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ARMY EDUCATIONAL OUTREACH PROGRAM

FY23 Internships Evaluation Report
Summative Findings

May 2024

aeop
ARMY EDUCATIONAL OUTREACH PROGRAM

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Contents

Executive Summary

The Army Educational Outreach Program (AEOP) offers students and teachers science, technology, engineering, and mathematics (STEM) programming that is designed to attract, develop, and mentor the next generation of the nation's diverse talent through United States (U.S.) Army educational outreach programs. The Internships and Fellowships programs support the AEOP mission and goals by providing high school, college, and graduate students with immersive STEM research opportunities in military and university laboratories across the United States and its territories.[1]

Education Development Center, Inc. (EDC), the external evaluation partner for AEOP, conducted a summative evaluation of the 2022-2023 program year. The Internships evaluation sought to document and assess the benefits of participation, program strengths and challenges, and overall effectiveness in meeting AEOP and program objectives. The primary tools for data collection were student and mentor post-surveys. It is important to recognize that survey results only reflect those individuals who completed surveys and cannot be applied across the Consortium and may not be generalizable within a specific program.

Key findings from the evaluation are presented below.

Overview of Participants

In FY23, there was a total of 483 students participants in Internships and 284 educators, advisors, mentors, Science & Engineers (S&E) volunteers, or other adults. Among student participants, 50% (240) were high school students and 31% (149) were earning an undergraduate degree, and 16% (77) were completing their graduate studies.[2]

AEOP has a particular focus on reaching participants who have more limited access to STEM learning opportunities and/or who are from groups that are underrepresented in STEM education and careers. AEOP defines underserved and underrepresented participants as those who possess one or more of the following characteristics: attend a rural, urban, or frontier/tribal school; identify as female; identify as racial/ethnic minority in STEM (i.e., Alaska Native, Native American, Black or African American, Hispanic, Native Hawaiian and other Pacific Islander, other); receive free or reduced meals price at school; speak English as a second language (ELL); first generation college student; students with disabilities; or a dependent of a military service member or veteran. AEOP has identified a particular interest in reaching students who meet two or more of the underserved and underrepresented criteria described above (referred to hereafter as Underserved). In FY23, 45% (213) of all Internship student participants met two or more of the Underserved criteria. An additional 29% (136) of student participants met one of the AEOP Underserved criteria.

[1] AEOP supports high school, undergraduate, and graduate level Internships as well as graduate and post-graduate level Fellowships at Army research laboratories. For the purpose of this report, we have labeled both programs as "Internships."
[2] Grade levels for 4% participant of students (17) were unspecified or unknown.

Participant Experience and Outcomes

The Internships program helped students to develop STEM knowledge. Internships gave high school, undergraduate, graduate, and post-doc students the opportunity to develop their STEM knowledge in a variety of ways. According to survey results from both students and mentors, the majority of students increased their STEM knowledge of STEM topics and knowledge of how STEM professionals do their work in real settings. Between 84% to 92% of students reported increases in STEM knowledge**.**

Students reported improved STEM skills across a variety of areas such as: conducting research and working in a lab; planning and carrying out an experiment; recording, analyzing and interpreting data. Overall, between 63% and 76% of students reported improvements in a range of STEM skills.

Students noted gains in nearly all areas 21st Century skills such: communicating and interacting with others respectively, actively working together problem-solving, collaborating, and developing leadership skills. Students also grew in their ability to think about how projects impact a larger real-world community. Students were less likely to indicate growth in the areas of "leading and guiding others in a team or group."

Students' interest in STEM and STEM careers increased, including Army/DoD careers. About two-thirds of students reported that they were more likely to engage in other STEM related activities after their participation in the internship program. Most students reported that they were more likely to engage in STEM activities after their participation in AEOP (ranging between 54% and 77%).

Mentors used a variety of strategies to engage with students. They reported using strategies to support students' development of STEM skills through hands on learning; they provided extra support when students needed it and shared feedback on progress. Mentors also supported students' development of collaboration and team building in addition to asking students about future career pathways.

Overall, both students and mentors reported generally positive experiences with Internships. Students enjoyed learning new STEM skills, working in teams, networking with STEM researchers. Mentors enjoyed engaging with students with opportunities for hands-on learning experiences, increasing students' interest in STEM, and providing students opportunities to work with others.

Recommendations

Programmatic Considerations

- **Continue to offer hands-on, authentic, relevant experiences.** To keep participants engaged and excited about STEM fields, prioritize providing them with practical and applicable STEM learning experiences..

- **Integrate more explicit ways to develop 21st Century Skills.** Students and mentor survey responses alike discussed the importance of students developing 21st Century skills, which are transferrable across educational levels (e.g. high school, undergraduate, and graduate) as well as across fields; examples of this include presenting their work and communicating findings to others as well as team building and collaboration skills. Some mentors and sites are already supporting this; we suggest shoring up these efforts.
- **Strengthen the application process so that intern projects relate to student interest(s).** Mentors who were satisfied discussed their desire to cultivate the next generation of STEM professionals through their shared work with students who are motivated. Strengthening the alignment between projects and student interest can support the reciprocal relationship building between mentor and mentee through shared learning
- **Offer ongoing and consistent communication between program administrators, mentors, and student participants.** Students indicated a desire for more information about changes in planning and organization, updates to timelines, clearer requirements, and more transparency around expectations for both students and mentors.

Evaluation Considerations

- **Continue to examine ways to increase response rates.** Between last year and this year, the participant survey response rates remained relatively low (23% in FY22 and 18% in FY23). The IPAs and AEOP Consortium should explore strategies to improve response rates in the future.

