



Summative Evaluation:
Advocate Grant Program

Prepared for the
Society for Science and the Public

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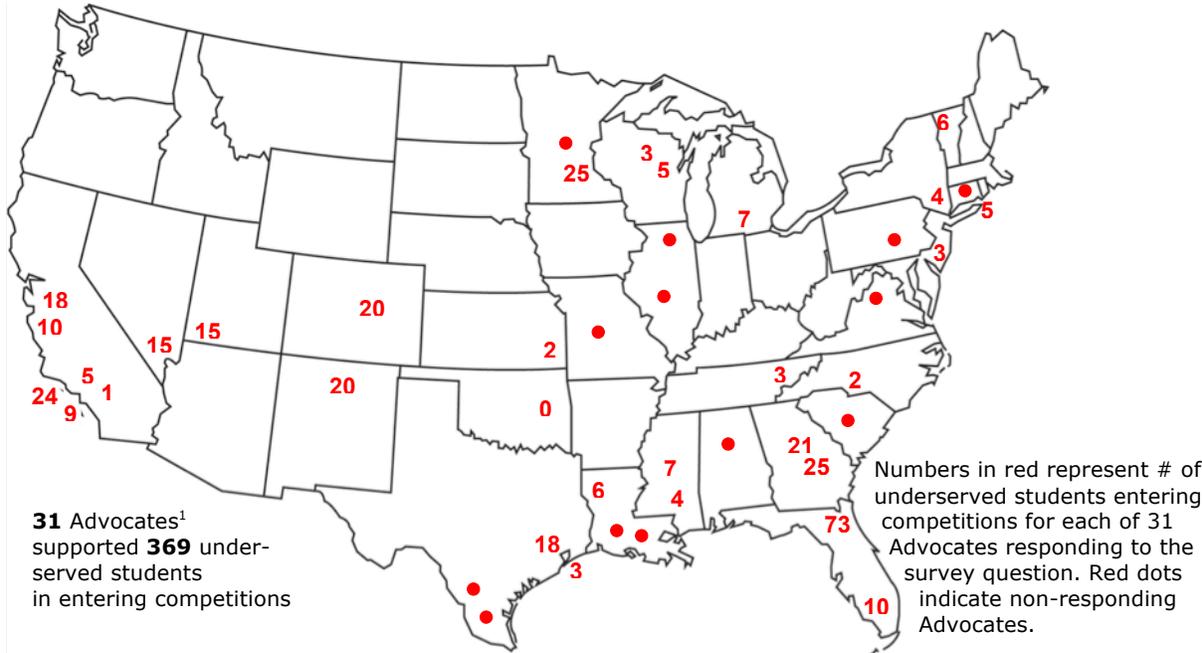
TABLE OF CONTENTS

- PROJECT OVERVIEW..... 1
 - Advocate Reach Nationwide..... 1
 - Advocates’ Settings..... 1
 - Advocates’ Characteristics..... 2
 - Number of Students Supported..... 3
- EVALUATION FINDINGS 4
 - Program Impacts on Advocates..... 4
 - Advocates gained awareness of the Society as a resource for teachers 4
 - Advocates gained awareness of competition deadlines, requirements, and range 6
 - Advocates developed a sense of camaraderie with others in the student research and competition community..... 6
 - Motivation to support underserved students remained high..... 6
 - Advocates’ ability to support students showed moderate gains 6
 - Program Benefits for Advocates 7
 - Advocate Perspectives on the Benefits to Students 7
 - Advocates saw confidence building as the biggest benefit to students conducting research and participating in competitions 7
 - Advocates saw awards and scholarships as the biggest motivation for students participating in competitions, followed closely by the encouragement of adults 8
 - Advocates saw many benefits of the program to their students 9
 - Advocates saw impact on their school or institution 9
 - Additional Findings from the Advocate Perspective..... 10
 - Advocates commented on working with underserved students..... 10
 - Advocates commented on competitions..... 10
 - Two Advocates addressed resource issues 11
 - Advocates recommended program improvements..... 11
 - Additional Advocate comments provide insights 12
 - Advocates provided insights into why they plan to continue the work 13
- CONSIDERATIONS AND RECOMMENDATIONS 14
- FINAL THOUGHTS 16
 - The program met its goals 16
 - Society support led to the intended Advocate impacts 16

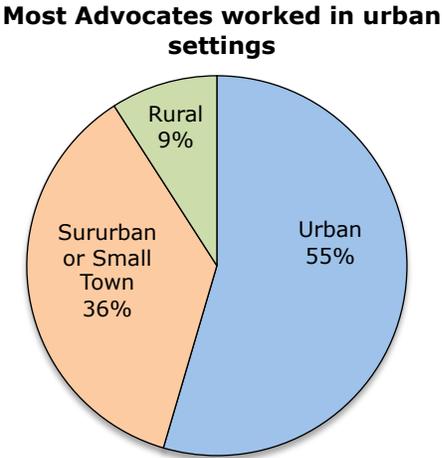
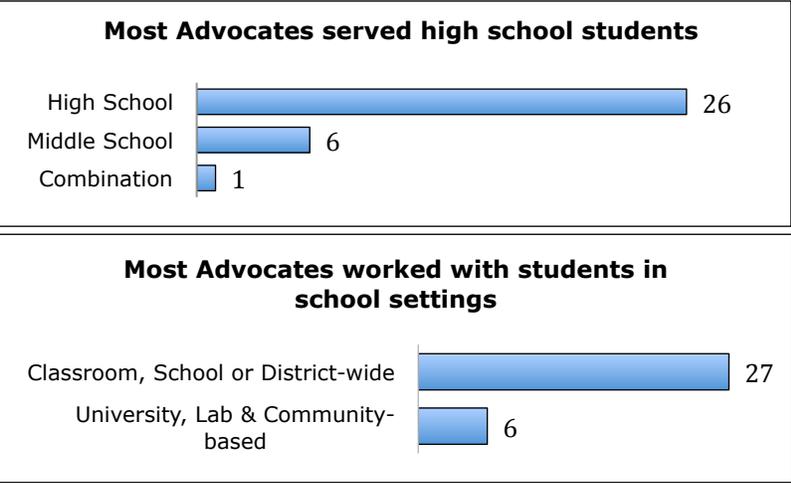
PROJECT OVERVIEW

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 2017-2018 cohort with 44 Advocates from across the United States. Data for this report include 33 Advocate surveys (a 75% response rate) and questionnaire responses from Society staff.

