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ARMY EDUCATIONAL OUTREACH PROGRAM

2022 Unite Evaluation Report
Summative Findings

July 2023

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. Unite supports AEOP's mission by offering pre-collegiate, academic summer programs for rising 9th through rising 12th grade students from groups historically underrepresented and underserved in STEM areas.

Education Development Center, Inc. (EDC), the external evaluation partner for AEOP, conducted a summative evaluation of the 2021-2022 program year. The FY22 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 may not be generalizable within a specific program.

Key findings from the evaluation are presented below.

Participant Experience and Outcomes

In FY22, Unite served a total of 463 student participants and 109 mentors.

Unite students engaged in a number of key STEM related activities. Both students and mentors alike reported that students had the opportunity to work collaboratively as a team, analyze data or information to draw conclusions, use laboratory procedures and tools, and solve real-world problems (at least 60% of students and mentors reported that these activities took place). More than one-half of mentors additionally reported that students had the opportunity to present STEM research to a panel of judges from industry or the military (57%) and worked with a STEM researcher or company on a real-world research project (52%).

Students noted gains in both STEM and 21st Century skills. Unite students reported (and mentors agreed) that they increased their knowledge in a STEM topic(s), knowledge of the research process, and knowledge of what everyday research work is like in STEM. Specific skill gains included collaborating with others effectively and respectfully in diverse teams (81%), creative thinking (97%), adapting to change when things don't go as planned (96%), and thinking about how systems work and parts interact with each other (46%).

Students' interest in STEM and STEM careers increased, including Army/DoD careers. A majority of participants reported that the program had a positive influence on their interest in earning a STEM degree (82%). Most (74%) reported that Unite was either the primary reason or at least a contributing factor for increased interest in pursuing a STEM career. The majority of students responding to the survey either agreed or strongly agreed that DoD research is valuable to society (94%).

Mentors used a variety of strategies to engage with students. Mentor engagement strategies reported most frequently by Unite mentors included helping students become aware of the role(s) that STEM plays in their everyday lives (92%), providing students with constructive feedback (90%), and encouraging student to learn collaboratively (90%).

Overall, both students and mentors reported generally positive experiences with AEOP. Student responses were extremely positive with responses indicating they developed increased confidence, teamwork, interest, and social skills. Mentors cited the level of student engagement, the hands-on activities, and collaboration with other mentors as key points of satisfaction.

Participants offered some suggestions for improvement. About 10% of students indicated that they wanted more guest speakers, as well as more field trips. A small percentage of mentor respondents (5%) indicated that although students engaged in hands-on activities, they would like more. Others wanted increased funding (for things like field trips and equipment and resources for program sites). Lastly, some students said that their experience registering and interacting with the website could be improved.

A small percentage of respondents (7%) indicated that more training would be beneficial for mentors, including things like webinars and course materials, specifically for new mentors. Additionally, mentors wanted an increase in the stipend amount.

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 program; however, based on the results presented above, we offer the following recommendations: presented above, we offer the following recommendations:

Programmatic Considerations

- **Continue to offer hands-on, authentic, relevant research experiences.** Research shows these kinds of experiences are important to developing and sustaining students' interest in STEM education and career pathways.
- **Encourage work with STEM researchers and companies on real-world projects.** While slightly more than half of Unite mentors reported that this type of collaboration was undertaken, nearly half did not. Given the desire for additional outside speakers expressed by participants and mentors alike, more collaborative real-world experiences for a greater percentage of participants and mentors would be consistent with both practice and interest.
- **Improve opportunities for Unite students to develop skills in data analysis and interpretation.** Unite student and mentor reported relatively smaller gains in important data analysis practices such as considering multiple interpretations and identifying limitations of methods or data collection tools.

- Increase focus on Army/DoD STEM research activities. Increasing the focus on Army/DoD STEM research could potentially improve the number of Unite students meeting the AEOP goals of increasing student appreciation of Army/DoD research and increasing student interest in Army/DoD STEM careers.
- **Consider ways to bring mentors together to exchange promising practices, successes, and lessons learned.** Mentors play an important role in Unite. Most mentors shared that they are engaging in meaningful ways with student participants. When asked about ways to improve AEOP, mentors frequently expressed a desire for instructional materials. Peer learning opportunities would allow them to share effective strategies, resources, and tools.
- **Explore ways to improve awareness of various AEOP resources, including printed materials, the website, and other social media.** Although students reported that in-person resources like invited speakers and career events were helpful, they were less likely to say the same about printed and online media.

