserved youth in applying to scientific research and engineering design competitions
- Advocates support these youth in competing

By selecting and supporting 31 Advocates, the Program accomplished its first objective. For unforeseen reasons, only 29 were able to recruit and support students. Of those, 27 supported at least three underserved students in applying to and entering competitions. Another Advocate did not report student data, though indicated on the online survey that more than three students were supported in entering. The remaining Advocate supported three students, though it was unclear whether or not two were underserved (i.e., from low-income households since they were not racial minorities). Selecting a few Advocates each cohort who may not be able to fully participate is probably healthy. If only “sure bet” Advocates are included, it is likely that people serving students with the greatest need or those trying to start new programs would be excluded.

Twenty-nine Advocates supported a total of 517 underserved students in entering their projects in competitions, well over the program objective of 93 underserved students.

### Society support led to the intended Advocate and student impacts

Advocates reported feeling supported and appreciated; they felt recognized and treated professionally. This began with the kickoff meeting and carried through the year with small group and individual support. They felt part of a community with shared goals. They learned about competitions and how to support their students in competitions, yet it seemed to be the feeling of support from the Society and fellow Advocates that mattered more to most Advocates than the information they gained. The program provided Advocates with the motivation and support they needed to support their underserved students.

Participating in research projects and entering competitions had positive impacts on students; however, the students of the Advocates reported even greater overall impact than students in the comparison group. The consistent positive impact on Advocates' students may have been due to the selection of passionate, enthusiastic individuals who passed along both energy and information to their students. Having Advocates who were more informed and felt supported in their work may have also led to this outcome. Advocates were better able to help their underserved students overcome barriers to research and competition participation and were better equipped to nudge their students to compete.

## TECHNICAL REPORT

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This technical report section and the following appendixes add detail to the summative evaluation report for those interested. These are not necessary for understanding the first 35 pages of the report, though some readers may want the added information.

### Methodology

Insight for Learning Practices employed a mixed methods approach for this evaluation. The methods included: information interviews, document analysis, focus groups, surveys, and in-depth interviews of selected participants.

*Information Interviews* with key program staff allowed the evaluators to collect perceptions and opinions and were used to develop the pipeline program theory (Appendix A). These interviews laid the foundation for future interviews and provided a context for the study.

*Document Analysis* of program materials, including the Advocate applications and reports, provided additional opportunities to guide data collection and provided additional information on the context of the program.

*Focus Group Interviews* allowed the evaluators to ask focused questions to two groups of Advocates to gain additional information on their attitudes, experiences working with program youth, and plans for maintaining their support of youth in the future. The first group met in Washington DC on September 29 and consisted of nine Advocates who were attending the Research Teacher Conference. The second group met via Zoom online on October 18 and consisted of six Advocates who had not attended the conference. Focus group results guided survey development and served as the foundation for in-depth interviews.

*In-depth Interviews* with the 31 Advocates provided data to further explore program impacts. Questions emerged from the data collected through surveys and focus groups.

*Surveys* were completed by Advocates and students. These included quantitative (multiple choice, etc.) and qualitative (open-ended) data, and were developed using SurveyMonkey. Results guided the development of in-depth Advocate interview protocols. (See Appendix C on pages 66-84 for surveys.)

Incentives were offered to students to encourage participation in the student surveys. A flyer given to Advocates and comparison group teachers to give to their students explained the purpose of the study and encouraged participation. Students were told they would complete an online survey that would take 10-15 minutes to complete. The survey asked about STEM projects and competitions as well as information about age, grade level, etc. The flyer explained that each student completing the survey would be entered into a drawing for one of ten \$50 gift cards. Odds of winning were estimated at 1 in 80 or better. Responses would be confidential.

The surveys repeated the information about the drawing. Students were given the option of providing their first name and teacher's name if they wanted to be included in the drawing. Not all students provided this information. Students were also asked for a code word in case the teacher had two students with the same first name (which was the case for one gift card

recipient). After the deadline, the evaluators generated a list of random numbers between one and the total number of students. Using the case numbers assigned by SurveyMonkey that matched the ten random numbers, ten students were selected. Teachers of the ten students were contacted to determine an address for the gift card. In some cases, gift cards were sent to the teacher or Advocate to distribute, though some gave students' addresses to send the cards directly to the student. All contact information for students has been deleted or destroyed.

### **Comparison Group Selection**

Society for Science and the Public staff reached out to 64 teachers that participate in one of 16 regional science fairs to identify students for the comparison group. Geographic regions and teachers were selected to be representative of science fair participants and comparable to the Advocates' settings. An email invited teachers to complete an eleven-question survey asking for contact information and the number of students they could invite to participate in the student survey. The request specified that students could respond if they had completed projects, whether or not they entered their project in a competition. Thirteen of the 64 (20.31%) completed the survey. Spring breaks and testing scheduled could be contributing factors to the low response rate since invitations were sent in March and April.

Using the responses from the thirteen comparison group teachers, evaluators emailed the student survey link for the thirteen teachers to pass along to their students. Surveys were received from seven teachers' students, though one teacher had only one student respond.

### **Retrospective Survey Design**

With only one opportunity to survey students, it was impossible to use the standard pre-post survey design. Such a design can also result in a response-shift bias in which participants change their understanding of their own behaviors and attitudes over time in ways that can mask impact (Howard, 1980). For example, after entering a competition a student might realize she was not as good at sharing project results with others as she originally thought (though she knows her skills have improved). Or, on a typical pre-program survey an Advocate might indicate a high awareness of the range of competitions available to students, though might realize just how many more are available throughout participation in the program. Typical pre-post design might show no change in awareness where the retrospective design would show positive change as the Advocate used the same frame of reference for rating before and after.

To avoid the response-shift bias and to capture data at one point in time, the retrospective design was used (Allen & Nimon, 2007). Advocates were asked to rate items before and after the program. Students were asked to rate items before and after they completed their project.

### **Data Analysis**

This section provides the details for the data analyses and includes data tables for the figures and findings in the report. This section follows the order of the report. Data source tables are provided in Appendix D, pages 85-86.

Statistical analyses using SPSS included basic descriptive statistics, independent samples t-tests, contingency coefficient calculations, and one-way ANOVAs.

Codes were developed for the open-ended survey responses from the program impacts, themes that emerged in the focus groups and interviews, and themes that emerged from the response data. Interview coding was done using NVIVO, and open-ended survey response coding was completed in Excel.

### Characteristics of Advocates and Student Survey Respondents

The purpose of presenting information about the characteristics of respondents is to allow readers to understand the source of the data as well as make judgments about the extent to which groups can be compared statistically to yield valid results. These variables (demographics, settings of participation, and extent of participation) also provide the reader with a portrait of program participants.

Basic frequency analyses were used for all demographic data. For the nominal data (e.g. gender, race, and setting), contingency coefficients were calculated as a measure of association between groups of Advocate and comparison group students. A contingency coefficient is the recommended test to test for the association between two nominal variables. To examine similarities and differences between Advocate and comparison group students on continuous variables (e.g. age, grade level), independent sample t-tests were calculated using the Statistical Package for Social Science (SPSS). Exact significance levels were calculated and, if significant, were reported at  $p < .05$  or  $p < .001$  levels.

### Advocate Reach Nationwide

Data shown on the map on page 3 (with number of underserved students supported in entering competitions for each Advocate) were obtained from Advocate student tracking reports submitted to the Society. Each of 28 Advocates provided student data to the Society throughout the program. Two Advocates were unable to recruit students. One additional Advocate did not report student data prior to the data collection cut-off date of July 15, 2017.

### Advocates' Settings

The following tables provide details for the data graphed on page 3 of the report. Definitions for categories are provided with each table.

#### Middle and High School

Some Advocates supported students in several grade levels. "Combination" includes Advocates supporting students in traditional middle *and* high school grade levels. One of these Combination Advocates also worked with elementary level students.

Table 1. Advocates by Type of School (Number and Percent)

Type of School	Number of Advocates	Percent of Advocates
High School (grades 9-12)	19	61.29%
Middle School (grades 6-8)	5	16.13%
Combination (Grades 6-12)	5	16.13%
No students	2	6.45%
Total	31	100.00%

#### Urban, Rural, and Suburban

Using National Center for Education Statistics (NCES) school data from the 2015-2016 school year (from <https://nces.ed.gov/ccd/districtsearch/>), schools were identified as urban

if they met the NCES criteria for large city, midsize city, or small city. Schools were identified as rural if they met NCES criteria for remote town or rural fringe, distant, or remote. Home zip code was used for homeschooled students to determine the nearest school to use for the NCES database.

NCES locale codes were grouped as follows:

- Urban = codes 11, 12, 13
- Rural = codes 33, 41, 42, 43
- Suburban or Small Town = codes 21, 22, 23, 31, 32

Table 2. Advocates by Geographic Setting (Number and Percent)

<b>Setting</b>	<b>Number of Advocates</b>	<b>Percent of Advocates</b>
Urban	18	58.06%
Suburban or Small Town	6	19.35%
Rural	7	22.58%
<b>Total</b>	<b>31</b>	<b>100.00%</b>

#### *Advocate Community Setting*

The community settings in which the Advocates supported students include the following:

- Classroom = support during one or more class periods taught by the Advocate to that Advocate’s students
- Whole School = support by the Advocate in her/his school to students regardless of whose classes they attend
- District-wide = district-wide support for students from more than one school
- Mixed - School = an Advocate based at one school who provides support primarily for students at that school, but also supports students in one or more other schools
- Laboratory = university or business-based Advocate supporting students in a lab setting
- Community = university, business, or professional society-based Advocate supporting students in community or school settings, such as after-school or summer programs
- Mixed - Laboratory = an Advocate based in a lab who also supports students in settings outside the lab

Table 3. Advocates by Community Setting of Advocates (Number and Percent)

<b>Setting</b>	<b>Number of Advocates</b>	<b>Percent of Advocates</b>
Classroom	8	25.81%
Whole School	6	19.35%
District-wide	2	6.45%
Mixed - School	1	3.23%
Total School-based	17	
Laboratory	5	16.13%
Community	5	16.13%
Mixed - Laboratory	2	6.45%
Total Lab & Community-Based	12	
No Students	2	6.45%
<b>Grand Total</b>	<b>31</b>	<b>100.00%</b>

Categories were collapsed to allow for easier comparison of groups within the Advocate data. The figure on page 3 of the report presents combined settings using data from all 31 Advocates, including those without students, as summarized in Table 4.

Table 4. Advocates by Combined Community Settings (Number and Percent)

<b>Setting</b>	<b>Number of Advocates</b>	<b>Percent of Advocates</b>
School-based	18	58.06%
Lab & Community-Based	13	41.94%
Total	31	100.00%

### **Characteristics of Advocates**

The following tables provide details for the data graphed on page 4 of the report.

#### *Advocate Gender*

Advocates' gender data were gathered by observation.

Table 5. Advocates by Gender (Number and Percent)

<b>Gender</b>	<b>Number of Advocates</b>	<b>Percent of Advocates</b>
Female	24	77.24%
Male	7	22.58%
Total	31	100.00%

#### *Advocate Competition Experience*

Prior experience data were gathered from Advocates' applications and interviews.

Table 6. Advocates by Prior Experience with Competitions

<b>Experience</b>	<b>Number of Advocates</b>	<b>Percent of Advocates</b>
Prior Experience	26	83.87%
No Prior Experience	5	16.13%
Total	31	100.00%

#### *Advocate Professional Development Opportunities*

Attendance of Advocates at the two meetings in Washington D.C. were obtained from the Society. All Advocates were invited to attend the Kirkoff meeting in June, though not all could attend. Two Advocates left the program after the Kickoff and prior to the fall Research Teacher Conference in Washington D.C. These Advocates were replaced and are not included below. Advocates were invited to apply to a lottery to attend the fall conference with 10 Advocates attending, including the two Advocates added after the kickoff.