Advocate Reach Nationwide



Advocates' Settings



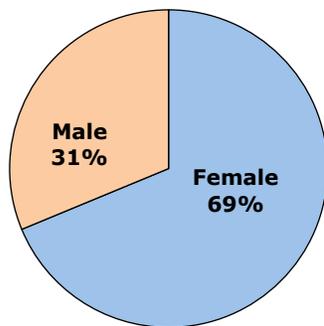
¹ Of the 33 Advocates responding to the survey questions regarding number of students supported, one left the question blank and one reported inconsistent numbers.

Advocates' Characteristics

Thirty-three of the 44 Advocates responded to the survey. Of those 33 respondents, four were Lead Advocates and ten (30%) were returning from the 2016-2017 cohort. The following summarizes the characteristics of the Advocates completing each question. Since not all of the 33 respondents answered all questions, the number of survey responses (*N*) is given for each result that does not reflect all 33 of the respondents.

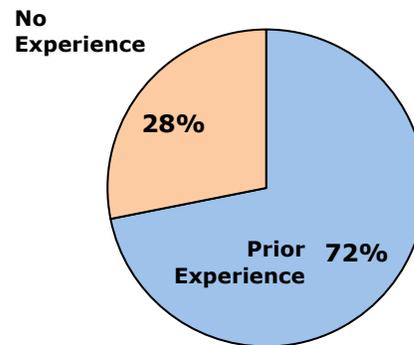
Most Advocates (71%) Responding Were Female

Females made up 71% of the Advocates responding to the gender identity question. (22 females to 10 males; *N* = 32)



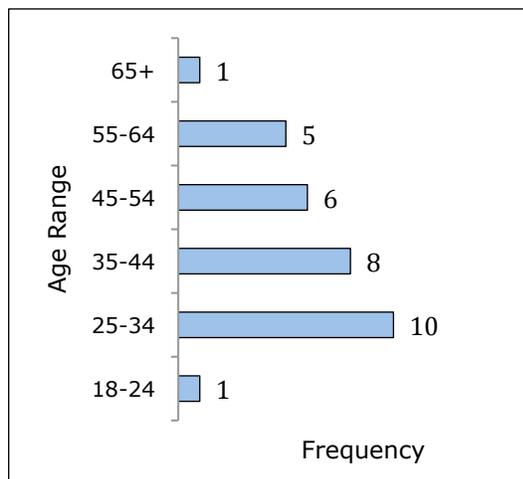
Most Advocates (72%) Responding Had Prior Competition Experience

Twenty-three Advocates had prior experience with competitions. One had experience as a regional coordinator and another as a director. (*N* = 32)



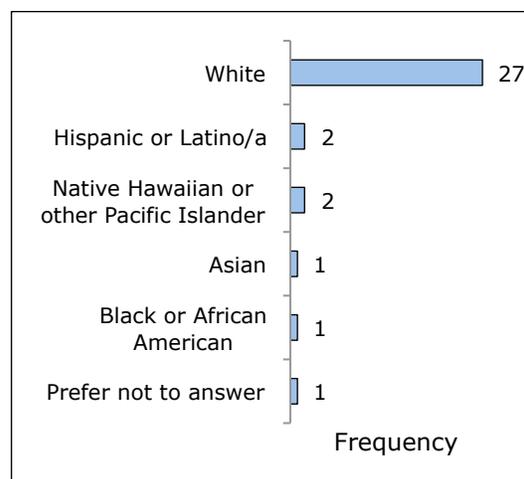
The largest age group of Advocates (30%) Responding Were Ages 25-34

Over half of the Advocates responding to the survey were under age 45, including half of the Lead Advocates. (*N* = 31)



Most Advocates (90%) Responding Were White

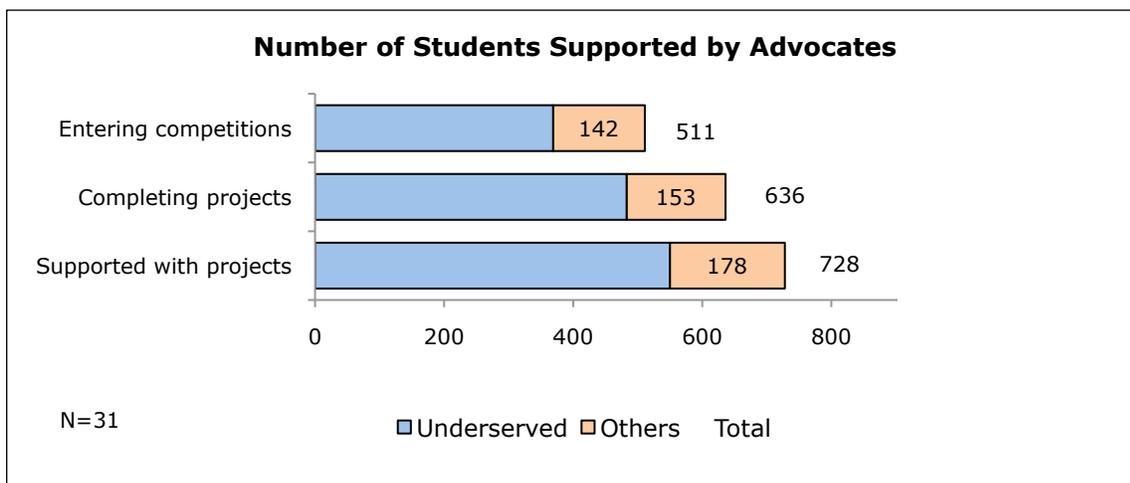
Advocates were allowed to select up to two responses. Three Advocates selected more than one ethnicity and one chose not to reply. (*N* = 30)



Number of Students Supported

On the survey, the Advocates provided the numbers of students they supported in scientific research and engineering design projects. Advocates in the 2017-2018 cohort for whom we had data supported a total of 728 students ($N = 31$).