1 Introduction and Evaluation Approach

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. Unite supports AEOP's mission by offering pre-collegiate, academic summer programs for rising 9th through rising 12th grade students from groups historically underrepresented and underserved in STEM areas. In FY22, Unite served a total of 463 student participants and 109 mentors.

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.

Education Development Center, Inc. (EDC) became the AEOP's external evaluation partner in fall 2021. The primary tools for data collection were student 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. In most cases, AEOP program staff were responsible for distributing the online survey links to their student participants and mentors at the conclusion of program activities.

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?

1.2 Survey Respondents

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

Table 2. Participant and Mentor Survey Response Rates

	Participant Surveys		Mentor Surveys	
Program	**Count**	**Response Rate**	**Count**	**Response Rate**
Unite	377	81%	83	76%

1.3 Limitations

It is important to recognize that survey results only reflect those individuals who completed surveys and may not be generalizable within Unite.

1.4 Report Organization

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

- Overall Experience
- Program Activities
- Development of STEM Skills
- Development of 21st Century Skills
- Interest in STEM and STEM Careers
- Impact of S&E Mentors on Participants
- Recommendations

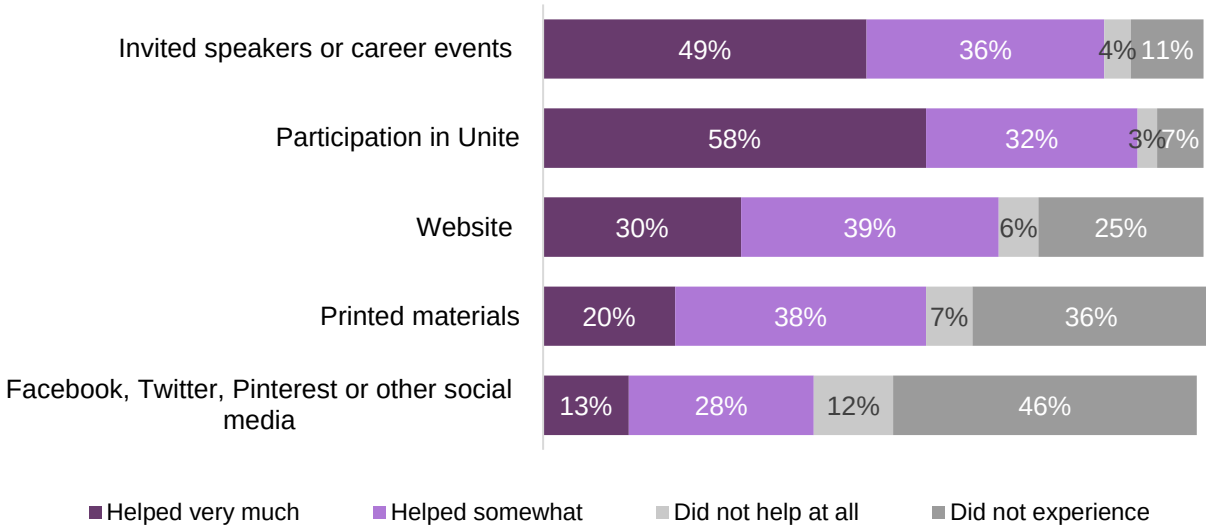
2 Overall Experience

In general, students and mentors reported positive experiences with Unite. Both students and mentors indicated that they were largely were satisfied with the program. Students enjoyed learning new STEM skills and becoming more confident in their abilities. Students found the invited speakers and career events helpful. Mentors enjoyed engaging with students in research, solving real-world problems, and providing students with opportunities for hands-on learning experiences.

2.1 Perceived Value of Unite Resources

Students reported that invited speakers or career events were the most helpful resources overall. Most (85%) reported that invited speakers or career events helped very much (49%) or somewhat helped (36%).