1 Introduction

1.1 AEOP Priorities & Goals

The Army Educational Outreach Program (AEOP) mission is to provide an accessible pathway of science, technology, engineering, and mathematics (STEM) opportunities to attract, develop, and mentor the next generation of our nation's diverse talent through United States (U.S.) Army educational outreach programs. The Internships program supports the AEOP mission and priorities by providing high school, college, and graduate students with immersive STEM research opportunities in military and university laboratories across the U.S. and its territories.[3]

AEOP has three priorities:

1. **STEM Literate Citizenry.** Broaden, deepen, and diversify the pool of STEM talent in support of our Defense Industry Base (DIB).
2. **STEM Savvy Educators.** Support and empower educators with unique Army research and technology resources.
3. **Sustainable Infrastructure.** Develop and implement a cohesive coordinated, and sustainable STEM education outreach infrastructure across the Army.

1.2 Overview of Participants

In FY23, the Internships program served a total of 483 participants; 392 (81%) were Interns and 91 (19%) were Fellows. Additionally, there were 284 educators, advisors, mentors, Science & Engineering (S&E) volunteers, or other adults who provided support and guidance for those engaging in internships.

In FY23, 27% (106) of all Internship student participants met two or more of the Underserved criteria. An additional 25% (96) of student participants met one of the AEOP Underserved criteria. AEOP has a particular focus on reaching participants who have more limited access to STEM learning opportunities and/or who are from groups that are underrepresented in STEM education and careers. AEOP has identified an interest in reaching students who meet two or more of the underserved and underrepresented criteria (referred to hereafter as Underserved). AEOP defines Underserved participants as those who possess one or more of the following characteristics: attend a rural, urban, or frontier/tribal school; identify as female[4]; identify as racial/ethnic minority in STEM (i.e., Alaska Native, Native American, Black or African American, Hispanic, Native Hawaiian and other Pacific Islander, other); receive free or reduced meals price at school; speak English as a second language (ELL); first generation college student; students with disabilities; or a dependent of a military service member or veteran.

[3] AEOP supports high school, undergraduate, and graduate level apprenticeships as well as graduate and post-graduate level fellowships at Army research laboratories. For the purpose of this report, we have deemed all participants as "Apprenticeships."
[4] In two AEOP programs—Junior Science and Humanities Symposium (JSHS) and Internships—only females engaged in certain STEM fields (physical science, computer science, mathematics, or engineering) are considered as underserved. For the purpose of this analysis, we have included all students who identified a female but not based on their STEM discipline, as those data were not available. This likely overestimates numbers for JSHS and Internships.

2 Evaluation Approach

Education Development Center, Inc. (EDC) is AEOP's external evaluation partner. The primary tools for data collection were student[5] and mentor post-surveys, which were designed to evaluate the benefits of participation, program strengths and challenges, and overall effectiveness in meeting AEOP and program objectives.

Table 1. Research Questions Addressed in This Report

AEOP Priority	Research Questions Regarding Participants
STEM Literate Citizenry: Broaden, deepen, and diversify the pool of STEM talent in support of our defense industry base.	*Participant Research Question #1* - To what extent do participants report growth in interest and engagement in STEM?
	Research Question #2a - To what extent do participants report increased STEM competencies, 21st Century/STEM skills, STEM knowledge, STEM abilities, and STEM confidence?
	Research Question #2b – To what extent do participants demonstrate use of and growth in 21st Century skills?
	Participant Research Question #3 - To what extent do participants and mentors report increased participant interest in STEM research and careers?
	Participant Research Question #4 - To what extent do participants and mentors report increased awareness of and interest in Army/DoD STEM research and careers?
	Research Question #5 - To what extent do participants report increased enrollment, achievement, and completion of STEM degree programs?
STEM Savvy Educators: Support and empower educators with unique Army research and technology resources.	*Research Question #6* - What is the impact of scientist and engineer (S&E) mentors on AEOP participants?
	Research Question #7 - To what extent do teacher participants report increased use of new approaches to teaching research concepts within STEM practices, and infusion of careers?
Sustainable Infrastructure: Develop and implement a cohesive, coordinated, and sustainable STEM education outreach infrastructure across the Army.	*Research Question #8* - To what extent do participants report growth in awareness of and/or interest in AEOP opportunities?

2.1 Survey Respondents

This report describes participant data and results from student and mentor surveys. Table 2 shows the number of completed surveys.

[5] Throughout this report, we refer to students and participants interchangeably.

Table 2. Participant and Mentor Survey Response Rates

	Participant Surveys		Mentor Surveys	
Program	Count	Response Rate	Count	Response Rate
Internships	86	18%	67	24%

2.2 Limitations

It is important to recognize that survey results only reflect those individuals who completed surveys and may not be generalizable within Internships. Due to the low response rates for both participants and mentors (18% and 24%, respectively), it is possible that these responses do not generalize well to the populations that were involved in the Internships program.

It is also important to consider the characteristics of survey respondents. For example, some of the respondents had not yet completed high school at the time of the survey, while others are undergraduate students. In this instance, it is important to note that we cannot reasonably expect respondents to report postsecondary outcomes that are long-term goals of the AEOP program.

Finally, while we have presented participant and mentor findings together topically, these results should be interpreted with caution since the proportions of respondents for each group vary considerably by program. In addition, not all questions across the participant and mentor surveys are exactly aligned.

2.3 Report Organization

Evaluation findings presented below are guided by the research questions and organized thematically by topic. Sections include the following:

- Development of STEM Knowledge and Skills
- Development of 21st Century Skills
- Interest in STEM and STEM Careers
- Impact of Mentors on Participants
- Overall Experience
- Recommendations

3 Development of STEM Knowledge and Skills

Internships gave high school, undergraduate, graduate, and post-doc students the opportunity to develop their STEM knowledge in various ways. According to survey results from both students and mentors, most students increased their STEM knowledge, knowledge of specific STEM topics and knowledge of how STEM professionals work in real settings. Additionally, participants reported gains in a number of STEM research skills. For example, students improved their knowledge of STEM topics and increased their knowledge of how scientists and engineers work on real-world problems, through everyday research within the STEM field. Mentors were slightly more likely than students to report that students experienced gains as a result of their participation in Internships. At least 84% of students and mentors reported that students had these opportunities.