Of these 728 students supported by the 31 Advocates, 550 (75.5%) were underserved students as defined by the Advocates. Among those underserved students who participated, 483 (87.8%) completed projects with 369 (67.1%) entering competitions. Comments indicated that administrative issues might have affected some of the students who completed projects but did not enter competitions. For example, one Advocate reported a principal failing to submit registration fees. Another Advocate was removed from her position right before the competition season. These issues appeared to affect all of the Advocate's students, not just underserved students, in entering competitions.



Advocates were also asked how many of the underserved students entering competitions would not have entered without the Advocate's support. Advocates reported that 281 of the 369 (76.2%) underserved students would probably not have entered competitions without their support ($N = 31$). Fifteen Advocates indicated that none of their students who entered would have done so without their support.

EVALUATION FINDINGS

Prior to the program’s evaluation, the Advocate Grant Program evaluation team and staff at the Society identified intended and unintended program impacts on Advocates and their students. Impacts covered changes in awareness, interest, attitude, skills, and behavior² 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

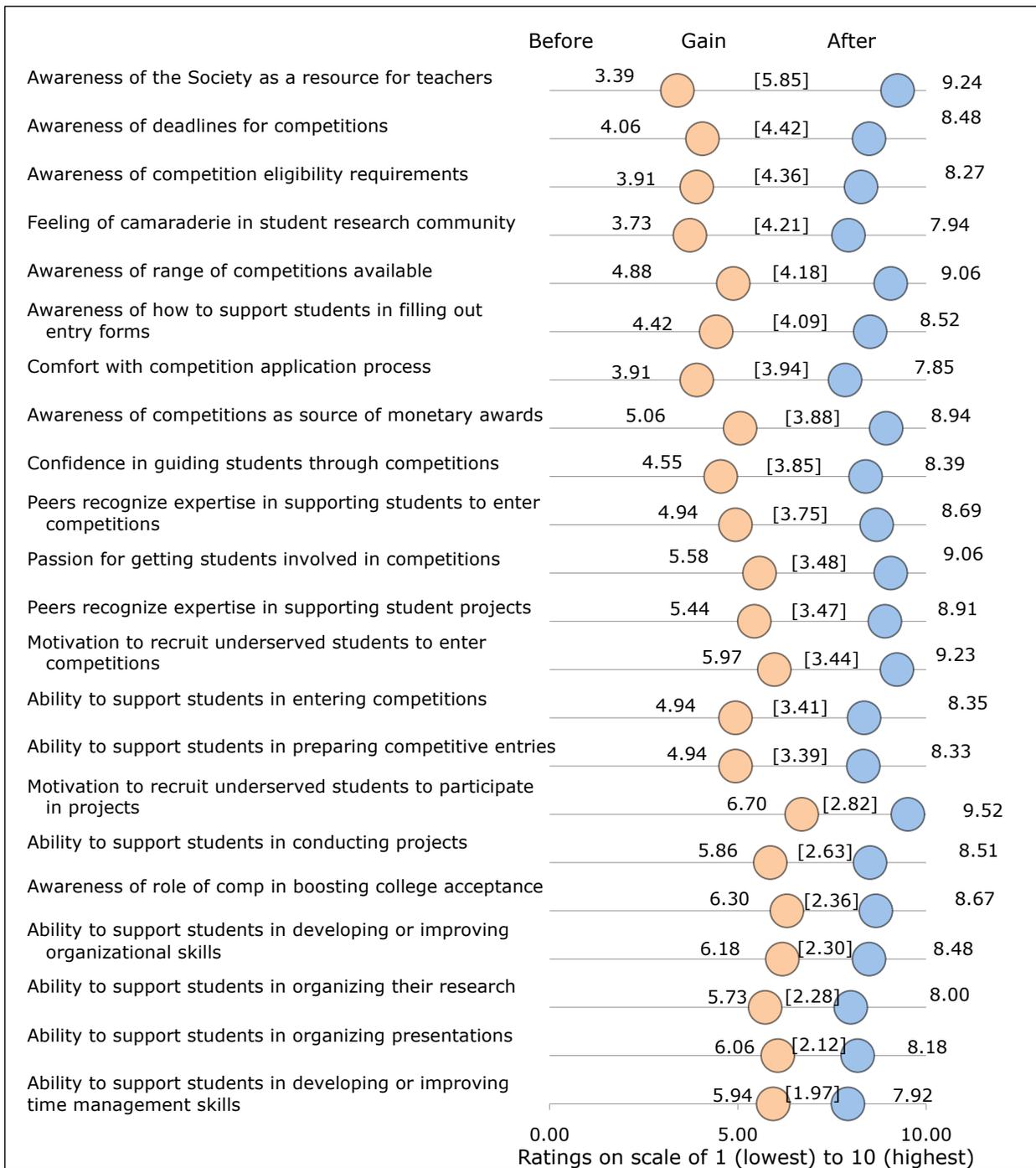
The following findings of impacts on Advocates are based on online surveys of 33 of the 44 Advocates in the 2017-2018 cohort³. This means that findings may not be entirely representative of the entire 2017-2018 cohort. Survey questions asked Advocates to respond to statements about their awareness, ability, 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 asked for additional information and insights.

Advocates gained awareness of the Society as a resource for teachers

On the survey, Advocates were asked to rate 22 statements regarding their awareness, motivation, recognition, attitude, and ability to support students *Before* and *After* their participation in the Advocate Grant Program on a scale of 1 to 10, with 10 as the highest level. *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). (*N* = 33 for all *Before*, *Gain*, and *After* scores.)