Table 7. Advocates by Professional Development Attendance

<b>Opportunity</b>	<b>Number of Advocates</b>	<b>Percent of Advocates</b>
June Kickoff only	16	51.61%
Fall Conference only	4	12.90%
Both	6	19.35%
Neither	5	16.13%
Total	31	100.00%



### *Advocate 2017-2018 Status*

All Advocates were invited to apply to be an Advocate in the next cohort, 2017-2018. Not all Advocates applied and not all that applied were accepted. Six of the returning Advocates were selected to continue as Lead Advocates.

These Lead Advocates will:

- Assist the Society in keeping in touch with new Advocates, giving advice or answers as they are able and communicating any issues that arise to the program managers
- Post in the online community at least once a month
- Lead a session or breakout session at the Advocate Training Institute
- Lead a session at the Research Teachers Conference if they are a returning Advocate or veteran research teacher (if they attend)
- Lead 1 learning call during the year
- Contact (via email or phone) each person in their cohort individually at least once every 6 weeks (cohorts consist of 6-7 Advocates in their geographic region)

Table 8. Status of Advocates in Next Year’s Advocate Cohort (Number and Percent)

<b>Status</b>	<b>Number of Advocates</b>	<b>Percent of Advocates</b>
Returning as Advocate	7	22.58%
Returning as Lead Advocate	6	19.35%
Not Returning	18	58.06%
Total	31	100.00%

### *Characteristics of Advocate and Comparison Group Students*

The following tables provide details for the data presented on pages 5-9 of the report.

#### *Student Survey Response by Advocate and Teacher*

Number of completed surveys returned from students for each Advocate were compiled and used to calculate the area of the squares on the treemaps on page 5 of the report. Treemaps represent parts of a whole with nested squares. In this case, the large rectangle represents the total respondents for the group (Advocate or comparison group respondents) and the area of the smaller rectangles is proportional to the students responding for each Advocate or comparison group teacher.

Only 24 Advocates had students return surveys. These Advocates are represented in the table below with letters A to X. The percent of the area for each Advocate’s rectangle was calculated by dividing the number of student surveys received for that Advocate by the total number received (244). The total area of the graphic was set at 45 (5 inches by 9 inches on PowerPoint). The area for the individual smaller rectangles for each Advocate on the treemap was calculated by multiplying the area percent by 45.

Table 9. Student Surveys Returned by Advocate (Number of Surveys and Treemap Data)

<b>Advocate</b>	<b># surveys</b>	<b>Area</b>	<b>Area %</b>
A	1	0.1844	0.0041
B	1	0.1844	0.0041
C	2	0.3689	0.0082
D	2	0.3689	0.0082
E	2	0.3689	0.0082

F	2	0.3689	0.0082
G	3	0.5533	0.0123
H	3	0.5533	0.0123
I	3	0.5533	0.0123
J	3	0.5533	0.0123
K	6	1.1066	0.0246
L	6	1.1066	0.0246
M	6	1.1066	0.0246
N	7	1.2910	0.0287
O	7	1.2910	0.0287
P	7	1.2910	0.0287
Q	7	1.2910	0.0287
R	12	2.2131	0.0492
S	13	2.3975	0.0533
T	16	2.9508	0.0656
U	21	3.8730	0.0861
V	33	6.0861	0.1352
W	39	7.1926	0.1598
X	42	7.7459	0.1721
Total	244	45	1

Students from seven comparison group teachers submitted completed surveys. Like the data from the Advocates' student respondents, comparison group respondent data were used to calculate the area for the treemaps on page 5 of the report.

Table 10. Student Surveys by Comparison Group Teacher (Number of Surveys and Treemap data)

Teacher	# surveys	Area	Area %
A	1	0.1636	0.0036
B	3	0.4909	0.0109
C	5	0.8182	0.0182
D	22	3.6000	0.0800
E	62	10.1455	0.2255
F	83	13.5818	0.3018
G	99	16.2000	0.3600
Total	275	45	1

*Student Survey Response Rates*

Response rates for the surveys were difficult to calculate accurately since we have no way of knowing how many students were given the links to the surveys. Rates were calculated based on known information. Surveys were received from seven comparison group teachers, though one teacher had only one student respond.

Table 11. Comparison Group Survey Response Rates

Date Teacher Survey Received	# of Students Possible	# of Students Competing Survey
3/23/17	90	
3/28/17	100	1
3/29/17	22	
3/29/17	40	
3/29/17	1	
3/29/17	62	62
3/29/17	56	
4/2/17	100	83
4/4/17	45	
4/4/17	13	3
4/6/17	35	5
4/6/17	30	22
4/7/17	60	99
Total	654	275

There was no way to determine how many students the teachers actually reached and gave the survey link. It was assumed that only those teachers with students responding actually gave the link to students. Response rate reported on page 5 of the report was calculated twice. The first used the total number of possible students for the seven teachers with student respondents (400) and the total number of respondents (275) to reach 68.75% ( $275/400$ ). Since one teacher predicted 100 students and only one completed the survey, a second response rate was calculated with the total possible from the six teachers (300) and the 275 responses ( $275/300 = 91.67\%$ ).

Likewise, there was no way to determine how many students working with Advocates actually received the link to the student survey. Response rate calculated for the Advocate students used the 24 Advocates with students responding to the survey, assuming those with no student response did not give students the survey link. Those 24 Advocates served 551 students who could have completed the survey, though not all were considered eligible. The reported response rate of 47.91% was calculated using the 260 Advocate student surveys received (though 5 were incomplete),  $260/551 = .4791$ .

### Student Grade Levels

Students provided their grade level on the surveys. Frequency data are provided by group below.

Table 12. Students by Grade levels and Group (Number)

Grade	Advocate	Comparison	Total
6	6	28	34
7	8	86	94
8	25	47	72
9	9	1	10

10	49	101	150
11	112	10	122
12	35	2	37
Total	244	275	519

Table 13. Percent of students by grade levels and group

Grade	Advocate	Comparison
6	2.46%	10.18%
7	3.28%	31.27%
8	10.25%	17.09%
9	3.69%	0.36%
10	20.08%	36.73%
11	45.90%	3.64%
12	14.34%	0.73%
Total	100%	100%

#### *Student Gender Identity*

Students were asked to indicate their gender identity. Response options included female, male, prefer not to answer, and not listed. Those that indicated their gender was not listed were asked to provide a description.

A contingency coefficient was calculated comparing the gender identity of Advocate students ( $N = 244$ ) and comparison group students ( $N = 275$ ). This test was significant at  $p < .05$ . While both groups had a majority of females, the differences appeared to be due to a higher percentage of females in the Advocate student group than in the comparison student group.

Table 14. Number and percent of students for each gender identity by group

Gender Identity	Advocate #	Advocate %	Comparison #	Comparison %
Female	150	61.48%	143	52.00%
Male	87	35.66%	128	46.55%
Prefer not to answer	1	0.41%	2	0.73%
Not listed	6	2.46%	2	0.73%
Total	244	100%	275	100%

Responses from students indicating their gender identities were not listed included:

- Genderfluid (2 students)
- Both
- Non-binary
- Did you just assume my gender
- Attack Helicopter
- Yes
- I feel like a male but also a female idk I'm confused

#### *Student Race and Ethnicity*

Students were asked two separate questions on race and ethnicity on the survey:

- Are you Hispanic, Latino/a, or of Spanish origins?
- No, I'm not Hispanic, Latino/a or of Spanish origins.
  - Yes, I'm Hispanic, Latino/a or of Spanish origins.

Which of the following best describes your race? (select one)

- White
- Black or African-American
- American Indian or Alaskan Native
- Asian
- Native Hawaiian or other Pacific Islander
- Multiple races or some other race/origin (please specify)

Data were combined to determine if students were in an eligible category or not. Those eligible for the program were Hispanic/Latinx, Black/African-American, American Indian, Native Hawaiian, Pacific Islander, or mixed race with at least one of those categories.

Table 15. Race and Ethnicity of Student Survey Respondents (Number and Percent)

	<b>Advocate Group</b>	<b>Advocate %</b>	<b>Comparison Group</b>	<b>Comparison %</b>
Unknown	2	0.82%	1	0.36%
White	88	36.07%	146	53.09%
Black or African-American	27	11.07%	45	16.36%
American Indian or Alaskan Native	9	3.69%	6	2.18%
Asian	11	4.51%	21	7.64%
Native Hawaiian or Pacific Islander	0	0.00%	2	0.73%
Hispanic/Latino/a or Spanish origin	83	34.02%	35	12.73%
Mixed race minority	23	9.43%	16	5.82%
Mixed race non-minority	1	0.41%	3	1.09%
Total	244	100.00%	275	100.00%

To calculate the contingency coefficient ( $p < .001$ ), the data above were grouped with all students in eligible category groups and compared to those not in eligible categories. See Table 16. Unknowns were not included in this step (thus,  $N = 242$  and  $N = 274$ ).

Table 16. Eligible and Ineligible Race and Ethnicity Groups of Students (Number and Percent)

<b>Race</b>	<b>Advocate</b>	<b>Advocate %</b>	<b>Comparison</b>	<b>Comparison %</b>
Eligible	142	58.68%	104	37.96%
Ineligible	100	41.32%	170	62.04%
Total	242	100.00%	274	100.00%

#### *Family Income Level*

As indicated on page 7 in the report body, Advocates did not have access to consistently reliable family income level data, and students were not asked about family income on the

surveys. Using publically available median and average income level data for school zip codes (home zip codes for homeschoolers), family income level was estimated for each student. With 517 students, it was not feasible to determine income by individual students' zip codes. School-based income data did not yield useful results for the analyses so were not reported.

*Student Geographical Setting – Urban, Rural, and Suburban*

Setting was determined for the Advocates and comparison group teachers, and then associated with the students of those Advocates and teachers. (Definitions are presented on page 45.) Contingency coefficients were calculated for student group in three geographical settings. Differences were significant at  $p < .001$ . This difference appeared to be due to larger numbers of urban students in the comparison group. So that geographic settings could be used as variables in ANOVAs and Cluster Analyses (discussed later), dichotomous variables were created for students in rural and non-rural settings as well as one for urban and non-urban settings. T-tests were calculated for each of these dichotomous groups. Differences were significant ( $p < .001$ ).

Table 17. Students by Geographical Setting Variables (Number and Percent)

Setting	Advocate	Advocate %	Comparison	Comparison %
Urban	96	39.34%	167	60.73%
Rural	68	27.87%	0	0.00%
Suburban/Small Town	80	32.79%	108	39.27%
Rural	68	27.87%	0	0.00%
Non-Rural	176	72.13%	275	100.00%
Urban	96	39.34%	167	60.73%
Non-Urban	148	60.66%	108	39.73%

*Student Setting – School and Community*

As with the geographical setting, the student's school or community setting was determined first by the Advocate and then associated with the student. All comparison students were in classroom settings. Combined groups (School-based and Lab and Community-based shown in Table 19) were used for ANOVAs and Cluster Analyses.