Internship participants had opportunities to develop their STEM knowledge in a variety of areas. Most participants reported increases in their overall learning concerning the development of in-depth knowledge of specific STEM topics (96%) as well as developing knowledge of research processes used in STEM (96%). With a close, but slightly lower percentage, 94% of participants increased their knowledge of what everyday research and work was like in STEM fields as well as their knowledge of how scientists and engineers work on real problems in STEM.

Results from mentor surveys were similar; however, mentor reports were generally higher in percentage specifically within the category of students learning “a lot” compared to student reports. Overall increases in learning reported by both students and mentors were generally in agreement (Table 3 below).

Table 3. Students Increased their STEM Knowledge in a Variety of Ways

Response		I/They didn't learn anything new	I/They learned a little	I/They learned more than a little	I/They learned a lot	Overall Learning
In depth knowledge of a STEM topic(s)	Participant	4%	4%	28%	65%	**96%**
	Mentor	0%	0%	21%	79%	**100%**
Knowledge of how scientists and engineers work on real problems in STEM	Participant	6%	10%	21%	63%	**94%**
	Mentor	0%	6%	15%	79%	**100%**
Knowledge of research processes used in STEM	Participant	4%	6%	33%	56%	**96%**
	Mentor	0%	6%	17%	77%	**100%**
Knowledge of what everyday research work is like in STEM	Participant	6%	5%	17%	72%	**94%**
	Mentor	0%	2%	12%	86%	**100%**

Totals may vary due to rounding.
Participant Survey (n = 80)
Mentor Survey (n = 67)

Students discussed that they increased their knowledge of how STEM professionals work on real-world problems and developed knowledge of specific programs.

"*It has helped me build team skills and problem solving skills when presented with an actual problem that has no defined solution*. -Internships Student

"*Before starting this, I only knew of pro-code development programs as I was working in Python in school. Now that I have taken this internship, I have been introduced to ServiceNow and am now aware of a way to get big projects done faster. When learning about ServiceNow, I have been introduced to JavaScript, which expanded my knowledge on programming instead of just knowing one language.* -Internships Student

Participants reported gains in a number of STEM research skills as a result of their participation in Internships. Students improved their knowledge of STEM topics and increased their knowledge of how scientists and engineers work on real-world problems, through everyday research within the STEM field. Mentors were only slightly more likely than students to report that they experienced gains as a result of their participation in Internships.

Survey results indicate that the majority of students increased their STEM skills across a variety of areas. Both students and mentors were asked about an array of STEM- and research-related skills. As Table 4 shows, students and mentors consistently reported increases in all areas. The greatest areas of growth, 70% or above, were reported in students learning how to carry out an experiment (76%), how to record data accurately (76%), how to identify the limitations of the methods and tools used for collecting data (73%). Additionally, students developed skills in how to support an explanation with STEM knowledge or data from

experiments, at a 71% overall gain. Conversely, a relatively lower overall gain was reported (63%) for students learning how to create charts or graphs to display data and find patterns. Generally, participants and mentor responses agreed. There were more notable differences in responses where mentors reported higher percentages in the category of students “learning a lot” across various areas. Lastly, both students and mentors were in agreement with the lowest reported area of skill development, “how to create charts or graphs to display data and find patterns,” which may be an indication of programs not having a focus on this.

Table 4. Students Reported Developing their STEM Skills in a Variety of Ways

Response		I/They didn't learn anything new	I/They learned a little	I/They learned more than a little	I/They learned a lot	Overall Learning
How to carry out an experiment*	Participant	10%	14%	19%	57%	**76%**
	Mentor	2%	6%	17%	75%	**99%**
How to record data accurately	Participant	7%	17%	24%	52%	**76%**
	Mentor	0%	11%	29%	60%	**100%**
How to identify the limitations of the methods and tools used for collecting data	Participant	7%	20%	28%	45%	**73%**
	Mentor	0%	8%	32%	60%	**100%**
How to support an explanation with my STEM knowledge or data from experiments	Participant	7%	22%	30%	41%	**71%**
	Mentor	0%	3%	31%	66%	**100%**
How to make a model to show how something works	Participant	12%	18%	32%	38%	**70%**
	Mentor	2%	23%	27%	48%	**98%**
How to present an argument that uses data and/or findings from an experiment	Participant	9%	21%	22%	47%	**70%**
	Mentor	2%	6%	28%	64%	**99%**
How to create charts or graphs to display data and find patterns	Participant	15%	22%	17%	46%	**63%**
	Mentor	2%	11%	22%	65%	**98%**

Totals may vary due to rounding.
Participant Survey (n = 80)
Mentor Survey (n = 67)

Through the internship experience, students developed knowledge of STEM research, processes involved in lab work, and increased knowledge of specific programming tools.

"*I learned two new programming languages*. -Internships Student

"*I learned tools and safety procedures.* -Internships Student

"*It has allowed me to explore biomechanical fields and future chemical laboratories within universities. It has given me knowledge and insight on processes involved within STEM and has benefitted me so as to interact with natural phenomenon.* -Internships Student

4 Development of 21st Century Skills

In addition to reporting to what extent they experienced gains in STEM-related skills, students were also asked to indicate gains in 21st Century Skills. Students reported increases in nearly all areas from communicating and interacting with others respectively, to actively working together problem-solving, collaborating, and developing leadership skills to finally, thinking about how projects impact a larger real-world community. Students were less likely to indicate growth in the areas of "leading and guiding others in a team or group." This may be due to the program primarily focusing on research and learning through mentorship from industry professionals. Leadership skills may not have been an explicit focus.

The surveys asked about 21st Century skills across three main domains, shown in Table 5. Results from each of these domains are described in the following sections. Results from each domain are below.

Table 5. 21st Century Skills Assessed through the Evaluation

21st Century Areas	Description
Problem solving and collaboration	• Solving problems individually or with a team • Involving others in decision making • Working collaboratively with others • Leading and guiding others in a team
Communicating and interacting with others	• Communicate clearly with others orally • Communicate clearly with others in writing • Interacting with others in a respectful and professional
Community and real-world connections	• Thinking about how their work impacts the larger community

4.1 Problem Solving & Collaboration

Students and mentors indicated that participants improved their problem-solving and collaboration skills with nearly 80% or above in all categories. The majority of participants reported gains in their ability to solve problems individually or within a team (96%), work collaboratively with others (92%), as well as lead and guide others in a team or a group (88%). Mentor responses were aligned with student responses. See Table 6 below for the full range of responses to these items.