² 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>

³ Eleven Advocates did not respond to requests for survey completion.



As the figure shows, the greatest gain (5.85) was in Advocates' awareness of the Society as a resource for teachers. Advocates rated this item with the lowest *Before* mean (3.39) which indicates that the program took Advocates with very little knowledge of the Society or its resources and brought them up to a very high level of awareness (9.24 *After* mean).

Advocates gained awareness of competition deadlines, requirements, and range

Several areas of awareness showed large mean gains. Advocates responding to the survey questions ($N = 33$) reported gains in awareness of competition deadlines, eligibility requirements, the range of competitions, 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.

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

Survey results indicate that Advocates developed a “Feeling of camaraderie with others in the student research and competition community.” However, they started the program with a low mean score (*Before* = 3.73) and ended with the third lowest *After* mean score (7.94). This indicates that there is still room for the program to continue to increase Advocates sense of community.⁴

The AGP participation gave me the support and opportunity to collaborate with like-minded educators.
– Advocate 42

Motivation to support underserved students remained high

“Motivation to recruit underserved students to participate in [research and design] projects” had the highest *After* mean score (9.52), with 25 Advocates rating the item as a 10 after participating in the program and the remaining Advocates rating the item as seven or higher. The *Before* mean was also the highest (6.70) among the items. This leaves less room for gains overall, though five Advocates gave the item a one or two rating for before the program.

Before the AGP I was only slightly aware of the gap created by underserved students in science competitions, but now I am vastly aware and passionate about helping these students.
– Advocate 40

“Motivation to recruit underserved students to enter competitions” also resulted in a relatively high *Before* mean (5.97) and a high *After* mean (9.23) with a *Gain* of 3.44. Together, the results of these two items indicate that the Society is attracting Advocates who are motivated to work with underserved students on research and design projects and to move them toward competitions. All gain scores on this item were zero (no change) or positive, indicating that the program continues to increase that motivation.

Advocates’ ability to support students showed moderate gains

Advocates indicated moderate gains on the items: “Ability to support students in entering competitions” (3.41 mean) and “Ability to support students in preparing competitive entries” (3.39 mean), indicating that the program helped many Advocates increase those abilities.

The Society has enabled me to help students grow and understand science research.
– Advocate 60

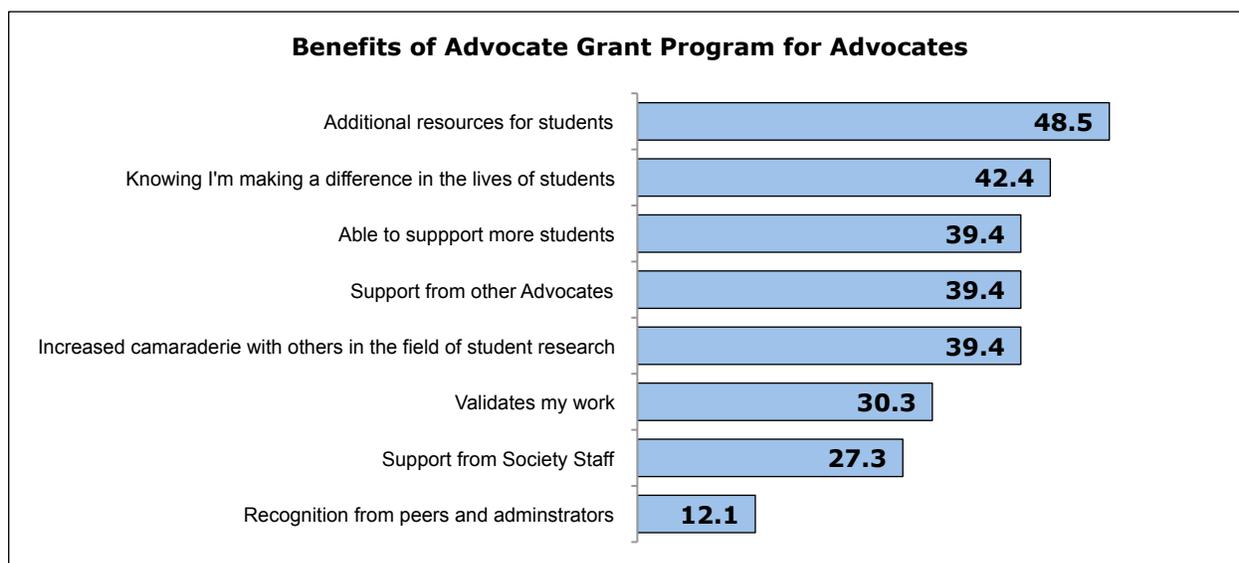
Results of survey items addressing the Advocates’ abilities to support students in conducting their projects and developing skills showed smaller gains. Since *Before* means were

⁴ Advocates were assigned case numbers using random numbers from 10 to 99. Case numbers are provided for all quotes.

relatively high (ranging from 5.86 to 6.30) on these items, there was somewhat less room for growth in these areas. This may reflect the recruitment of experienced research teachers. New Advocates without this experience may need some additional support helping students carry out research projects.

Program Benefits for Advocates

Advocates were asked what they saw as the biggest benefits of the Advocate Grant Program to themselves. They could select up to three responses and add their own ideas in a comment box (which none did). As seen in the figure below, many focused on the benefits to their students. Numbers indicate percent of Advocates selecting an item.