Table 18. Student respondent setting

Setting	Advocate Students
Classroom	133
Whole School	65
District-wide	2
Mixed - School	1
Total School-based	201
Laboratory	15
Community	27
Mixed - Laboratory	7
Total Lab & Community-Based	49
Grand Total	244

Table 19. Student Respondent Settings Combined by Group

Setting	Advocate	Advocate %	Comparison	Comparison %
School-based	201	82.38%	275	100.00%
Community & Lab-based	43	17.62%	0	0.00%
Total	244	100.00%	275	100.00%

#### Required Research

Students were asked in what grades they completed STEM projects. They were then asked in what grades the projects were required. To calculate the contingency coefficient ( $p < .001$ ), the student responses to both questions and the student's grade level were used to determine if the project in the current year was required.

Table 20. Student Respondent Required and Not Required research by group

Required?	Advocate	Advocate %	Comparison	Comparison %
No	96	39.34%	28	10.18%
Yes	148	60.66%	247	89.82%
Total	244	100.00%	275	100.00%

#### Student Project Types

Students were asked to report the type of their project for the 2016-2017 year, as listed in the table below, and the contingency coefficient was calculated ( $p < .05$ ). The missing data were included in calculating the percentage of each category for the figure on page 8 of the report, though were not presented in color on the figure because of the small size.

Table 21. Student Respondent Project Types by Group

Project Type	Advocate	Advocate %	Comparison	Comparison %
Science research	202	82.79%	214	77.82%
Engineering design	23	9.43%	47	17.09%
Behavioral science	19	7.79%	13	4.73%
Missing	0	0.00%	1	0.36%
Total	244	100.00%	275	100.00%

#### Student Competition Entry

Students were asked if they had entered their project in a competition. There was no significant difference on a t-test between the Advocate and comparison group student respondents. As described for some of the findings below, some analyses were conducted on students who had entered competitions, excluding those who had not.



Table 22. Student Respondents Entering and Not Entering Competitions by Group

Entering competition?	Advocate	Advocate %	Comparison	Comparison %
Yes	169	69.26%	197	71.64%
No	85	34.84%	78	28.36
Total	244	100.00%	275	100.00%

### *Society Competitions*

Students provided information on the competitions they entered. In looking at the three national competitions sponsored by the Society for Science and the Public (Broadcom MASTERS, Regeneron STS, and Intel ISEF), more Advocate student respondents entered these competitions than comparison group students. Only small percentages of students in each group entered these competitions. This difference was significant ( $p < .05$ ) on the contingency coefficient.

Table 23. Student respondents entering and not entering Society competitions by group

Entering Society competition?	Advocate	Advocate %	Comparison	Comparison %
Yes	19	7.79%	9	3.27%
No	225	92.21%	266	96.73%
Total	244	100.00%	275	100.00%

### *Student Prior Research and Competition Experience*

Students provided information on their prior experience with research projects and competitions at each grade level, grades 8 - 12. Taking into account the student's current grade level, number of years experience with projects and with competition entries were determined. A t-test was calculated. Differences were significant ( $p < .001$ ).

Table 24. Mean Number of Projects and Competitions per Year by Group

	Advocate	Comparison
Mean # of Projects Per Year	0.39	0.73
Mean Competitions Per Year	0.29	0.42

Additional variables calculated were the number of years completing a STEM project and number of years entering competitions (Table 25). These variables reflect the age level of each group; however, the mean number of projects and competitions takes age into account (Table 24).

Table 25. Mean Number of Years with Project and Competition Experience by Group

	Advocate	Comparison
Mean Years of Project Experience	1.80	2.16
Mean Years of Competition Experience	1.27	1.37

## Findings

Analyses of the results presented in the Findings section varied and are described below following the order in the Findings section of the report (pages 10 - 31). In all cases, data from the surveys, interviews, focus groups, and Advocate reports were triangulated; that is, multiple sources of data were used to develop and interpret each finding.

### Program Impacts on Advocates

#### *Gains in awareness, ability, attitude, and motivation*

On the survey, Advocates were asked to rate 20 impact statements on a scale of 1 (lowest) to 10 (highest) for *Before* and *After* the program (see questions 3-7 on the Advocate survey on pages 66-69). *Gain* scores were then calculated by subtracting *Before* from *After* scores. Table 26 provides the data presented on page 11 of the report. The evaluation team used *Gain* scores as a primary measure of program impact.

Table 26. Advocate Survey Impact Statement Ratings in Descending Order of *Gain* Scores

<b>Impact</b>	<b>Before</b>	<b>After</b>	<b>Gain</b>
Awareness of deadlines for competitions	3.58	8.55	4.97
Awareness of range of competitions	4.26	8.94	4.68
Awareness of eligibility requirements for competitions	4.13	8.55	4.42
Ability to support students in entering competitions	4.03	8.19	4.16
Awareness of how to support students in filling out entries	4.16	8.26	4.10
Feeling of camaraderie with others in the student research and competition community	3.58	7.42	3.84
Recognized as a source of information on supporting students in entering competitions	4.39	8.19	3.81
Recognized as a source of information on research competitions	4.19	7.94	3.74
Awareness of competitions as a source of monetary awards	4.65	8.03	3.39
Comfort with application processes for a range of competitions	3.87	7.33	3.23
Ability to support students in preparing competitive entries	4.52	7.74	3.23
Motivation to recruit underserved students to enter competitions	5.87	8.81	2.94
Passion for getting students involved in competitions	6.32	9.06	2.74
Awareness of competition participation in boosting college acceptance	5.81	8.42	2.61
Motivation to recruit underserved students to participate in research projects	6.39	8.97	2.58
Ability to support students in improving the organization of presentations	5.84	8.35	2.52
Ability to support students conducting research	5.87	8.16	2.29
Ability to support students in improving organization of research	5.87	8.06	2.19
Ability to support students in improving time management skills	5.45	7.52	2.06
Ability to support students in improving organizational skills	5.65	7.68	2.03

The evaluation team also explored the ratings in order of *Before* and *After* scores to note where Advocates indicated the most room for growth and where they were at the time of

the survey near the program end. The data above are resorted in the two tables below by *Before* and *After* scores.

Table 27. Advocate Survey Impact Statements in Descending Order of *Before* Ratings

<b>Impact</b>	<b>Before</b>	<b>After</b>	<b>Gain</b>
Motivation to recruit underserved students to participate in research projects	6.39	8.97	2.58
Passion for getting students involved in competitions	6.32	9.06	2.74
Motivation to recruit underserved students to enter competitions	5.87	8.81	2.94
Ability to support students conducting research	5.87	8.16	2.29
Ability to support students in improving organization of research	5.87	8.06	2.19
Ability to support students in improving the organization of presentations	5.84	8.35	2.52
Awareness of competition participation in boosting college acceptance	5.81	8.42	2.61
Ability to support students in improving organizational skills	5.65	7.68	2.03
Ability to support students in improving time management skills	5.45	7.52	2.06
Awareness of competitions as a source of monetary awards	4.65	8.03	3.39
Ability to support students in preparing competitive entries	4.52	7.74	3.23
Recognized as a source of information on supporting students in entering competitions	4.39	8.19	3.81
Awareness of range of competitions	4.26	8.94	4.68
Recognized as a source of information on research competitions	4.19	7.94	3.74
Awareness of how to support students in filling out entries	4.16	8.26	4.10
Awareness of eligibility requirements for competitions	4.13	8.55	4.42
Ability to support students in entering competitions	4.03	8.19	4.16
Comfort with application processes for a range of competitions	3.87	7.33	3.23
Awareness of deadlines for competitions	3.58	8.55	4.97
Feeling of camaraderie with others in the student research and competition community	3.58	7.42	3.84

Table 28. Advocate Survey Impact Statements in Descending Order of *After* Ratings

<b>Impact</b>	<b>Before</b>	<b>After</b>	<b>Gain</b>
Passion for getting students involved in competitions	6.32	9.06	2.74
Motivation to recruit underserved students to participate in research projects	6.39	8.97	2.58
Awareness of range of competitions	4.26	8.94	4.68
Motivation to recruit underserved students to enter competitions	5.87	8.81	2.94
Awareness of deadlines for competitions	3.58	8.55	4.97
Awareness of eligibility requirements for competitions	4.13	8.55	4.42
Awareness of competition participation in boosting college acceptance	5.81	8.42	2.61
Ability to support students in improving the organization of	5.84	8.35	2.52

presentations			
Awareness of how to support students in filling out entries	4.16	8.26	4.10
Ability to support students in entering competitions	4.03	8.19	4.16
Recognized as a source of information on supporting students in entering competitions	4.39	8.19	3.81
Ability to support students conducting research	5.87	8.16	2.29
Ability to support students in improving organization of research	5.87	8.06	2.19
Awareness of competitions as a source of monetary awards	4.65	8.03	3.39
Recognized as a source of information on research competitions	4.19	7.94	3.74
Ability to support students in preparing competitive entries	4.52	7.74	3.23
Ability to support students in improving organizational skills	5.65	7.68	2.03
Ability to support students in improving time management skills	5.45	7.52	2.06
Feeling of camaraderie with others in the student research and competition community	3.58	7.42	3.84
Comfort with application processes for a range of competitions	3.87	7.33	3.23

The Advocate sample size was too small to use total *Gain* scores to compare groups within the sample.

#### *Support for Underserved Students*

Advocates provided numbers of students supported in 2015-2016 and 2016-2017 for each question in the shown in Table 29.

Table 29. Mean Numbers of Students Supported by Advocates During the Program Year and in the Prior Year

	<b>2015-2016</b>	<b>2016-2017</b>	<b>Change</b>
How many underserved students did you support who would not have otherwise participated in research and design projects?	12.45	19.13	6.68
How many underserved students did you support who would not have otherwise entered competitions?	11.97	16.97	5.00
How many students did you support in entering competitions?	5.23	13.58	8.35

#### *Program Impact on Students*

##### *Overall Impact*

Student survey questions asked about awareness, interest, attitudes, and skills *Before* and *After* completing research projects. *Gain* scores were calculated by subtracting *Before* ratings from *After* ratings. A total *Gain* score was computed based on the 27 retrospective survey items. (Note, numbers in the table below are all means, thus subtracting the mean *Before* from the mean *After* does not produce the mean *Gain*.)

Table 30. Mean *Before*, *After*, and *Gain* Scores by Student Group

	<b>Before</b>	<b>After</b>	<b>Gain</b>
Advocate Students	134.74	208.53	67.42
Comparison Students	153.44	201.74	43.08

The contingency coefficient for the total *Before* ratings yielded a significant difference ( $p < .001$ ), as did the contingency coefficient for the *Gain* scores ( $p < .001$ ). There was no significant difference for the *After* scores. This means that while comparison group students appeared to begin the program year with an advantage, at the end of the year the two groups appeared about equal in those areas measured.

#### *Entering Competitions and Race/Ethnicity*

Findings on pages 19-20 are based on a one-way between subjects ANOVA to compare the effect of group (Advocate or comparison), competition entry (yes or no), and underserved racial or ethnic status (underserved or not) on *Gain* scores.