Table 3. Students Improved their Problem-Solving and Collaboration Skills

		No Increase	Small Increase	Medium Increase	Large Increase	Overall Increase
Solving problems individually or with a team	Participant	4%	13%	48%	35%	96%
	Mentor	0%	6%	28%	66%	100%
Working collaboratively with others	Participant	8%	26%	39%	27%	92%
	Mentor	2%	12%	20%	67%	99%
Leading and guiding others in a team or group	Participant	22%	28%	30%	19%	78%
	Mentor	5%	22%	22%	50%	95%

Totals may vary due to rounding.
Participant Survey (n = 77)
Mentor Survey (n = 67)

4.2 Communicating and Interacting with others

Overall, students and mentors reported that students significantly increased their communication skills. Students reported gaining skills in interacting with others in a respectful way (95%), communicating clearly with others in writing (94%), and communicating clearly with others orally (87%). Mentor responses were aligned with student responses. Table 7 below provides the full range of scaled responses (i.e., from “no increase” to “large increase”).

Table 7. Students Generally Improved their Communication and Collaboration Skills

		No Increase	Small Increase	Medium Increase	Large Increase	Overall Increase
Interacting with others in a respectful and professional manner	Participant	5%	17%	33%	45%	**95%**
	Mentor	3%	8%	21%	69%	**97%**
Communicating clearly with others orally	Participant	13%	23%	28%	36%	**87%**
	Mentor	0%	10%	31%	58%	**100%**
Communicating clearly with others in writing	Participant	7%	13%	42%	38%	**94%**
	Mentor	0%	17%	34%	49%	**100%**

Totals may vary due to rounding.
Participant Survey (n = 76)
Mentor Survey (n = 67)

4.3 Community and Real-World Connections

Students increased their innovation skills and ability to use creative approaches to address problems. As Table 8 shows, most students (91%) and mentors (98%) reported that participants increased their skills at thinking about how their work impacts real world communities.

Table 4. Students increased their ability to think about how their work impacts the larger community.

		No Increase	Small Increase	Medium Increase	Large Increase	Overall Increase
Thinking about how your work could impact the larger community	Participant	9%	16%	31%	44%	**91%**
	Mentor	2%	12%	29%	57%	**98%**

Totals may vary due to rounding.
Participant Survey (n = 76)
Mentor Survey (n = 67)

Related to 21st Century Skills, students reported an increase in communication and problem-solving skills.

“ *At the end of the summer, I had to present what I had learned, and I felt confident speaking in front of a big group. Another important way my Apprenticeship helped me was figuring out what I had done wrong with my project and life. During the experiment, I had to take a few steps back just to move forward and this lesson has also helped me in life too*. -Internships Student

“ *It has helped me become more professional and [I] also learned how to tackle obstacles with little guidance, which pushed me to do better.* -Internships Student

5 Interest in STEM and STEM Careers

The survey results show that participating in Internships positively influenced students' inclination toward STEM education, interest and exploration, and community service projects, as well as mentoring or teaching other students. The program also increased students' interest in pursuing a STEM career and Army or DoD research, and many students learned about Army, or DoD careers through their participation in Internships.

5.1 STEM Confidence

Most students and mentors indicated that their experience with Internships increased students' STEM confidence. Both groups were asked to rate their agreement with a statement about confidence in STEM knowledge, skills, and abilities. As Table 9 shows, they overwhelmingly agreed that students were more confident in these areas as a result of their participation in AEOP (88% of students and 100% of mentors).

Table 9. Most Students and Mentors Indicated that Internships Increased Students' STEM Confidence

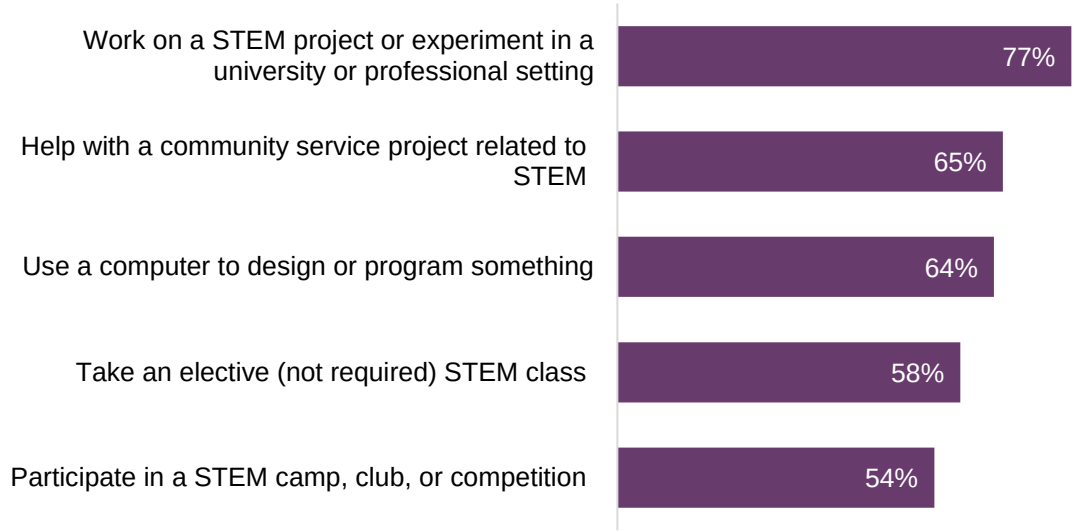
Response		Strongly Disagree	Disagree	Agree	Strongly Agree	Agree overall
I am/They are more confident in STEM knowledge, skills, and abilities	Participant	0%	12%	42%	46%	**88%**
	Mentor	0%	0%	37%	63%	**100%**

Participant Survey; (n = 69)
Mentor Survey (n = 62)

5.2 Interest in STEM-related Activities

About two-thirds of students reported that they were more likely to engage in other STEM related activities after their participation in the Internships program. As shown in Figure 1, the majority of students reported a higher inclination to engage work on a STEM project or experiment in a university or professional setting (77%), help with a community service project related to STEM (65%), and use a computer to design or program something (64%). Students were less likely to take an elective (not required) STEM class (58%) or participate in a STEM camp, club, or competition (54%). Responses include those who reported "more likely," and "much more likely" on a scale ranging from "much more likely to no change."