Figure 1. Students reported invited speakers and career events were the most helpful Unite resources, while social media was the least effective resource



Participant Survey (n = 343)

2.2 Program Satisfaction

To assess overall satisfaction, the surveys asked both students and mentors two open-ended questions about the perceived benefits of Unite and their overall satisfaction with their Unite experience.[1]

2.2.1 Student Program Satisfaction

[1] Because of the large number of responses to open-ended questions, the EDC evaluation team selected and analyzed a representative sample of the responses to each open-ended question using a 90% confidence level with a 10% margin of error.

Students participating in Unite reported gaining both skills and confidence as well as being more interested in pursuing careers in STEM. About 80% of respondents indicated that they enjoyed themselves and had a positive experience in UNITE. Participants were able to learn new things in their STEM classes, increase their knowledge of STEM careers, gain research and lab experience, develop friendships, and have fun. About 10% reported that they would come back again, while others (under 10%) specifically mentioned that their instructor or mentor contributed to their satisfaction with the program.

Table 3. Reasons students gave for their satisfaction with AEOP

Theme	Quote
Seeing New Possibilities	*I learned a lot about things I never knew I could do, and how I could help people just by having a job doing the things I love. Unite also opened up many paths that I didn't know about and overall, I am satisfied.*
Gaining Experience	*I was very satisfied with my Unite experience. I got to work with amazing mentors who taught me so much about research and thoroughly answered all of my questions. I really enjoyed collaborating with a group and designing and executing my own research project. Unite gave me the experience in research I needed to affirm that this is the career path for me. This experience was truly impactful for me.*
Student Engagement	*I have loved this program. It has been a fun way to make friends and gain experience in various lab and college settings.*
Communication and Creativity	*[Unite] taught me about how to be creative and how to talk better to people getting interviewed and be more properly mannered.*
Increased Confidence	*It has helped me become more confident in my abilities and to help me study materials that will be helpful to me in the future when pursuing my STEM career.*
Improved Social Skills	*[Unite] increased my social skills by working in teams. [I] built my confidence that I am capable and it's possible to pursue a career in STEM. [I] broadened my knowledge on the use and purpose of drones in science and technology.*

2.3 Mentor Program Satisfaction

Just under one-half of respondents were very satisfied with the UNITE program overall, and an additional 4% indicated that they were satisfied. No respondents indicated that they were fairly satisfied or dissatisfied. Reasons mentors gave for their satisfaction with Unite support from other mentors, the emphasis on hands-one-experiences and the level of student interaction.

Table 4. Reasons mentors gave for their satisfaction with AEOP

Theme	Quote
Support from other mentors	*Being that this was my first time working with the UNITE camp, it did not feel like it. My colleagues made sure I felt a part of the team. They were willing to teach me and motivated me throughout the camp. They are the most impactful, and genuine people I have ever met. The kids I worked with were so phenomenal. [Working with] the kids is what made it such a great experience for me, especially since I had never worked with high school kids. They were amazing and I was sad that I had to see them leave after Camp. Overall, my UNITE experience was amazing.*
Hands-on-experience	*We are very satisfied with the UNITE program. The UNITE program provides our students from the school system to gain hands on experience in STEM area. As result of this program, we have seen many students who pursue BS degree programs in the STEM area.*
Student engagement	*I engaged with the program as an invited speaker for an event on campus. It was a great experience, and I really enjoyed interacting with the students.*

2.4 Suggestions for Improvement

In addition to asking students and mentors about their overall satisfaction, the survey also asked them to identify areas for improvement. Both students and mentors were asked, *What are the three ways Unite should be improved for future participants?* Mentors were also asked, *What are the three ways Unite should be improved for mentors/team advisors?* A high-level summary of key themes is included below.

2.4.1 Students' Suggestions for Improvements

Students suggested a few areas for programmatic improvement which were suggested. About 10% indicated that they wanted more guest speakers as well as more field trips. Some of the suggestions for field trips included visiting a "chemical plant" or a "STEAM museum." Requests for guest speakers were suggested so students could learn more about doing research in college as well as increase their knowledge of STEM careers. Lastly, some participants, about 6%, mentioned that they wanted the stipend amount to be increased.

2.4.2 Mentors' Suggestions for Improvement

A small percentage of mentors (5%) indicated that although students engaged in hands-on activities, they would like more. Others wanted increased funding (for things like field trips and equipment and resources for program sites). And lastly, respondents shared that their experience registering and interacting with the website could be improved.