Table 31. Variables and sample sizes for ANOVA

<b>Variable</b>	<b>Label</b>	<b>N</b>
Group	Advocate	199
	Comparison	248
Entered	Entered Competition	313
	Did Not Enter Competition	134
Underserved Race	Underserved Race/Ethnicity	200
	Traditionally Served Race/Ethnicity	247
Total		447

Table 32. ANOVA Results

<b>Source</b>	<b>Type III Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.<sup>10</sup></b>
Corrected Model	187223.096(a)	7	26,746.16	15.19	0.000
Intercept	800,631.51	1	800,631.51	454.64	0.000
Group	35,700.37	1	35,700.37	20.27	0.000
Entered	53,381.84	1	53,381.84	30.31	0.000
Underserved Race	1,969.59	1	1,969.59	1.12	0.291
Group * Entered	17,606.56	1	17,606.56	10.00	0.002
Group * Underserved Race	11,915.98	1	11,915.98	6.77	0.010
Entered * Underserved Race	1,281.43	1	1,281.43	0.73	0.394
Group * Entered * Underserved Race	6,095.87	1	6,095.87	3.46	0.063
Error	773,082.84	439	1,761.01		
Total	2,259,765.00	447			
Corrected Total	960,305.94	446			

a. R Squared = .195 (Adjusted R Squared = .182)

<sup>10</sup> Levels shown in the table are calculations using SPSS with exact significance. In the main section of the report, significance of differences is reported at  $p < .05$  and  $p < .001$ .

Independent Samples T-Test results for each variable provided further insight. Note that several of these variables were correlated, that is, they share variance; therefore, some variables for which the t-tests yielded significant differences were not significant in the previous ANOVA. In the ANOVA, shared variance with the previous variable had been removed from the equation before each subsequent variable was entered.

Table 33. *Gain Score* T-test Results for Group

Group	N	Mean	SD	t	df	p
Advocate	199	67.42	51.91			
Comparison	248	43.08	38.25	5.703	445	.000

Table 34. *Gain Score* T-test Results for Entering a Competition

Entered Competition	N	Mean	SD	t	df	p
Yes	313	61.60	48.21			
No	134	35.96	36.12	5.527	445	.000

Table 35. *Gain Score* T-test Results for Underserved Race/Ethnicity

Underserved	N	Mean	SD	t	df	p
Yes	200	59.08	53.95			
No	247	49.74	38.86	2.125	445	.034

Table 36. Group Mean Total *Gain Scores* Underserved Race/Ethnicity (see figure on page 20)

	Advocate	Comparison
Underserved Race/Ethnicity	77.76	34.82
Represented Race/Ethnicity	53.84	47.55

### Cluster Analysis

Comparing overall means is a useful way of determining impact. However, overall means sometimes hide underlying differences among groups that provide a better understanding of individuals for whom the program works well and less well. With positive impacts overall, cluster analysis provides additional insight. Using *Gain scores* and key influencing variables, clusters point to key groups with the highest and lowest potential for impact.

Characteristics of each cluster are shown below in each table. In tables, the mean for each variable entered into the analysis is shown in the column under the cluster number. The number of desired clusters entered into both equations was six.

Table 37. Clusters Analysis for All Students (Advocate and Comparison Group Respondents)

	1	2	3	4	5	6
Group (Advocate=1; Comparison=2)	1.68	1.56	2.00	1.16	1.50	1.60
Grade	9.28	8.89	8.00	8.70	9.18	9.72
School (Middle=1; High=2)	1.64	1.48	1.00	1.38	1.61	1.76
Male (=1)	0.41	0.40	1.00	0.30	0.33	0.50
Female (=1)	0.56	0.56	0.00	0.68	0.63	0.49

Before Score Total	203.16	117.86	233.00	79.05	111.51	159.22
After Score Total	237.74	212.93	75.00	251.51	145.38	198.60
Gain Score Total	29.48	89.54	-172.00	163.65	27.94	34.47
Setting (School=1;Comm/Lab=2)	1.05	1.07	1.00	1.03	1.04	1.08
Urban (=1)	0.47	0.65	1.00	0.16	0.55	0.43
Rural (=1)	0.05	0.19	0.00	0.76	0.02	0.09
Age	14.89	14.49	14.00	14.22	14.87	15.33
Underserved Race (=1)	1.56	1.61	1.00	1.32	1.51	1.60
Entered a Competition (=1)	1.28	1.22	2.00	1.05	1.48	1.32
Awards Total	0.59	0.76	0.00	2.08	0.26	0.32
Competitions Total	1.49	1.16	0.00	2.46	0.87	1.34
Society Competition (=1)	0.05	0.06	0.00	0.05	0.02	0.06
Required to do project (=1)	0.80	0.77	1.00	0.65	0.82	0.77
Total Number of Cases	102	94	1	37	84	129

*Cluster 1 = Mainstream Lower Impact Cluster*

This large group ( $N = 102$ ) is just about average in every way except for their relatively low *Gain* score mean. There are slightly more comparison students than Advocate students in this cluster. They tend to be high school underclassmen with a mix of genders, underserved, urban, and awards. Very few are rural. A large percent completed research projects that were required.

*Cluster 2 = Urban Higher Impact Cluster*

This group ( $N = 94$ ) has a large number of urban students and a high *Gain* score mean. There is a mix of comparison and Advocate students. They tend to be high school students in grades 10-11 with a mix of genders and awards.

*Cluster 3 = Odd Man Out*

This cluster contains one 8<sup>th</sup> grade, urban student in the comparison group. He is from an underserved racial group, was required to complete a project, and did not enter a competition. Most notable is the extremely high negative *Gain* score with a very high *Before* score and very low *After* score.

*Cluster 4 = Middle School High Impact Cluster*

With the highest *Gain* score mean (three times the overall mean of 53.92), this group ( $N = 37$ ) is the youngest. Students in this cluster were more likely to enter a competition, entered more competitions, and earned more awards on average than students in other clusters. Students in this group tend to be female, rural, and in the Advocate Grant Program. Two Advocates account for 26 of the 37 students in this group (70%).

*Cluster 5 = Freshmen Lower Impact Cluster*

With the lowest *Gain* score mean (other than our Odd Man Out), students in this cluster ( $N = 84$ ) tend to be freshmen females in high school. Students in this cluster are the opposite of those in the Middle School High Impact Cluster in that they were less likely to enter a competition, entered fewer competitions, and earned fewer awards on average than students in other clusters.



*Cluster 6 = Older Medium-Low Impact Cluster*

This cluster is the largest ( $N = 129$ ) and oldest (mean = 15.33 years old). With a slightly lower *Gain* score mean than the overall mean (34.47 vs. 53.92), students in the group tended to be in high school and earned few awards.

By ignoring the Odd Man Out for now, the two extremes (Middle School High Impact and Freshmen Lower Impact) provide the most useful insight into the impact of completing research projects and entering competitions. Underserved students with Advocates in rural settings who entered more than one competition and earned awards in those competitions reported the highest *Gain* scores as an indication of high impact. Students in the cluster who reported entering few competitions and earning the fewest awards also had the lowest *Gain* score mean as an indication of low impact.

This confirms that entering a competition and having the full experience (not just completing a research project) is associated with the higher impact.

To look further at impact of the Advocate Grant Program on participating students, a cluster analysis of only those students with Advocates who responded to the survey provides additional insight.

Table 38. Clusters Analysis for Advocate Student Respondents

	1	2	3	4	5	6
Group (Advocate=1; Comparison=2)	1.00	1.00	1.00	1.00	1.00	1.00
Grade	5.30	5.61	5.40	3.79	5.19	5.81
School (Middle=1; High=2)	1.83	1.91	1.96	1.38	1.85	1.95
Male (=1)	0.39	0.39	0.40	0.24	0.31	0.38
Female (=1)	0.52	0.61	0.60	0.72	0.62	0.59
Before Score Total	215.65	120.27	110.44	79.07	104.58	160.49
After Score Total	250.70	226.09	127.68	254.55	169.62	210.06
Gain Score Total	27.61	99.70	12.60	167.55	56.85	45.08
Setting (School=1;Comm/Lab=2)	1.17	1.15	1.00	1.03	1.15	1.19
Urban (=1)	0.35	0.33	0.28	0.03	0.62	0.48
Rural (=1)	0.22	0.48	0.04	0.93	0.08	0.21
Age	16.09	16.18	16.08	14.31	16.15	16.41
Underserved Race (=1)	1.43	1.45	1.48	1.17	1.50	1.49
Entered a Competition (=1)	1.43	1.21	1.64	1.03	1.27	1.41
Awards Total	0.91	0.97	0.12	2.28	0.54	0.56
Competitions Total	0.87	1.61	0.44	2.66	0.96	1.05
Society Competition (=1)	0.09	0.09	0.00	0.03	0.04	0.11
Required to do project (=1)	0.65	0.61	0.76	0.59	0.69	0.57
Total Number of Cases	23	33	25	29	26	63

*Cluster 1 = High Start - Low Impact*

This group ( $N = 23$ ) was about average in every way except for their low *Gain* score mean. A closer look, however, reveals that they started with high *Before* scores with little room to show increase. They tend to be suburban 10<sup>th</sup> graders with a mix of races and genders.

*Cluster 2 = High School Higher Impact Cluster*

This group ( $N = 33$ ) has a high *Gain* score mean. They tend to be high school students in grades 10-11 who entered competitions and earned an award.

*Cluster 3 = High School Low Impact Cluster*

With the lowest *Gain* score mean (12.60), students in this cluster ( $N = 25$ ) tend to be in grades 10-11. They are the opposite of those in the Middle School High Impact Cluster in that they were less likely to enter a competition, entered fewer competitions, and earned fewer awards on average than students in other clusters.

*Cluster 4 = Middle School High Impact Cluster*

With the highest *Gain* score mean (167.55 = 2.5 times the overall mean of 67.42), this group ( $N = 29$ ) is the youngest. Students in this cluster were more likely to enter a competition, entered more competitions, and earned more awards on average than students in other clusters. Students in this group tended to be female, rural, and underserved. Two Advocates account for 26 of the 29 students in this group (90%).

*Cluster 5 = Urban Medium Impact Cluster*

This group ( $N = 26$ ) has a moderate *Gain* score mean, close to the overall average. Students in this cluster tend to be urban 10<sup>th</sup> graders with a mix of races and genders. Two Advocates account for 16 of the 26 (62%) students in this cluster.

*Cluster 6 = Upper Classmen Medium Impact Cluster*

This cluster is the largest ( $N = 63$ ) and oldest (mean = 16.41 years old). With a slightly lower than *Gain* score mean than the overall mean, students in the group tended to be in 11<sup>th</sup> grade and entered more Society sponsored competitions (ISEF and STS) than students in other clusters.

Once again, the extremes provide useful insight into the impact of the Advocate Grant Program. Young underserved students in rural settings who entered more than one competition and earned awards in those competitions reported the highest *Gain* scores as an indication of high impact. Students in the cluster who reported entering few competitions and earning the fewest awards also had the lowest *Gain* score mean as an indication of low impact. Also with low impact were those students in the first cluster who started with high scores, but were otherwise average.

*Advocate Encouragement*

As reported in the Findings on page 21, all students were asked how likely they would have been to complete their STEM project without teacher or Advocate encouragement, using a 0-100 scale with 0 as very unlikely. The ANOVA yielded the following.

Table 39. Project Competition Likelihood ANOVA - Variables in Equation and Sample Sizes

Variable	Label	N
Group	Advocate	234
	Comparison	253
Entered	Entered Competition	333
	Did Not Enter Competition	154
Underserved Race	Underserved Race/Ethnicity	233
	Traditionally Served Race/Ethnicity	254
Total		487

Table 40. Project Competition Likelihood ANOVA - Results

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	34720.187(a)	7	4,960.03	5.042	0.000
Intercept	658,773.400	1	658,773.40	669.603	0.000
Group	10,757.328	1	10,757.33	10.934	0.001
Entered	10,948.762	1	10,948.76	11.129	0.001
Underserved Race	2,480.286	1	2,480.29	2.521	0.113
Group * Entered	895.574	1	895.57	0.910	0.341
Group * Underserved Race	1,384.057	1	1,384.06	1.407	0.236
Entered * Underserved Race	189.965	1	189.97	0.193	0.661
Group * Entered * Underserved Race	76.705	1	76.71	0.078	0.780
Error	471,253.086	479	983.83		
Total	1,282,855.000	487			
Corrected Total	505,973.273	486			

a. R Squared = .069 (Adjusted R Squared = .055)

As reported in the Findings on page 22, both Advocate and comparison group students were asked how likely they would have been to enter their STEM project into a competition if their Advocate or teacher hadn't encouraged them (0-100 scale with 0 as very unlikely). The ANOVA yielded the following.