Figure 1. About two-thirds of students reported an increase in their interest in participating in other kinds of STEM-related activities.



Participant Survey (n = 69)
Responses include those who reported “more likely” and “much more likely.”

Students learned about STEM careers through first-hand exposure to STEM professionals and their specialized day-to-day work.

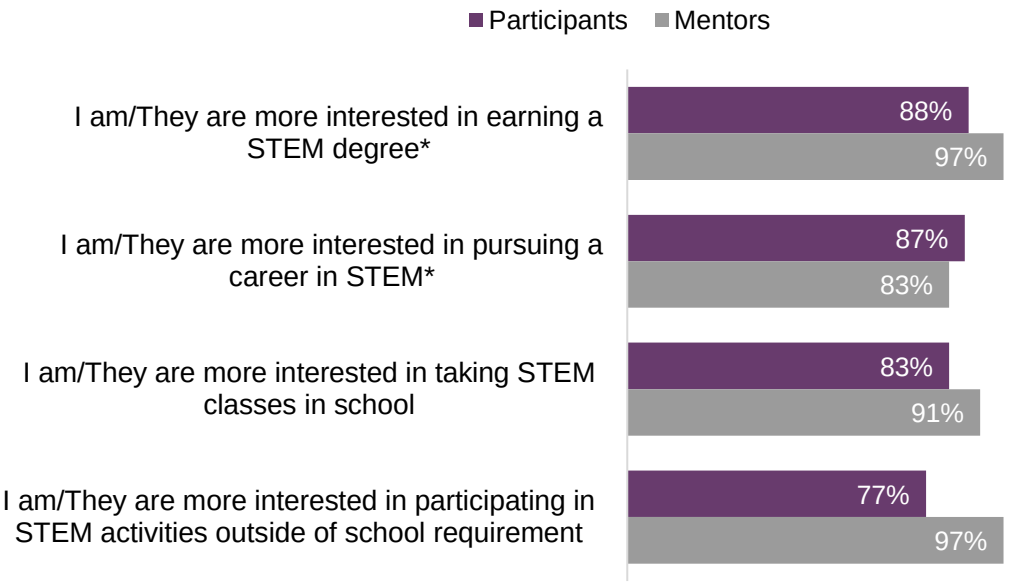
“ *This project was the first time I had an accurate representation of what it looks like when scientists perform an actual experiment. I also learned a lot about Linux OS, as I had no experience with Linux prior to this internship*. -Internships Student

“ *It was my first in person introduction to the professional STEM field, giving me a taste of what it was like to work full time amongst STEM professionals. It helped me better reach out to other people within the field and explore the diverse array of STEM paths that can be taken.* -Internships Student

5.3 Interest in Pursuing STEM Education and Careers

The Internships program contributed to increasing students' interests in pursuing more STEM education and/or a STEM career. The survey asked students and mentors about the ways in which the Internships program contributed to increasing students' interests in pursuing more STEM education and/or a STEM career. Both groups' responses were aligned, reporting overall positive results**.** For example, students reported that they were more interested in earning a STEM degree at 88%, and they were also more interested in pursuing a career in STEM, at 87%. When asked about taking STEM classes in school, 83% reported they were more interested. Students were least likely to report more interest in participating in STEM activities outside of their school requirements, at 77%. See Figure 2 below for more details.

Figure 2. Apprenticeshps Had a Positive Influence on Students' Interest in STEM Education and Careers



Participant Survey; (n = 66)
Mentor Survey (n = 62)
Participant and Mentor responses include those who reported Agree or Strongly Agree.
*This question was not asked of GEMS and JSS participants.