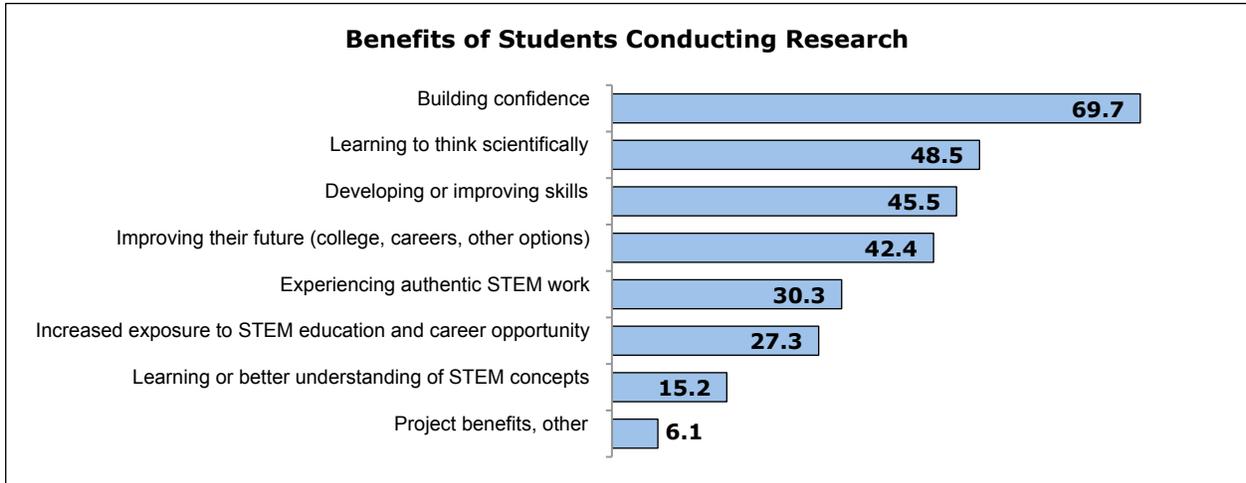


Advocate Perspectives on the Benefits to Students

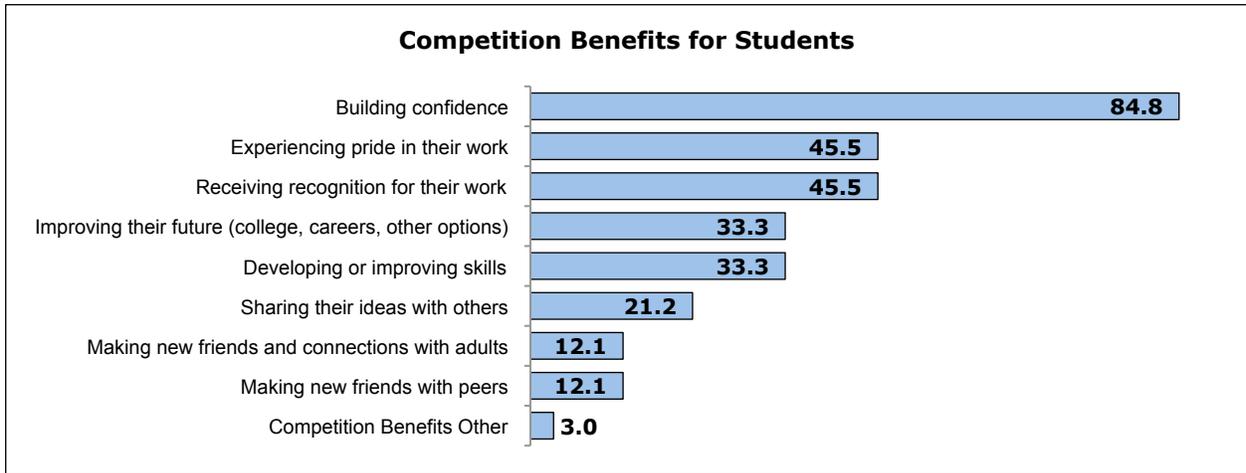
Advocates were asked several questions about the benefits to students of conducting research, entering competitions, and the Advocate Grant Program.

Advocates saw confidence building as the biggest benefit to students conducting research and participating in competitions

Most Advocates (69.7%, $N = 33$) identified building confidence as a benefit of students conducting research. Other frequently selected benefits included learning to think scientifically; developing and improving skills; and improving their future. Benefits selected by fewer Advocates included experiencing authentic STEM work; increased exposure to STEM education and career opportunity; and learning or better understanding STEM concepts. Other benefits added to these options by Advocates responding to an open-ended question were developing an independence from parents' opinions about education and career sources, as well as taking ownership of their work. Percentages are shown below.

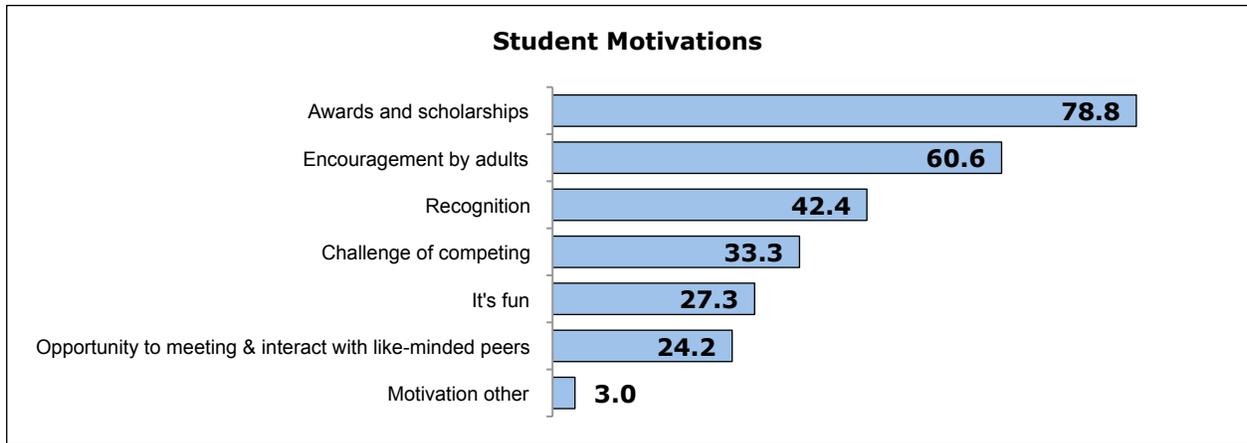


Advocates also selected what they perceived to be benefits to entering competitions. Building confidence was selected by the most Advocates (84.8%, $N = 33$). About 45.5% of Advocates selected experiencing pride in their work and receiving recognition for their work. The figure below shows percentages of Advocates selecting each potential benefit.