Table 41. Competition Entry Likelihood ANOVA - Variables in Equation and Sample Sizes

Variable	Label	N
Group	Advocate students	234
	Comparison students	253
Competition	No	154
	Yes	333

Table 42. Competition Entry Likelihood ANOVA - Results

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	30574.923	3	10191.64	10.355	0.000
Intercept	741881.846	1	741881.85	753.745	0.000
Group	11633.042	1	11633.04	11.819	0.001
Entered01	17808.292	1	17808.29	18.093	0.000
Group * Entered01	174.819	1	174.82	0.178	0.674
Error	475398.350	483	984.26		
Total	1282855.000	487			
Corrected Total	505973.273	486			

R Squared = .060 (Adjusted R Squared = .055)

### *Motivation to Enter Competitions*

Student respondents who had entered a competition rated 10 reasons for why they may have entered competitions. Advocate student respondents rated all items more highly than did comparison group students. Using an independent samples t-test for equality of means, seven of the ten items resulted in a significant difference as seen in Tables 43 and 44.

Table 43. Student Mean Rating for “Types of Help” by Group (Highest to Lowest)

	<b>Advocate</b>	<b>Comparison</b>
Explore fascinating question**	7.50	6.15
Encouraged by teachers	7.32	7.53
List on college application	7.22	7.07
Passion for science or engineering**	7.21	5.66
Fun**	7.16	5.16
Recognition**	6.97	5.69
Win prizes	6.90	6.65
Travel**	6.79	5.35
Encouraged parent/guardian**	6.04	4.93
Encouraged by peers**	5.22	3.63

\*\*  $p < .001$

Table 44. Results from T-test for Equality of Means for “Types of Help” Statements by Group of Students

Group Statistics	Group	N	Mean	SD	Equal variances:	t	df	Sig. (2-tailed)	Mean Diff.	SE Diff.	95% Confidence Interval of the Difference	
											Lower	Upper
Win prizes	Advocate	158	6.90	2.83	assumed	0.784	350	0.434	0.24	0.31	-0.37	0.86
	Comparison	194	6.65	2.97	not assumed	0.788	341.42	0.431	0.24	0.31	-0.37	0.85
List on college application	Advocate	157	7.22	2.96	assumed	0.466	350	0.642	0.14	0.31	-0.47	0.76
	Comparison	195	7.07	2.85	not assumed	0.464	328.25	0.643	0.14	0.31	-0.47	0.76
Encouraged parent/guardian	Advocate	158	6.04	2.89	assumed	3.511	350	0.001	1.11	0.32	0.49	1.73
	Comparison	194	4.93	3.00	not assumed	3.525	340.48	0.000	1.11	0.32	0.49	1.73
Encouraged by teachers	Advocate	157	7.32	2.82	assumed	0.666	350	0.506	-0.20	0.31	-0.80	0.40
	Comparison	195	7.53	2.87	not assumed	0.667	336.24	0.505	-0.20	0.30	-0.80	0.40
Encouraged by peers	Advocate	156	5.22	3.04	assumed	5.090	349	0.000	1.59	0.31	0.98	2.21
	Comparison	195	3.63	2.81	not assumed	5.045	319.89	0.000	1.59	0.32	0.97	2.21
Fun	Advocate	156	7.16	2.80	assumed	6.390	349	0.000	2.00	0.31	1.39	2.62
	Comparison	195	5.16	3.01	not assumed	6.441	341.11	0.000	2.00	0.31	1.39	2.61
Passion for science or engineering	Advocate	158	7.21	2.90	assumed	4.870	352	0.000	1.55	0.32	0.92	2.17
	Comparison	196	5.66	3.02	not assumed	4.892	341.69	0.000	1.55	0.32	0.92	2.17
Travel	Advocate	156	6.79	2.99	assumed	4.233	348	0.000	1.44	0.34	0.77	2.11
	Comparison	194	5.35	3.31	not assumed	4.280	343.32	0.000	1.44	0.34	0.78	2.11
Recognition	Advocate	156	6.97	3.02	assumed	3.995	350	0.000	1.28	0.32	0.65	1.91
	Comparison	196	5.69	2.96	not assumed	3.987	329.75	0.000	1.28	0.32	0.65	1.91
Explore fascinating question	Advocate	157	7.50	2.67	assumed	4.392	351	0.000	1.34	0.31	0.74	1.95
	Comparison	196	6.15	3.00	not assumed	4.449	347.19	0.000	1.34	0.30	0.75	1.94

### Sources of Support

Students indicated the person helping them the most in several areas. Advocates' students were given choices of the Advocate and another teacher; however, comparison group students were only given a generic teacher option. All were given options for club sponsor or afterschool staff, university professor, older student, family member, and no one helped.

The percent of respondents by Advocate and comparison group students are provided in the following tables. The highest percentage for each is bolded to identify where Advocates' and comparison group student responses differed.

Table 45. *Who helped most with selecting a STEM topic?*

	<b>Advocate</b>	<b>Comparison</b>
Advocate/Comparison Teacher	<b>55.83</b>	<b>39.55</b>
Another teacher	10.83	0.00
Club sponsor or after school staff	2.50	0.00
University professor	4.58	0.00
Older student	2.50	4.85
Family member	10.83	24.25
No one helped me	12.92	31.34
Total	100.00	100.00

Table 46. *Who helped most in finding references for the topic?*

	<b>Advocate</b>	<b>Comparison</b>
Advocate/Comparison Teacher	<b>54.39</b>	36.06
Another teacher	11.72	0.00
Club sponsor or after school staff	4.60	0.37
University professor	5.02	1.12
Older student	3.35	4.09
Family member	5.86	16.36
No one helped me	15.06	<b>42.01</b>
Total	100.00	100.00

Table 47. *Who helped most with identifying procedures?*

	<b>Advocate</b>	<b>Comparison</b>
Advocate/Comparison Teacher	<b>61.51</b>	<b>55.02</b>
Another teacher	13.81	0.00
Club sponsor or after school staff	3.35	0.37
University professor	5.02	0.74
Older student	3.35	4.46
Family member	5.02	13.38
No one helped me	7.95	26.02
Total	100.00	100.00

Table 48. *Who helped most with explaining the research or engineering process?*

	<b>Advocate</b>	<b>Comparison</b>
Advocate/Comparison Teacher	<b>63.18</b>	<b>60.37</b>
Another teacher	14.64	0.00
Club sponsor or after school staff	3.35	0.37
University professor	3.35	0.74
Older student	1.26	3.33
Family member	4.18	12.22
No one helped me	10.04	22.96
Total	100.00	100.00

Table 49. *Who helped most with supplies and equipment?*

	<b>Advocate</b>	<b>Comparison</b>
Advocate/Comparison Teacher	<b>56.67</b>	22.59
Another teacher	9.58	0.00
Club sponsor or after school staff	4.17	0.00
University professor	5.00	1.48
Older student	1.67	3.33
Family member	14.17	<b>59.63</b>
No one helped me	8.75	12.96
Total	100.00	100.00

Table 50. *Who helped most finding experts?*

	<b>Advocate</b>	<b>Comparison</b>
Advocate/Comparison Teacher	<b>51.88</b>	33.96
Another teacher	12.55	0.00
Club sponsor or after school staff	3.77	0.75
University professor	2.51	0.00
Older student	1.26	3.36
Family member	7.11	12.31
No one helped me	20.92	<b>49.63</b>
Total	100.00	100.00

Table 51. *Who helped most with organizing data?*

	<b>Advocate</b>	<b>Comparison</b>
Advocate/Comparison Teacher	<b>55.46</b>	32.34
Another teacher	12.18	0.00
Club sponsor or after school staff	4.20	0.00
University professor	4.62	1.86
Older student	4.62	3.35
Family member	8.40	22.30
No one helped me	10.50	<b>40.15</b>
Total	100.00	100.00

Table 52. *Who helped most with writing?*

	<b>Advocate</b>	<b>Comparison</b>
Advocate/Comparison Teacher	<b>41.42</b>	31.85
Another teacher	12.97	0.00
Club sponsor or after school staff	3.77	0.00
University professor	2.51	0.00
Older student	5.02	4.07
Family member	7.95	18.89
No one helped me	26.36	<b>45.19</b>
Total	100.00	100.00

Table 53. *Who helped most with meeting deadlines?*

	<b>Advocate</b>	<b>Comparison</b>
Advocate/Comparison Teacher	<b>62.50</b>	<b>60.37</b>
Another teacher	11.25	0.00
Club sponsor or after school staff	2.92	0.00
University professor	2.08	0.00
Older student	2.50	2.96
Family member	5.42	12.59
No one helped me	13.33	24.07
Total	100.00	100.00

Table 54. *Who helped most with identifying competitions to enter?*

	<b>Advocate</b>	<b>Comparison</b>
Advocate/Comparison Teacher	<b>64.98</b>	<b>76.21</b>
Another teacher	8.86	0.00
Club sponsor or after school staff	5.49	0.00
University professor	2.53	0.00
Older student	0.42	1.86
Family member	2.53	3.72
No one helped me	15.19	18.22
Total	100.00	100.00

Table 55. *Who helped most with interpreting competition rules?*

	<b>Advocate</b>	<b>Comparison</b>
Advocate/Comparison Teacher	<b>65.96</b>	<b>74.25</b>
Another teacher	11.06	0.00
Club sponsor or after school staff	3.83	0.37
University professor	2.13	0.00
Older student	0.85	1.12
Family member	4.26	3.73
No one helped me	11.91	20.52
Total	100.00	100.00



Table 56. *Who helped most with filling out applications?*

	<b>Advocate</b>	<b>Comparison</b>
Advocate/Comparison Teacher	<b>63.68</b>	<b>65.06</b>
Another teacher	11.54	0.00
Club sponsor or after school staff	3.85	0.00
University professor	1.71	0.00
Older student	0.85	1.12
Family member	6.84	7.81
No one helped me	11.54	26.02
Total	100.00	100.00

Table 57. *Who helped most with providing or arranging transportation to the competition(s)?*

	<b>Advocate</b>	<b>Comparison</b>
Advocate/Comparison Teacher	<b>45.06</b>	<b>36.60</b>
Another teacher	8.58	0.00
Club sponsor or after school staff	4.72	0.75
University professor	1.29	0.00
Older student	1.29	1.13
Family member	20.60	27.17
No one helped me	18.45	34.34
Total	100.00	100.00

## Summary and Uses of the Technical Report

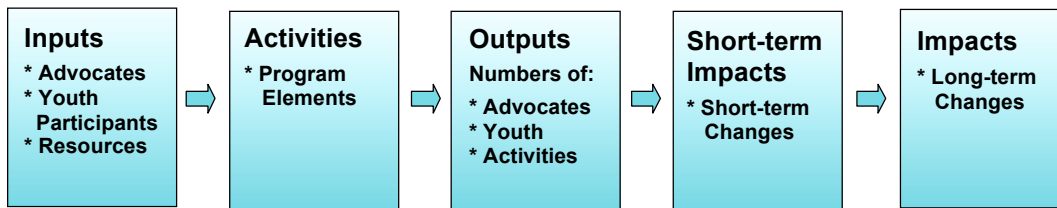
In general, this technical report provides detailed data and explanation of which statistical tests were used to develop findings. In addition, the numeric presentation of the data may be useful for creating additional graphics of special groups. The evaluation team does not recommend distributing the technical report or appendices to funders or participants unless specifically requested. While the main report (pages 1-35) was developed to be an easy and quick read, this section is necessarily dense.