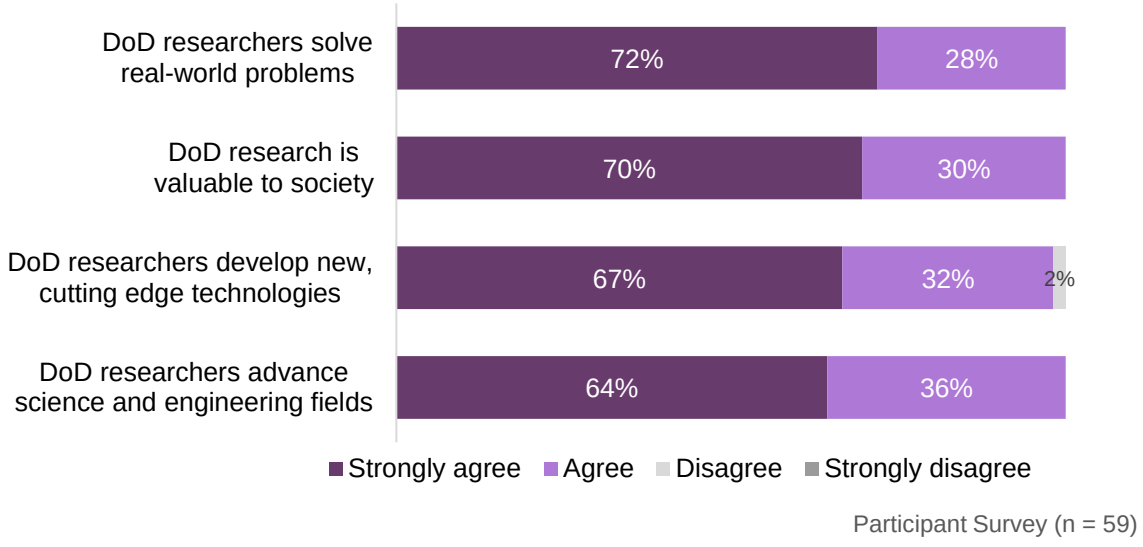
6 Perceptions of DoD

Participating in the Internships program appears to cultivate students' appreciation for and interest in DoD STEM research and careers. Students gained a greater appreciation of Army/DoD STEM research and careers. AEOP's explicit connection to the Army and DoD was recognized, with students acknowledging the importance of DoD research. All or nearly all students (100%) agreed or strongly agreed that DoD researchers solve real-world problems and advance science and engineering fields. Additionally, 90% of students agreed or strongly agreed that DoD research is valuable to society, and 99% acknowledged that DoD researchers develop new, cutting-edge technologies. As Figure 4 shows, both mentors and students reported that students had a greater appreciation of DoD STEM research (93% of mentors and 82% of students, respectively) and were more interested in pursuing a STEM career with the DoD (83% and 66%, respectively). Mentors consistently indicated larger proportions compared to students in these evaluations.

6.1 Understanding of DoD Research

Students gained a greater appreciation of Army/DoD STEM research and careers through their participation in Internships. AEOP has an explicit connection to the Army and DoD. Overall, students also agreed that DoD research is important (Figure 3). All or nearly all students (100%) agreed or strongly agreed that DoD researchers solve real-world problems and that DoD researchers advance science and engineering fields, (100%). Students also agreed or strongly agreed that DoD researcher is valuable to society (90%), and that DoD researchers develop new, cutting-edge technologies (99%).

Figure 3. Students Understand that DoD Research is Important

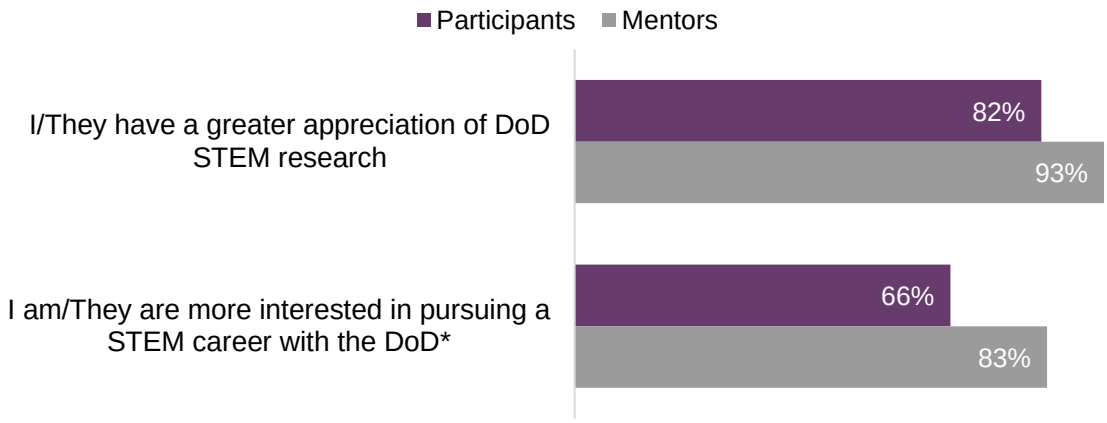


6.2 Interest in Army/DoD STEM Research and Careers

Participating in AEOP cultivates students' appreciation for and interest in DoD STEM research and careers. As Figure 4 shows, both mentors and students reported that students

had a greater appreciation of DoD STEM research (93% of mentors and 82% of students, respectively) and were more interested in pursuing a STEM career with the DoD (83% and 66%, respectively). Similar to other aspects evaluated, mentors consistently indicated larger proportions compared to students.

Figure 2. Participating in Internships Cultivates Students' Appreciation for and Interest in DoD STEM Research and Careers



Participant Survey (n = 66)
Mentor Survey (n = 62)
Participant and Mentor responses include those who reported Agree or Strongly Agree.

7 Impact of Mentors on Participants

Mentors play an important role in AEOP. Although their roles may differ, students reported positive experiences working with their mentors and the survey results suggest mentors had a strong impact on Internships participants.

Students and mentors reported a high use of strategies to achieve AEOP goals. For example, 93% of students reported that mentors helped them to learn or practice a variety of STEM skills or gave extra support when needed. Additionally, 76% of students reported that mentors allowed them to work on a team project or team activity. Reporting slightly lower, about two-thirds of students shared that mentors encouraged them to share ideas with others holding different perspectives or coming from different backgrounds (66%), mentors helped them to become more aware of STEM in everyday life (65%), helped them to understand how to use STEM to improve a community (65%), and talked to them about the education needed for a STEM career (65%).

Table 10. Students Reported a High Use of Strategies by Mentors to Achieve AEOP Goals.