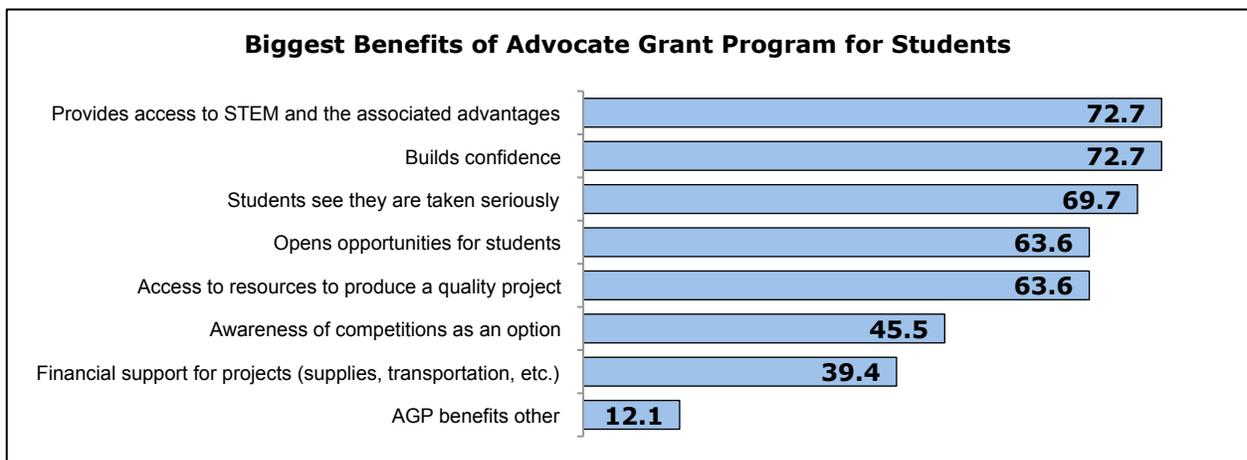
Advocates saw awards and scholarships as the biggest motivation for students participating in competitions, followed closely by the encouragement of adults

When asked what they think motivates students to participate in competitions, Advocates could select up to three responses. Most (78.8%, $N = 33$) selected awards and scholarships. Many Advocates (60.6%) selected encouragement by adults. The figure below shows percentages of Advocates selecting each option. One Advocate (case 94) added, "During the process of science research, none of my students really call it fun. However, at the end of the year/competition season, I overhear them talking it up to their friends and my students who have not yet graduated will re-enroll or continue with further research projects."



Advocates saw many benefits of the program to their students

When asked what they saw as the biggest benefits for the Advocate Grant Program to their students, Advocates could select up to three choices including the option to identify a benefit not listed. The figure below shows percentages of Advocates selecting each option.

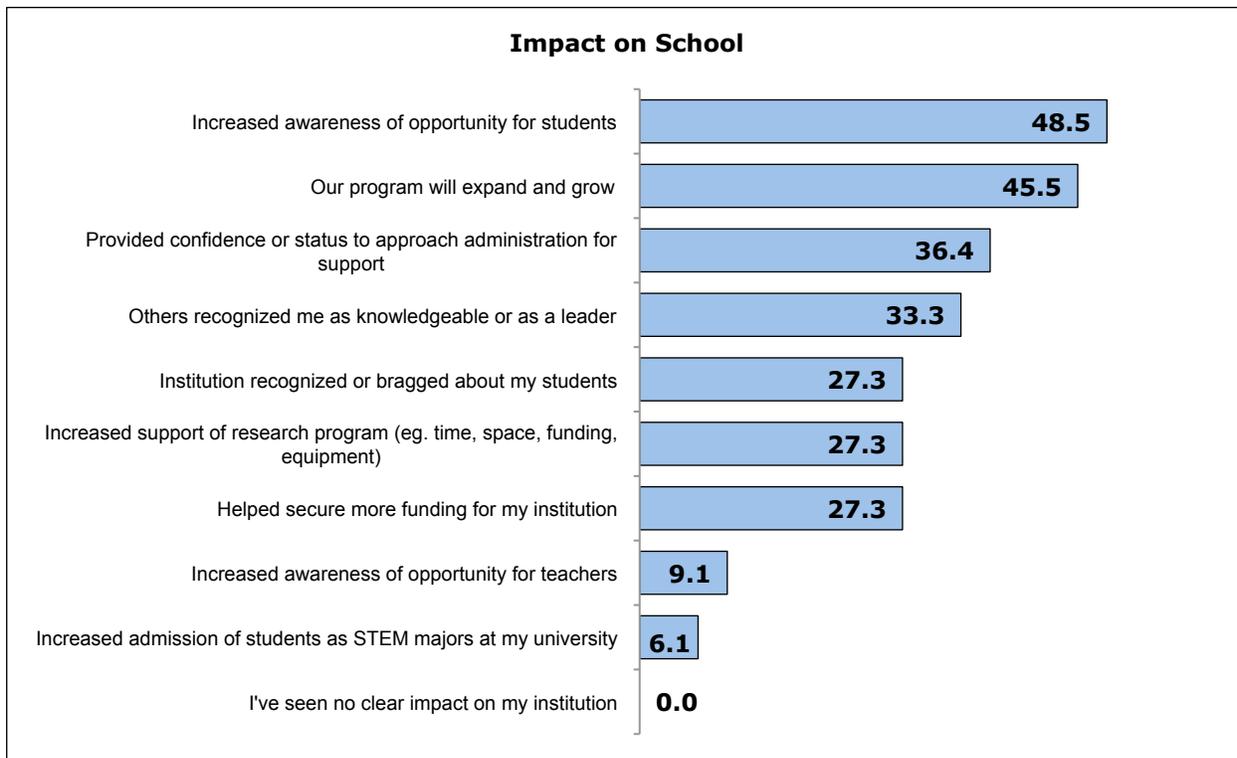


Other benefits were identified as the following (in the words of the Advocates):

- Experience to learn for future competitions. The most successful students were the ones with previous experience.
- I have support beyond the school.
- Inspiring nontraditional students to get involved with STEM
- They feel they are apart of something bigger than just their school.