## References

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doi:10.1177/0193841X8000400105.

## APPENDIX A – Pipeline Program Theory

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### Inputs:

- Society for Science and the Public Staff
- Advocates
- Youth participants
- Funding from Alcoa (currently Arconic), the Jack Kent Cooke Foundation, private donor(s), and Regeneron
  - \$3K grants to Advocates
- External Evaluation Team

### Activities:

- Advocate recruitment
- Advocate selection
- Convening meeting in DC with Advocates (June)
- Research Teacher Conference in DC (Sept-Oct)
- Monthly Learning and Regional calls with Advocates
- Individualized support by phone with Advocates
- Individualized support by phone with Advocates' students
- Youth recruitment by Advocates
- Youth's scientific research mentored by Advocates
- Youth selection of and application to competitions mentored by Advocates
- Youth participation in competitions

### Anticipated Outputs:

- 31 Advocates complete program
- 93 or more youth participate in competitions
- June 2016 convening meeting
- Monthly calls with Advocates

### Anticipated Short-Term Impacts:

- Advocates gain knowledge of the range of competitions & the application process for each
- Youth (who would otherwise not do so) complete research projects
- Youth (who would otherwise not do so) enter competitions

### Anticipated Impacts:

- Participating youth pursue STEM education and careers
- Advocates continue to support youth in competitions after grant
- Society alumni achieve success – worthwhile, socially-redemptive endeavors in/out of STEM

## APPENDIX B – Impact Statements

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Impact categories for the following impacts came from *Framework for Evaluating Impacts of Informal Science Education Projects* (2008) edited by A. Friedman (retrieved from <http://www.informalscience.org/framework-evaluating-impacts-informal-science-education-projects>).

### Advocate Impacts

#### A. Awareness, Knowledge, Understanding

1. Increased awareness of the range of competitions
2. Increased awareness of eligibility requirements for competitions
3. Increased awareness of deadlines for competitions
4. Increased awareness of competitions as a source of monetary awards for post-secondary education
5. Increased awareness that competition participation boosts acceptance to college or university of the students' choice
6. Increased recognition by peers and administrators as a source of information about competitions
7. Increased recognition by peers and administrators as a source of information for how to enter competitions
8. Increased awareness of how to support student to produce competition entries

#### B. Engagement or Interest

1. Increased motivation to recruit underserved students to enter competitions

#### C. Attitude

1. Increased comfort with the application processes for a range of competitions
2. Increased feeling of camaraderie with others in the student research and competition community (Recognition that others are involved in the same processes and struggles involved in supporting student research and competitions)
3. Increased passion for getting students involved in competitions

#### D. Skills

1. Increased ability to help students enter competitions
2. Increased ability to support students in organizational skills
3. Increased ability to support students in time management.
4. Increased ability to support student in organization of research
5. Increased ability to support students in the organization of presentations
6. Increased ability to support students in the preparation of winning entries to competitions
7. Increased ability to support high-quality student research

#### E. Behavior

1. Advocates support underserved students who would otherwise not enter competitions

## Student Impacts

### A. Awareness, Knowledge, Understanding

1. Increased awareness of education and career opportunities in STEM
2. Increased awareness that science supports their communities
3. Develop a deeper understanding of STEM content
4. Develop a deeper understanding of scientific research processes
5. Awareness of competitions as a source of monetary awards for post-secondary education
6. Increased awareness that competition participation boosts acceptance to the college or university of their choice

### B. Engagement or Interest

1. Increased STEM educational and career aspirations
2. Increased interest in STEM careers
3. Increased interest in entering competitions

### C. Attitude

1. Increased enjoyment of participating in STEM activities
2. Increased belief in their ability to handle scientific content
3. Increased comfort in working with adult as intellectual colleagues
4. Increased self-esteem (i.e., recognition of one's self as high-achieving)
5. Increased capacity to be role models for younger children
6. Increased perception of the value of scientific research
7. Increased perception of the value of research competitions

### D. Skills

1. Improved writing skills
2. Improve oral presentation skills
3. Improved capacity to apply scientific thinking to world around them
4. Improved organizational skills
5. Improved time management skills
6. Improved ability to meet deadlines
7. Increased skill in writing a scientific journal article
8. Increased skill in presenting research work to peers, scientists, and public

### E. Behavior

1. Underserved students (who would not otherwise have done so) participate in competitions

## APPENDIX C - Surveys

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The three surveys that follow were developed using SurveyMonkey.com and distributed by links emailed to Advocates and the comparison group teachers. Advocates provided links to the Student Survey version A to their students. Comparison teachers gave links to the Student Survey version C to their students. Required items were marked with an asterisk.

### Advocate Survey

As part of your participation in the Advocate Grant Program, the evaluation team is asking each Advocate to complete this survey, to participate in a phone interview, and to assist us in having your students complete an online survey.

This Advocate survey should take about 20 minutes to complete.

To protect your privacy, all data collected will be kept confidential. We ask for your name in this survey so we may ask follow-up questions in the interview. The only people with access to the survey data are the external evaluators. Society staff will not have access. The evaluation results will be shared with the Society in formative and summative reports and may be shared with others in reports or articles. If direct quotes are used, they will remain anonymous. In all cases, the Advocates' identities will not be revealed.

If you have any questions about this survey or the AGP evaluation, please contact Christine Klein, Director, Insight for Learning Practices at 314-504-1465 or [ckleinconsulting@gmail.com](mailto:ckleinconsulting@gmail.com). Or, contact the Society's Chief Program Officer, Michele Glidden, at 202-785-2255.

Thank you for your participation.

\* 1. Please enter your first name:

\* 2. Please enter your last name:

Please respond to the following questions based on the impact the Advocate Grant Program (AGP) has had on you.

3. Please rate your awareness of the following items prior to participating in AGP and after participation. (1 = not at all aware; 10 = aware a great deal)

	Before AGP Participation	After AGP Participation
The range of scientific research competitions available for my students	<input type="checkbox"/>	<input type="checkbox"/>
Eligibility requirements for scientific research competitions	<input type="checkbox"/>	<input type="checkbox"/>
Deadlines for scientific research competitions	<input type="checkbox"/>	<input type="checkbox"/>
How to support students in filling out competition entries	<input type="checkbox"/>	<input type="checkbox"/>

The role of competitions as a source of monetary awards for postsecondary education	<input type="checkbox"/>	<input type="checkbox"/>
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The role of competition participation in boosting acceptance to the college or university of the student's choice	<input type="checkbox"/>	<input type="checkbox"/>
---	--------------------------	--------------------------

4. Please rate the extent to which your peers and administrators recognize you as a source of information about the following areas. (1 = not recognized at all; 10 = highly recognized)

	Before AGP Participation	After AGP Participation
Student scientific research competitions	<input type="checkbox"/>	<input type="checkbox"/>
Supporting students in how to enter competitions	<input type="checkbox"/>	<input type="checkbox"/>

5. Please rate your ability to support students in the following areas. (1 = not at all; 10 = a great deal)

	Before AGP Participation	After AGP Participation
Conducting scientific research	<input type="checkbox"/>	<input type="checkbox"/>
Entering competitions	<input type="checkbox"/>	<input type="checkbox"/>
Developing or improving their organizational skills	<input type="checkbox"/>	<input type="checkbox"/>
Developing or improving their time management skills	<input type="checkbox"/>	<input type="checkbox"/>
Organizing their research	<input type="checkbox"/>	<input type="checkbox"/>
Organizing their presentations	<input type="checkbox"/>	<input type="checkbox"/>
Preparing their competitive entries	<input type="checkbox"/>	<input type="checkbox"/>

6. Please rate your attitude in the following areas. (1 = not at all; 10 = a great deal)

	Before AGP Participation	After AGP Participation
Comfort with the application processes for a range of competitions	<input type="checkbox"/>	<input type="checkbox"/>
Feeling of camaraderie with others in the student research and competition community	<input type="checkbox"/>	<input type="checkbox"/>
Passion for getting students involved in scientific research or engineering design competitions	<input type="checkbox"/>	<input type="checkbox"/>

7. Please rate your motivation in the following areas. (1 = not at all; 10 = a great deal)

	Before AGP Participation	After AGP Participation
Motivation to recruit underserved students to enter competitions	<input type="checkbox"/>	<input type="checkbox"/>
Motivation to recruit underserved students to participate in research and design projects	<input type="checkbox"/>	<input type="checkbox"/>

8. If you have comments on questions 3-7, please enter them here.

\* 9. How many underserved students do you support who would not otherwise have conducted research or participated in design projects?

Last Year--2015-2016:

This Year--2016-2017:

\* 10. How many underserved students do you support who would not otherwise have entered competitions?

Last Year--2015-2016:

This Year--2016--2017:

\* 11. How many students did you support in entering competitions?

Last Year--2015-2016:

This Year--2016-2017:

12. If you have comments on questions 9-11 above, enter them here.

In the remaining questions, we are interested in your opinion. You will have an additional opportunity to share your ideas in the individual phone interviews.

13. What do you see as the benefits to students of their involvement in conducting research?

14. What do you see as added benefits for students of participating in competitions?

15. What do you think motivates students to participate in competitions?

16. What do you see as the biggest benefit of the Advocate Grant Program to your students?

17. What do you see as the biggest benefit of the Advocate Grant Program to you?

18. How could the Advocate Grant Program be improved?

19. If you have used the \$3000 for anything other than a stipend for yourself, please explain how you have used it.

20. Do you plan to continue to support underserved youth in entering competitions next year after the Advocate Grant Program?

Yes

No

Why or why not?

21. If you plan to continue, what parts of the Advocate Grant Program have helped you to do so?

22. What impact, if any, have you seen on your school (or institution) from the Advocate Grant Program?

(For example, some Advocates hoped after the program they would have more administrative support or funding opportunities.)

Thank you for your responses. The next steps in the evaluation of the program will be student surveys and phone interviews with each Advocate. Thank you in advance for your help with these.



## Student Survey – Version A (Advocates’ Students)

### Introduction

Thank you for taking this survey. This survey involves questions about science, technology, engineering, or math (STEM) projects and competitions. It will take you 15-20 minutes to complete.

We won’t ask you about your own STEM project. None of the questions will test your knowledge.

We will ask your opinion about things related to STEM projects.

There are no right or wrong answers on this survey. We just want your honest opinion.

We value your input on this survey. To thank you for your input, all completed surveys will be entered into a drawing for one of ten \$50 gift cards. To be entered into the drawing you must answer at least 90% of the questions. You will be asked for your first name and two other questions so you can be notified if your name is drawn for one of the prizes. Not everyone will win, but everyone’s input will help students and teachers in the future.

If you have any questions about this survey, please contact Christine Klein, Director, Insight for Learning Practices at 314-504-1465 or ckleinconsulting@gmail.com. Or, contact Raeva Ramadorai at the Society for Science and the Public, 202-872-5144.

Thank you for your participation.

### About You

This page asks for information about you and your participation in STEM projects and competitions.