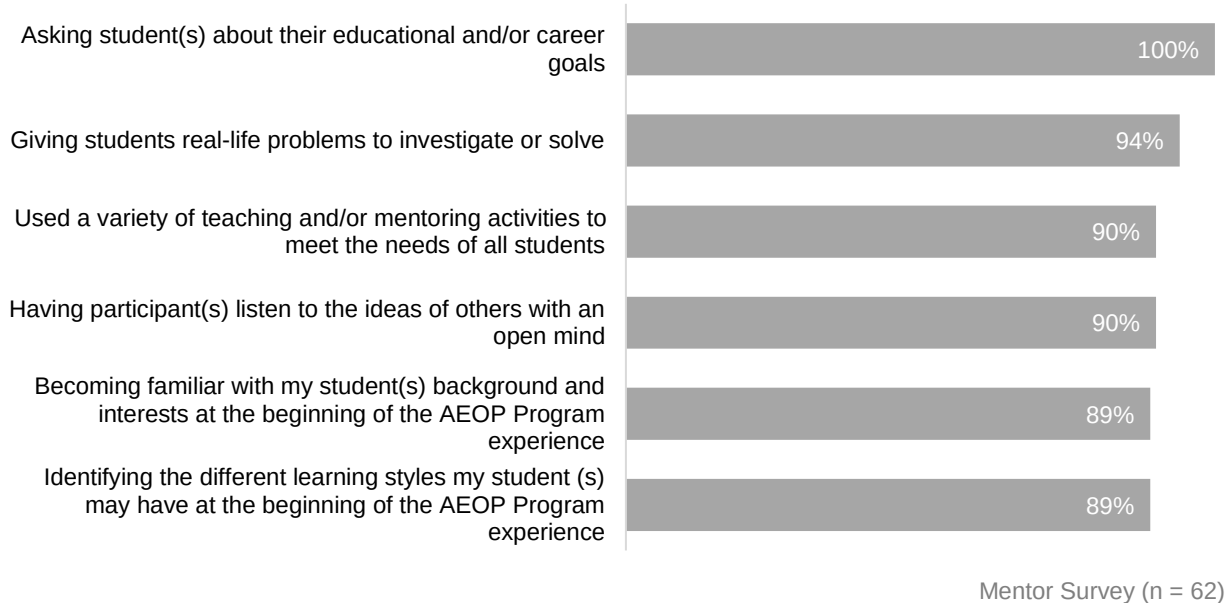
Response		
Helped me learn or practice a variety of STEM skills	Participant	93%
Provided guidance to help students practice a variety of STEM skills	Mentor	94%
Gave me extra support when I needed it	Participant	93%
Provided additional support to students as needed	Mentor	80%
Allowed me to work on a team project or activity	Participant	76%
Allowed students to work on a team project or activity	Mentor	94%
Encouraged me to share ideas with others who have different backgrounds or viewpoints	Participant	66%
Had student(s) exchange ideas with others whose backgrounds or viewpoints are different from their own	Mentor	100%
Helped me become aware of STEM in my everyday life	Participant	65%
Helped students become aware of the role(s) that STEM plays in their everyday lives	Mentor	74%
Helped me understand how I can use STEM to improve my community	Participant	65%
Helped students understand how STEM can help them improve their own community	Mentor	61%
Talked to me about the education I need for a STEM career	Participant	65%
Talked to students about the education they need for STEM careers	Mentor	87%

Participant Survey (n = 72)
Mentor Survey (n = 62)

Mentors used a variety of strategies to achieve AEOP goals. The survey asked mentors about a range of strategies that they employed in the Internships program. Some of these strategies were likely done at the beginning of the program such as learning about students'

backgrounds and interest(s) (89%) and identifying different learning styles of their students (89%). Other strategies were employed when students were collaborating and working in teams such as having participants listen to the ideas of others with an open mind, which was reported by 90% of mentors. And finally, mentors asked students about their future aspirations, learning about students' educational or career goals, which 100% of mentors reported having done. See Figure 5 below for details.

Figure 5. Mentors Used a Variety of Strategies to Achieve AEOP Goals



8 Overall Experience

In general, students and mentors reported positive experiences with the Internships program. Students enjoyed learning from STEM professionals, learning new STEM skills, and collaborating within their teams. Mentors enjoyed engaging with students in opportunities for real world learning and research projects, hands-on learning, and increasing students' interest in STEM careers.

Suggestions for improvement from students were focused on better communication, more collaboration and group interaction, a better application process, and more in person activities. Other suggestions for improvements included providing more resources and activities based on the role and level of participant (e.g., high school, graduate student, post-doctoral fellow) and access to more supports and resources to help participants more easily use hardware or tools at their site.

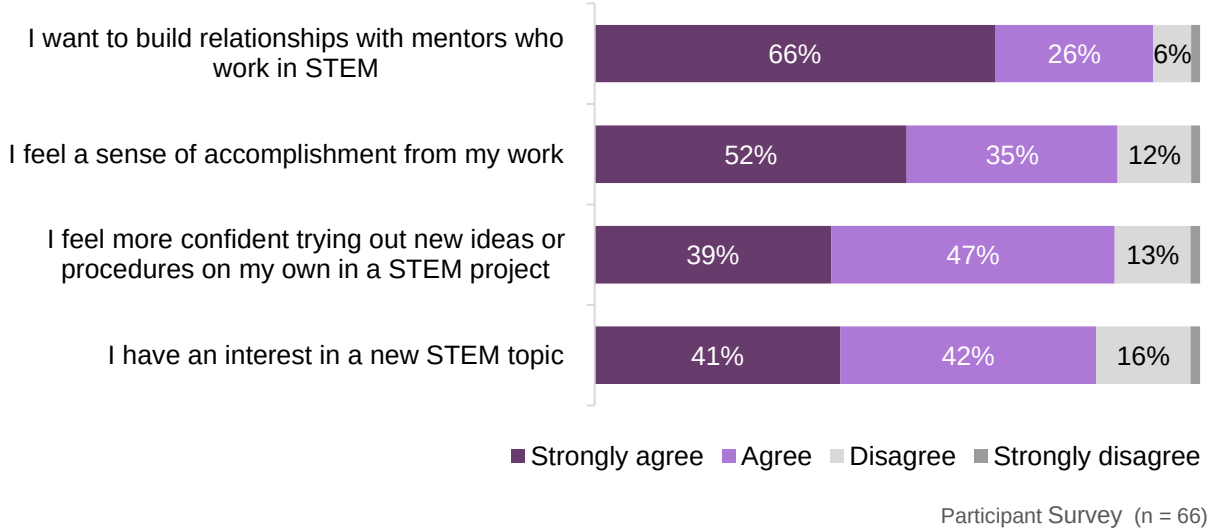
8.1 Overall Satisfaction

To assess overall satisfaction, the surveys asked both students and mentors an open-response question, *please tell us about your overall satisfaction with your Internships experience*. Although the students ranged in ages, in general they appreciated building relationships with STEM experts, researchers, and mentors who supported their learning and growth. In addition to developing STEM knowledge, participants remarked that they were learning transferable skills that applied to other parts of their lives. Of those who were not satisfied, one participant wanted more time working with their mentor. Another participant shared that they could not access online materials and that "the experience is almost exclusively geared towards undergraduate-level fellows doing a summer internship [and the participants was a graduate student]. This was worth noting as participants enter Internships at a variety of levels, from high school through post-doctoral studies.