Advocates saw impact on their school or institution

When asked what, if any, impact they saw on their school or institution, Advocates could again select up to three choices. All Advocates responding to the question ($N = 33$) reported impacts. Awareness of opportunities for students, ability to grow programs, and status to approach administration were the top three selected options. The figure below shows percentages of Advocates selecting each option.



Additional Findings from the Advocate Perspective

Advocates provided additional insights on the program in open-ended survey questions. These go beyond the impacts described above and include ideas for program improvement. Most comments are grouped and listed below. Those not listed were comments on information presented above or were explanations of answers incorporated into this report.

Advocates commented on working with underserved students

The biggest impact this program has had on me is to inspire me to actively recruit and support nontraditional science fair students. This is now something I am committed to! ... I think it is incredibly important work; to advocate for the increased involvement of underrepresented students in STEM.
– Advocate 82

I know I am making a difference in the lives of my underserved students. The spurt in confidence and motivation, and getting them to the finish line makes it all worthwhile.
– Advocate 42

Before the AGP I was only slightly aware of the gap created by underserved students in science competitions, but now I am vastly aware and passionate about helping these students. ... I will continue to support underserved youth for as long as I teach. It is important and valuable work.
– Advocate 40

Advocates commented on competitions

The Advocate Grant Program EXTREMELY helped me be able to serve my students through the process of applying for a competition. It was a great deal of work, but if

it would not have been for the Advocate Grant Program, I probably would not have been successful in getting my students to participate in a science competition.
– Advocate 49

Personally, I have struggled with support surrounding science competitions at my school and will into the future and when at competitions I sense a real feeling of being an outcast because I do not fit the mold of most. This does not define me, and frankly I feel like students really respect that more. They see me as human. I have found the competitions to be highly favored with judges in my state. This year the Regional Fair selected a sophomore from [a high school] because it was the first time that school entered students in the Fair. They have special [city] awards and it was frustrating to see judges focus only on this one student because it was the first time that school. Our students won more at state. The fair director told me it was so great to see that school at the fair. It seems biased in every way and I was under the impression this was not supposed to be school based. I have also had judges at both regional and state fair ask my students what school they attend, and I feel as though private schools tend to be favored. It makes me feel like our kids don't always get a fair shot.
– Advocate 11

I love science competitions and so do the kids. If I don't encourage them, most won't seek them out. Once they compete, they know they can and pursue other opportunities to continue to research and develop their science projects.
– Advocate 73

Two Advocates addressed resource issues

As a 2nd year Advocate, in a rural area with major challenges to access, proficiency was already there, the major obstacle was resources.
– Advocate 47

Thank you for all of your help and support! I have always been passionate about providing research opportunities to my students; however, now I actually have the resources I need to do so effectively.
– Advocate 35

Advocates recommended program improvements

Twenty-one Advocates responded to a survey question asking for ideas to improve the program. Three simply complimented the program and said to keep doing what you are doing. One Advocate said the program “is the best professional development I’ve ever done.” Another simply said “Expansion.”

Two Advocates wanted a longer period of support, suggesting two years with an option to opt out rather than needing to apply for a second year. Both commented on the learning curve. One was from a small town and the other was rural with less administrative support. The rural Advocate identified the first year to learn and to begin to develop administrative and community support that would be applied in the second year.

Two Advocates commented on Edmodo, which they saw as helpful while also seeing room for improvement. One wanted a hub with resources, such as recommended activities and experiments. The other Advocate reported feeling isolated in a cohort that didn’t share many resources on Edmodo. The hub idea would have addressed this.

Two Advocates addressed the need for support from their administration. Both commented on their lack of administrative support without explicitly offering ideas for program improvement. Implied, however, was the need for information on how to work with administrators to gain support.

Other recommendations for improvement or issues raised came from only one Advocate, making it difficult to know how many other Advocates would agree. These ideas are summarized here.

Support for students:

- Additional support for students through an online mentoring program that would aid students in finding and connecting with mentors
- An online platform for students to communicate with each other
- Resources to support Advocates working with students who are below grade-level, resources to help them help the students create competitive entries
- Support for students when administrative support is lacking or withheld

Networking of Advocates:

- Mid-year meet-up of Advocates in each region
- Offer the research seminar to middle school teachers too
- Recruit more urban Advocates (from an urban Advocate who felt there were more rural Advocates)
- Set up a pipeline of Advocates so students in a school system are supported at multiple levels by more than one Advocate

Funding

- Make more funds available, at least additional grant funds
- "Assign a grant writer to Advocates to acquire funds to purchase lab equipment for student research"
- Allow the stipend to be used for student supplies and equipment since lack of resources put their students at a "significant competitive disadvantage"

Other ideas

- "It would be nice if there was a grant available in an early (summer before) the school year to enable the research group to start in the summer and continue next school year. I have students who want to meet during the summer."
- Think about moving the Lead Advocate Call-Ins to a different platform, since some seemed disorganized or forgotten

Additional Advocate comments provide insights

Advocates were given an opportunity to comment on their answers regarding their ratings for their awareness, attitudes, motivations, and abilities *Before* and *After* the program. The following responses provide insights into the program and its impact.