\* 1. Grade in school during spring 2017:

- Grade 6
- Grade 7
- Grade 8
- Grade 9
- Grade 10
- Grade 11
- Grade 12

\* 2. What is your age?

\* 3. With which gender do you most identify?

- Female
- Male
- Prefer not to answer
- Not Listed (please specify)

\* 4. Are you Hispanic, Latino/a, or of Spanish origins?

- No, I'm not Hispanic, Latino/a or of Spanish origins.
- Yes, I'm Hispanic, Latino/a or of Spanish origins.

\* 5. Which of the following best describes your race? (select one)

- White
- Black or African-American
- American Indian or Alaskan Native
- Asian
- Native Hawaiian or other Pacific Islander
- Multiple races or some other race/origin (please specify)

\* 6. What is your home ZIP Code?

\* 7. What is the name of your school? (If homeschooled, write "homeschooled.")

8. In what city is your school located?

9. In what state is your school located?

### **Projects**

The following questions are about STEM projects. These include projects you might have done for a class, science fair, or other competitions.

10. What kind of project did you work on during this school year?

- Science research project
- Engineering design project
- Behavioral science research project
- Other (please specify)

11. What is the status of your project?

- Currently working on project
- Project is completed

12. Have you entered your project into a competition?

- Yes
- No

### **Entering Competitions**

13. Into which competition(s) have you entered your project this year? (Select all that apply)

- School-wide Science Fair
- County-wide Science Fair
- Regional Science Fair
- Intel International Science and Engineering Fair (ISEF)
- BioGENIUS Challenge
- Broadcom MASTERS
- eCybermission
- FFA Agriscience Fair
- Google Science Fair
- Junior Science and Humanities Symposium
- Regeneron Science Talent Search
- Seimens Math and Science Competitions
- Other (please specify)

14. Did you win any awards for your project this year?

- Yes
- No
- Too early to tell

15. If you won, what award(s) did you win?

- Award 1
- Award 2
- Other awards

### **Competitions**

16. Rate the importance of your reasons for entering a competition: (1 = low; 10 = high)

- Opportunity to win prizes that included scholarships and other monetary awards
- List on applications to get you into the college or university of your choice
- Encouragement from parents/guardians
- Encouragement from teachers
- Encouragement from friends and peers
- Competitions are fun
- Passion for science or engineering
- Opportunity to travel to events
- Opportunity to gain recognition
- Opportunity to explore a fascinating question

### **Current and Previous Participation**

The following questions ask about your participation in different grade levels. (Don't include grades beyond your current grade.)

17. In what grade levels did you complete a STEM project? (Check all that apply.)

- Grade 6
- Grade 7
- Grade 8
- Grade 9
- Grade 10
- Grade 11
- Grade 12

18. In what grade levels were you required to complete a STEM project by a teacher, your school, or an adult other than your parent/guardian?

- Grade 6
- Grade 7
- Grade 8
- Grade 9
- Grade 10
- Grade 11
- Grade 12
- I was never required to complete a project.

19. In what grade levels did you enter your STEM project into a competition?

- Grade 6
- Grade 7
- Grade 8
- Grade 9
- Grade 10
- Grade 11
- Grade 12
- I never entered a competition

### **BEFORE and AFTER your Project**

The following questions ask you to rate areas before and after doing your STEM project, including participating in competitions. Please carefully consider each area individually. This helps us understand how working on your project affected you.

20. Please rate your skill in each of these areas BEFORE and AFTER working on your project. (1 = no level of skill; 10 = expert level of skill)

	Before Project	After Project
Writing skills	<input type="checkbox"/>	<input type="checkbox"/>
Oral presentation skills	<input type="checkbox"/>	<input type="checkbox"/>
Time management	<input type="checkbox"/>	<input type="checkbox"/>
Meeting deadlines	<input type="checkbox"/>	<input type="checkbox"/>
Drawing portraits <sup>11</sup>	<input type="checkbox"/>	<input type="checkbox"/>
Writing a scientific journal article	<input type="checkbox"/>	<input type="checkbox"/>
Ability to present my research to other students	<input type="checkbox"/>	<input type="checkbox"/>
Ability to present my project to scientists or engineers	<input type="checkbox"/>	<input type="checkbox"/>
Ability to present my project to the general public	<input type="checkbox"/>	<input type="checkbox"/>

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<sup>11</sup> "Drawing a portrait" (not an intended impact of the program) was inserted among impact rating statements to assess a response set among the Advocates or comparison student groups; that is, to see if either of the groups had a tendency to rate any statement more highly or more lowly even if it was a skill developed as part of conducting a research project or participating in a competition. The *Before* means for this rating item were 4.05 for the Advocate group and 4.14 for the comparison group (no significant difference). The difference for the *After* ratings, 5.95 for Advocate students and 4.97 was significant ( $p < .001$ ). There may have been a small, but significant, overall effect of being supported by Advocates, but this was an intentional element of the program. In interviews, some Advocates told of students' pride in being part of the program.

21. Please rate your knowledge in each area BEFORE and AFTER working on your project. (1 = no knowledge or understanding; 10 = high level of knowledge or understanding)

	Before Project	After Project
My STEM topic	<input type="checkbox"/>	<input type="checkbox"/>
Other STEM topics	<input type="checkbox"/>	<input type="checkbox"/>
The scientific process	<input type="checkbox"/>	<input type="checkbox"/>
The engineering design process	<input type="checkbox"/>	<input type="checkbox"/>
Options for STEM careers	<input type="checkbox"/>	<input type="checkbox"/>
Options for education after high school	<input type="checkbox"/>	<input type="checkbox"/>
How STEM supports my community	<input type="checkbox"/>	<input type="checkbox"/>

22. Please rate your awareness on each of the following BEFORE and AFTER working on your project. (1 = no awareness; 10 = highly aware)

	Before Project	After Project
Competitions give prizes that include scholarships or other monetary awards	<input type="checkbox"/>	<input type="checkbox"/>
Competitions could help you get accepted into the college or university of your choice	<input type="checkbox"/>	<input type="checkbox"/>

23. Please rate the level of your interest or attitude BEFORE and AFTER working on your project. (1 = very low; 10 = very high)

	Before Project	After Project
My interest in participating in STEM activities	<input type="checkbox"/>	<input type="checkbox"/>
My confidence in handling STEM activities	<input type="checkbox"/>	<input type="checkbox"/>
My comfort in working with adults	<input type="checkbox"/>	<input type="checkbox"/>
My confidence that I can be successful if I put my mind to something	<input type="checkbox"/>	<input type="checkbox"/>
My confidence in serving as a role model to younger students	<input type="checkbox"/>	<input type="checkbox"/>
The value I place on scientific research	<input type="checkbox"/>	<input type="checkbox"/>

My interest in going to college	<input type="checkbox"/>	<input type="checkbox"/>
My interest in taking science and math classes in high school and beyond	<input type="checkbox"/>	<input type="checkbox"/>
My interest in a STEM related career (e.g. scientist, engineer, doctor, nurse, electrician, etc.)	<input type="checkbox"/>	<input type="checkbox"/>

### Help and Support

We know most students complete their own projects, sometimes individually and sometimes as a team. Yet, most students or groups of students have important support or guidance from older students and adults. It is that important support that we are asking about in the following questions.

24. Who helped or guided you in completing your project? (Select all that apply)

- Science teacher
- Math teacher
- Computer/technology teacher
- Teacher with whom you don't currently have a class
- School administrator
- University professor
- University student
- Student in your grade level
- Older student
- Club sponsor/After school program staff
- Family member
- Other (please specify)

25. When did you get most of the help on your project? (Select the best possible response.)

- During class
- Before or after school
- In the evening
- On the weekend
- In the summer

26. Where did you collect your data? (Select all that apply)

- My school
- University lab
- Business lab
- Hospital or veterinary lab
- A farm or ranch
- Park or other natural habitat
- Home
- Other (please specify)

27. Was your project this year part of an internship? (For example, a scheduled experience away from your school in a real workplace such as a research lab or robotics lab.)

- Yes
- No

## Advocates

The following questions are related to the person who gave you the link to this survey. We call this person your *Advocate* in the questions.

28. How likely would you have been to complete a STEM project if your Advocate hadn't encouraged you?

0 = Unlikely                  Neither likely or unlikely                  100 = Highly likely

29. How likely would you have been to enter a STEM competition if your Advocate hadn't encouraged you to enter?

0 = Unlikely                  Neither likely or unlikely                  100 = Highly likely

30. Who helped you most with each of these aspects of your project?

	Person Giving Support
• Selecting a STEM topic	<input type="checkbox"/>
• Finding references for topic	<input type="checkbox"/>
• Identifying procedures	<input type="checkbox"/>
• Explaining the research process	<input type="checkbox"/>
• Helping you get supplies & equipment	<input type="checkbox"/>
• Helping you find experts	<input type="checkbox"/>
• Helping you organize data	<input type="checkbox"/>
• Helping you write	<input type="checkbox"/>
• Helping you set and meet deadlines	<input type="checkbox"/>
• Helping you identify competitions to enter	<input type="checkbox"/>
• Helping you interpret competition rules	<input type="checkbox"/>
• Helping you in fill out competition applications	<input type="checkbox"/>
• Providing/arranging transportation to competition(s)	<input type="checkbox"/>

31. In what ways was your Advocate most helpful?

## Give Us Your Thoughts

32. Why did you do a STEM project?

33. What do you think are the benefits of entering a STEM competition?

34. If you entered a STEM competition, why did you enter? (If you never entered a competition, leave question blank.)

## Information for Drawings

35. Your first name:

36. Your code word: (Since many people have the same first name, give us a code word to use if you are a lucky gift card winner. A code word could be a favorite pet, color, best friend's first name, or anything you will remember.)

37. Last name of the person who gave you this survey:

**Thank You**

Thank you for completing this survey!

The drawing for the gift cards will be May 5. Teachers of the winners will be notified the following week.

Please press **DONE** below to submit your survey responses.

If you have any questions about this survey, please contact Christine Klein, Director, Insight for Learning Practices at 314-504-1465 or [ckleinconsulting@gmail.com](mailto:ckleinconsulting@gmail.com). Or, contact Raeva Ramadorai at the Society for Science and the Public, 202-872-5144.



## Student Survey – Version C (Comparison Group Students)

### Introduction

Thank you for taking this survey. This survey involves questions about science, technology, engineering, or math (STEM) projects and competitions. It will take you 15-20 minutes to complete.

We won't ask you about your own STEM project. None of the questions will test your knowledge. We will ask your opinion about things related to STEM projects.

There are no right or wrong answers on this survey. We just want your honest opinion.

We value your input on this survey. To thank you for your input, all completed surveys will be entered into a drawing for one of ten \$50 gift cards. To be entered into the drawing you must answer at least 90% of the questions. You will be asked for your first name and two other questions so you can be notified if your name is drawn for one of the prizes. Not everyone will win, but everyone's input will help students and teachers in the future.

If you have any questions about this survey, please contact Christine Klein, Director, Insight for Learning Practices at 314-504-1465 or ckleinconsulting@gmail.com. Or, contact Raeva Ramadorai at the Society for Science and the Public, 202-872-5144.

Thank you for your participation.

### About You

This page asks for information about you and your participation in STEM projects and competitions.

\* 1. Grade in school during spring 2017:

- Grade 6
- Grade 7
- Grade 8
- Grade 9
- Grade 10
- Grade 11
- Grade 12

\* 2. What is your age?

\* 3. With which gender do you most identify?