8.1.1 Overall Impressions

Students provided reasons for their positive experience; on average, 80% or more agreed or strongly agreed that they were satisfied with the Internships program. For example, after participating, students wanted to build relationships with mentors working in STEM (92%) and they felt a sense of accomplishment from their work in the program (87%). They also reported feeling more confident to try out new projects or procedures on their own (86%) and developed an interest in a new STEM topic as a result of the participating in the program at about 83%. See Figure 6 below for more details.

Figure 6. Students had Positive Overall Experiences



Participant Survey (n = 66)

> *"I had a fantastic learning experience that prompted growth and facilitated a new perspective on STEM*. -Internships Student
>
> *"I had an excellent experience and interactions with my supervisors and other researchers. I had an amazing time working beside experts in the fields of STEM, I have always wanted to participate in.* -Internships Student
>
> *"I enjoyed my time as an apprentice and feel that it has provided me with valuable experience and skills that I can use in several different areas of my life*. -Internships Student
>
> *"Overall, it was a great experience. I am very grateful to my mentors and their team for providing this opportunity to students like me.* -Internships Student

8.1.2 Mentor Program Satisfaction

Mentors were satisfied with their role in the Internships program. The majority of mentors reported that they were very satisfied with the Internships program. About one-third of respondents stated that exposing students to research is one of the strengths of the program. Mentors also mentioned that the Internships program gave students the opportunity to work alongside STEM experts/researchers and connects STEM career prospects with STEM programs. And for others, working with students who were motivated to learn was a benefit of the program. Lastly, other positives that were mentioned my mentors were the opportunity for

students to develop 21st Century skills (e.g., team building and communication skills), the ability for students to have hands-on experiences as well as the ability for students to further develop their career interests in STEM fields. Some mentors also mentioned student a diverse as a positive as well as the ease and flexibility of setting their program up.

> *"The experience enables the students to see both the research aspects of professionals and enjoy team-building projects, as well as learn about STEM careers in DoD by those who have worked there.* -Internships Mentor

> *"It has been a very good experience on our end! The flexibility for our folks to do data collection trips has been huge for two who are currently with me in [identifier removed]. They are seeing implementation science and its challenges firsthand, but they are seeing how they are making a direct impact within two weeks.* -Internships Mentor

> *"Two key strengths are exposing young students to real research environments, helping them gauge their fit in this field, and providing invaluable hands-on experience in experimental processes. Participants also learn to apply the scientific method, form hypotheses, evaluate results, and communicate their findings with other scientists.*
> -Internships Mentor

> *"The program helps bring the next generation of scientists to the field. Students can see what science careers in the government is like, for good and bad, and they can see if that career path is right for them.* -Internships Mentor

> *"I felt the program was beneficial in many ways - first to the intern for gaining incredibly valuable experience they can hopefully take to their post-school career. Second, to the project as our intern made meaningful contributions. Third, to the people on the team who helped mentor as it gave them valuable leadership experience to further grow as a STEM employee.* -Internships Mentor

8.2 Suggestions for Improvement

In addition to asking students and mentors about their overall satisfaction, the survey asked participants to identify areas for improvement. A high-level summary of key themes is included below.

8.2.1 Students' Suggestions for Improvements

Student responses indicated a desire for improved communications. About one-fifth of students stated that they wanted better communication, clearer requirements, and organization, and planning information from program leads. This included ongoing communication about program activities, email updates, due dates, and the requirements. About one-tenth of students wanted more collaboration time; this included more team-based work, more opportunities to interact with peers/interns, and even opportunities to collaborate doing "field work." Additionally, other suggestions included improving the application process to make it smoother, providing more in-person meetings for sites who heavily used online or visual communication, and access to more resources that are specific to the level and role or an apprentice (e.g., an undergraduate working in a lab, PhD student conducting research).

8.2.2 Mentors' Suggestions for Improvement

Mentors' suggestions for improvement were largely about giving mentees more hands on STEM research experience About one-half of respondents offered suggestions for improving their experience such as allowing apprentices to do more "meaningful work," "hands on work," or "active lab" work. Mentors believed that these experiences would help students to clarify career pursuits, more specifically, help them to decide if they wanted to conduct research or work in a lab in the future. About one-fifth of mentors suggested that students could develop their communication skills through having opportunities to present their work. Other suggestions, included providing more mentoring opportunities (e.g., having small teams of mentors for students) as well as strengthening the applicant pool and refining the application process.

9 Recommendations

This report distills findings across the student participant and mentor surveys as they align with AEOP's overarching research questions. As stated in the limitations, data collected for this evaluation are not necessarily representative of the entire Internships program; however, based on the results presented above, we offer the following recommendations:

Programmatic Considerations

- **Continue to offer hands-on, authentic, relevant experiences.** To keep participants engaged and excited about STEM fields, prioritize providing them with practical and applicable STEM learning experiences.
- **Integrate more explicit ways to develop 21st Century Skills.** Students and mentor survey responses alike advocated for students to develop 21st Century skills, which are transferrable across educational levels (e.g., high school, undergraduate, and graduate) as well as across fields; examples of this include presenting their work and communicating findings to others as well as team building and collaboration skills. Some mentors and sites are already supporting these efforts; we suggest shoring up these efforts.
- **Strengthen the application process so that intern projects relate to student interest(s).** Mentors who were satisfied discussed their desire to cultivate the next generation of STEM professionals through their shared work with students who are motivated. Strengthening the alignment between projects and student interest can support the reciprocal relationship building between mentor and mentee through shared learning
- **Offer ongoing and consistent communication between program administrators, mentors, and student participants.** Students indicated a desire for more information about changes in planning and organization, updates to timelines, clearer requirements, and more transparency around expectations for both students and mentors.

Evaluation Considerations

- **Continue to examine ways to increase response rates.** Between last year and this year, the survey response rates remained low (23% in FY22 and 18% in FY23). The IPAs and AEOP Consortium should explore strategies to improve response rates in the future.