The Advocate Grant Program has been invaluable for me, students and our school... The Advocate program has enabled me to mentor students and enter research competition. I also am in the process of confidently changing the activities in my classes to STEM BASED projects. Thank you very much. – Advocate 22

The Advocate Program has done a great job publicizing its Advocates, however, I still feel that there is a significant disconnect between the Advocates and their larger communities. Going forward, it would be useful to think of ways of letting the larger

community know about the program by publicizing within schools and guidance departments themselves. I am trying to do this within [city], but could always use more help! – Advocate 78

Administrator support was minimal and indifferent – Advocate 83

Would like to see sample ISEF project boards or similar for advocates to analyze and discuss to share with students. – Advocate 31

Advocates provided insights into why they plan to continue the work

When asked if they planned to continue to support underserved youth in entering competitions next year after the program ends, 29 Advocates said yes and three said no ($N = 32$). They were then asked why or why not. The 22 responses are summarized here.

Advocates planning to continue the support explained why:

- The work is important (4 Advocates)
- I see the students grow and succeed (3 Advocates)
- Student enrichment is rewarding (2 Advocates)
- This is my passion (2 Advocates)
- Having an audience for students to describe their thinking is important
- The need for support is higher than ever
- If I don't encourage the students, they won't seek out competitions on their own
- I know I'm making a difference
- The school system is invested in the work
- I will continue even though I won't be teaching next year
- Students hunger for such opportunities
- I feel obligated because of my own background
- I applied to be an Advocate again

The growth I observed in my students due to their participation in science research competition was amazing and enough reason to continue supporting students in entering competitions! – Advocate 49

The three Advocates not planning to continue the support explained why not:

- Career changes (2 Advocates)
- Was not accepted as a second-year Advocate and could not devote the time

CONSIDERATIONS AND RECOMMENDATIONS

The recommendations by Advocates described in the Findings section above were based on their own personal experiences. As stated, it is unclear how many Advocates would agree with each idea. Some of their ideas could be incorporated into the program, while others may not be feasible or even advisable. The Society can weigh each recommendation.

Based on the experience of the evaluation team with the program over the past two cohorts, we offer the following additional ideas for the Society to consider in conjunction with or in contrast with the ideas of the Advocates.

Program length and timing:

- Having the option for some Advocates to continue a second year by reapplying seems to make some Advocates long for that second year when they can't reapply or aren't accepted. Offering some form of on-going support for former Advocates could help.
- Consider an 18-month program with the same or larger stipend such that Advocates could choose two 9-month school years or an 18-month period with two summers.

Resources:

- Rather than the Edmodo hub idea for resources as recommended by the Advocate, consider a password protected website (or fully accessible) with resources for current and former Advocates shared by Advocates and Society staff. Moving resources away from Edmodo would allow former Advocates easier access once they've left the program.
- Rather than funds for student research supplies and equipment or providing a grant writer as recommended by Advocates, provide information on grants and grant writing resources on a shared platform using former Advocates' expertise.

Support for Advocates:

- Offer online meetings and resources to support Advocates in developing administrative support, using Advocates who have developed support from resistant administrators to lead the conversations.
- Offer online meetings and resources to support Advocates in setting up a pipeline of advocates (lower case "a" using teachers and administrators in their system) to support students at multiple levels.
- Provide templates for press releases to Advocates to use with their local papers or districts to build support, or send out press releases directly to local papers.

Building Camaraderie among Cohort Members:

- Consider face-to-face meet-ups among members in a region. These could have a planned program or simply be meeting for dinner and conversation on a weekend.
- Organize Advocate gatherings at NSTA and other professional meetings that Advocates may already attend.
- Pair Advocates with each other for bi-weekly telephone check-ins. Advocate pairs could be based on their biggest challenges; for example, supplies, funding, or obtaining administrative support.
- Pair Advocates who have not previously been research teachers with an experienced research teacher for bi-weekly phone calls to help locate resources and build confidence.

Efforts are needed to address the response rate of the survey. While the 75% response rate gives some assurance that the findings represent all of the Advocates, it leaves open the possibility that Advocates with more challenging issues did not respond. This would be important information.

To improve the response rate, one or more of the following should be considered:

- Require survey submission prior to the final payment
- Offer a drawing for student resources or supplies
- Offer a drawing for an spot in next the Research Teachers Conference
- Offer an incentive (\$25 gift card) for completion of the survey

To maintain accurate data and valid results:

- Call Advocates to clarify questions regarding the number of students served
- Leave incomplete surveys out of the data included in the analysis

Additionally, evaluators will work with Society staff to send out surveys to the 2018-2019 cohort earlier in the school year and will add questions about communication through Edmodo and online calls and meetings.

FINAL THOUGHTS

Evaluation of the Advocate Grant Program addresses 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 goals

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 2017-2018 cohort were the following:

- Society staff members identify and support 44 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 44 Advocates, the Program accomplished its first objective.

Of the 31 Advocates responding to the survey questions about student numbers, 28 supported at least three underserved students in entering competitions. All of the 31 Advocates reported supporting at least three students in completing projects, even though not all were able to compete.

Thirty-one Advocates supported a total of 369 underserved students in entering their projects in competitions, well over the program objective of 132 underserved students.

Society support led to the intended Advocate impacts

The gains reported by Advocates from *Before* the program to *After* the program demonstrated intended impacts. Advocates responding to the survey ($N = 33$) reported gains in awareness of the Society as a resource, competition deadlines, eligibility requirements, the range of competitions, and the ability to support students in filling out competition entries. Survey results indicated that Advocates developed a sense of camaraderie with others in the student research and competition community, although a few felt isolated. Survey results also indicated that the Society is attracting Advocates that are motivated to work with underserved students on research and design projects and to move them toward competitions. Though they were small gains, Advocates' gained in their abilities to support students in conducting their projects and developing skills; this may indicate the recruitment of research teachers at relatively higher levels of these skills prior to beginning the program.

Advocates reported that 76.2% of the underserved students support by Advocates in the 2017-2018 academic year would not have entered competitions without the Advocate's support.