- Female
- Male
- Prefer not to answer
- Not Listed (please specify)

\* 4. Are you Hispanic, Latino/a, or of Spanish origins?

- No, I'm not Hispanic, Latino/a or of Spanish origins.
- Yes, I'm Hispanic, Latino/a or of Spanish origins.

- \* 5. Which of the following best describes your race? (select one)
  - White
  - Black or African-American
  - American Indian or Alaskan Native
  - Asian
  - Native Hawaiian or other Pacific Islander
  - Multiple races or some other race/origin (please specify)
- \* 6. What is your home ZIP Code?
- \* 7. What is the name of your school? (If homeschooled, write "homeschooled.")
- 8. In what city is your school located?
- 9. In what state is your school located?

### **Projects**

The following questions are about STEM projects. These include projects you might have done for a class, science fair, or other competitions.

- 10. What kind of project did you work on during this school year?
  - Science research project
  - Engineering design project
  - Behavioral science research project
  - Other (please specify)
- 11. What is the status of your project?
  - Currently working on project
  - Project is completed
- 12. Have you entered your project into a competition?
  - Yes
  - No

### **Entering Competitions**

- 13. Into which competition(s) have you entered your project this year? (Select all that apply)
  - School-wide Science Fair
  - County-wide Science Fair
  - Regional Science Fair
  - Intel International Science and Engineering Fair (ISEF)
  - BioGENIUS Challenge
  - Broadcom MASTERS
  - eCybermission
  - FFA Agriscience Fair
  - Google Science Fair
  - Junior Science and Humanities Symposium
  - Regeneron Science Talent Search
  - Seimens Math and Science Competitions
  - Other (please specify)

14. Did you win any awards for your project this year?

- Yes
- No
- Too early to tell

15. If you won, what award(s) did you win?

- Award 1
- Award 2
- Other awards

### **Competitions**

16. Rate the importance of your reasons for entering a competition: (1 = low; 10 = high)

- Opportunity to win prizes that included scholarships and other monetary awards
- List on applications to get you into the college or university of your choice
- Encouragement from parents/guardians
- Encouragement from teachers
- Encouragement from friends and peers
- Competitions are fun
- Passion for science or engineering
- Opportunity to travel to events
- Opportunity to gain recognition
- Opportunity to explore a fascinating question

### **Current and Previous Participation**

The following questions ask about your participation in different grade levels. (Don't include grades beyond your current grade.)

17. In what grade levels did you complete a STEM project? (Check all that apply.)

- Grade 6
- Grade 7
- Grade 8
- Grade 9
- Grade 10
- Grade 11
- Grade 12

18. In what grade levels were you required to complete a STEM project by a teacher, your school, or an adult other than your parent/guardian?

- Grade 6
- Grade 7
- Grade 8
- Grade 9
- Grade 10
- Grade 11
- Grade 12
- I was never required to complete a project.

19. In what grade levels did you enter your STEM project into a competition?

- Grade 6
- Grade 7
- Grade 8
- Grade 9
- Grade 10
- Grade 11
- Grade 12
- I never entered a competition

**BEFORE and AFTER your Project**

The following questions ask you to rate areas before and after doing your STEM project, including participating in competitions. Please carefully consider each area individually. This helps us understand how working on your project affected you.

20. Please rate your skill in each of these areas BEFORE and AFTER working on your project. (1 = no level of skill; 10 = expert level of skill)

	Before Project	After Project
Writing skills	<input type="checkbox"/>	<input type="checkbox"/>
Oral presentation skills	<input type="checkbox"/>	<input type="checkbox"/>
Time management	<input type="checkbox"/>	<input type="checkbox"/>
Meeting deadlines	<input type="checkbox"/>	<input type="checkbox"/>
Drawing portraits <sup>12</sup>	<input type="checkbox"/>	<input type="checkbox"/>
Writing a scientific journal article	<input type="checkbox"/>	<input type="checkbox"/>
Ability to present my research to other students	<input type="checkbox"/>	<input type="checkbox"/>
Ability to present my project to scientists or engineers	<input type="checkbox"/>	<input type="checkbox"/>
Ability to present my project to the general public	<input type="checkbox"/>	<input type="checkbox"/>

21. Please rate your knowledge in each area BEFORE and AFTER working on your project. (1 = no knowledge or understanding; 10 = high level of knowledge or understanding)

	Before Project	After Project
My STEM topic	<input type="checkbox"/>	<input type="checkbox"/>
Other STEM topics	<input type="checkbox"/>	<input type="checkbox"/>
The scientific process	<input type="checkbox"/>	<input type="checkbox"/>
The engineering design process	<input type="checkbox"/>	<input type="checkbox"/>

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<sup>12</sup> See footnote 11 on page 73.

Options for STEM careers	<input type="checkbox"/>	<input type="checkbox"/>
Options for education after high school	<input type="checkbox"/>	<input type="checkbox"/>
How STEM supports my community	<input type="checkbox"/>	<input type="checkbox"/>

22. Please rate your awareness on each of the following BEFORE and AFTER working on your project. (1 = no awareness; 10 = highly aware)

	Before Project	After Project
Competitions give prizes that include scholarships or other monetary awards	<input type="checkbox"/>	<input type="checkbox"/>
Competitions could help you get accepted into the college or university of your choice	<input type="checkbox"/>	<input type="checkbox"/>

23. Please rate the level of your interest or attitude BEFORE and AFTER working on your project. (1 = very low; 10 = very high)

	Before Project	After Project
My interest in participating in STEM activities	<input type="checkbox"/>	<input type="checkbox"/>
My confidence in handling STEM activities	<input type="checkbox"/>	<input type="checkbox"/>
My comfort in working with adults	<input type="checkbox"/>	<input type="checkbox"/>
My confidence that I can be successful if I put my mind to something	<input type="checkbox"/>	<input type="checkbox"/>
My confidence in serving as a role model to younger students	<input type="checkbox"/>	<input type="checkbox"/>
The value I place on scientific research	<input type="checkbox"/>	<input type="checkbox"/>
My interest in going to college	<input type="checkbox"/>	<input type="checkbox"/>
My interest in taking science and math classes in high school and beyond	<input type="checkbox"/>	<input type="checkbox"/>
My interest in a STEM related career (e.g. scientist, engineer, doctor, nurse, electrician, etc.)	<input type="checkbox"/>	<input type="checkbox"/>

## Help and Support

We know most students complete their own projects, sometimes individually and sometimes as a team. Yet, most students or groups of students have important support or guidance from older students and adults. It is that important support that we are asking about in the following questions.

24. Who helped or guided you in completing your project? (Select all that apply)

- Science teacher
- Math teacher
- Computer/technology teacher
- Teacher with whom you don't currently have a class
- School administrator
- University professor
- University student
- Student in your grade level
- Older student
- Club sponsor/After school program staff
- Family member
- Other (please specify)

25. When did you get most of the help on your project? (Select the best possible response.)

- During class
- Before or after school
- In the evening
- On the weekend
- In the summer

26. Where did you collect your data? (Select all that apply)

- My school
- University lab
- Business lab
- Hospital or veterinary lab
- A farm or ranch
- Park or other natural habitat
- Home
- Other (please specify)

27. Was your project this year part of an internship? (For example, a scheduled experience away from your school in a real workplace such as a research lab or robotics lab.)

- Yes
- No

## Encouragement and Support

The following questions are related to the person who gave you the link to this survey. We call this person your *Advocate* in the questions.

28. How likely would you have been to complete a STEM project if your Advocate hadn't encouraged you?

0 = Unlikely

Neither likely or unlikely

100 = Highly likely



29. Who helped you most with each of these aspects of your project?

Person Giving Support

- Selecting a STEM topic
- Finding references for topic
- Identifying procedures
- Explaining the research process
- Helping you get supplies & equipment
- Helping you find experts
- Helping you organize data
- Helping you write
- Helping you set and meet deadlines
- Helping you identify competitions to enter
- Helping you interpret competition rules
- Helping you in fill out competition applications
- Providing/arranging transportation to competition(s)

### **Give Us Your Thoughts**

30. Why did you do a STEM project?

31. What do you think are the benefits of entering a STEM competition?

32. If you entered a STEM competition, why did you enter? (If you never entered a competition, leave question blank.)

### **Information for Drawings**

To thank you for filling out this survey, we would like to enter you into a drawing for one of ten \$50 gift cards. So we can find the winners, we are asking for the following information. The information is optional. However, if we don't know your first name and the last name of the individual who gave you this survey, we will not be able to include you in the drawing.

33. Your first name:

34. Your code word: (Since many people have the same first name, give us a code word to use if you are a lucky gift card winner. A code word could be a favorite pet, color, best friend's first name, or anything you will remember.)

35. Last name of the person who gave you this survey:

### **Thank You**

Thank you for completing this survey!

The drawing for the gift cards will be May 5. Teachers of the winners will be notified the following week.

Please press **DONE** below to submit your survey responses.

If you have any questions about this survey, please contact Christine Klein, Director, Insight for Learning Practices at 314-504-1465 or ckleinconsulting@gmail.com. Or, contact Raeva Ramadorai at the Society for Science and the Public, 202-872-5144.

## APPENDIX D – Data Source Tables

The following tables provide information on the data used in the evaluation.

### Data Sources by Method

Method	Documents	File Location	Method N	Unique Respondents	Response Rate	Dates
Interview	Staff Interviews	NVIVO	2	2	100.00	9/21-22/16
	Advocate Interviews	NVIVO	29	29	93.55	4/11/17-5/4/17
Focus Groups	In-person Focus Group	NVIVO	9	0	90.00	9/30/16
	Online Focus Group	NVIVO	6	0	N/A	10/19/17
Survey	Advocate Survey		31	0	100.00	3/23/17-4/10/17
	Student Survey-Advocates	DropBox/ Student Surveys/ Results	244	244	47.91	4/10/17-5/11/17
	Student Survey-Comparison	DropBox/ Student Surveys/ Results	275	275	68.75 or 91.67	4/11/17-5/7/17

### Documents Analyzed

Documents	File Location	Method N	Dates	Notes
Application	NVIVO	31	Spring 2016	2 applicants dropped out, no applications for replacements
Directory	NVIVO	31	June 2016	2 applicants dropped out, no directory entries for replacements
Report 1	NVIVO	27	7/19/16-4/5/17	
Report 2	NVIVO	26	Feb – May 2017	
Report 3	NVIVO	26	May 2017	
Edmodo Posts	DropBox/ Data/ Edmodo	104	June 2016 - July 2017	



## Documents by Type of Document

Document	Title	Number of Files
Staff Interview Transcripts	AGP-Interview-VH-092116.docx	1
	AGP-Interview-CS-092216 CT.docx	1
Advocate Interview Transcripts	Advocate-date-Interviewer	28
In-person Focus Group	AGP-FocusGroup-093016-KK.docx	1
Online Focus Group	AGP-Focus Group 101916-KK.docx	1
Advocate Survey	Advocate Survey Results 053117	1
Student Survey-Advocates	AdvocateStudentSurveyResults	1
Student Survey-Comparison	ComparisonStudentSurveyResults	1
Application	First-Last.pdf (includes 2 who dropped out early)	31
Directory	2016 Advocates Directory Final_06Jun16.docx	1
Report 1	Student Tracking Sheets	28
	LastName - Phase 1 Report	27
Report 2	Student Tracking Sheets	11
	LastName - Phase 2 Report	26
Report 3	Student Tracking Sheets	26
	LastName - Phase 3 Report	26
Edmodo Posts	LastName -date.tiff	104