A small percentage of mentors (just under 10%) indicated that more training would be beneficial for mentors, including things like webinars and course materials, specifically for new mentors. Additionally, mentors wanted an increase in the stipend amount.

3 Program Activities

Unite provided students with multiple opportunities to engage in STEM-related activities that reflect good practice. These ranged from learning to work collaboratively and learning laboratory procedures and tools to designing and carrying out investigations.

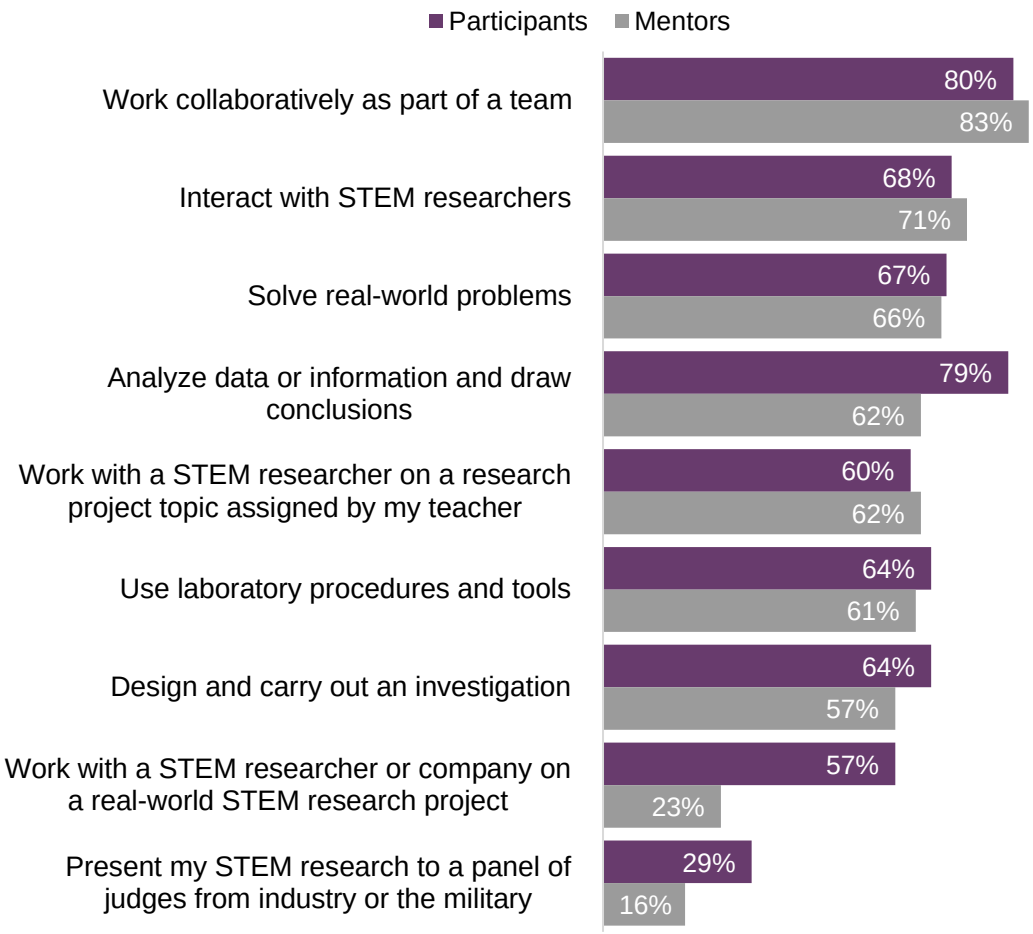
3.1 STEM Practices

Unite participants reported strong engagement in a number of STEM related activities. Figure 2 shows the results for both Unite students and mentors on a variety of activities common across Unite. Results shown below reflect the percentage of those surveyed who indicated the activity occurred at least once during the program.

Students and mentors were asked about a range of STEM activities including collaborative work, analysis of data, and working with STEM researchers on a real-world STEM research project. A large percentage of both students and mentors (>50%) reported these activities as occurring “most days” or “every day” with the exception of presenting research to a panel of judges.

For the 364 students responding to the survey, the most frequently reported activity was collaborative work as part of a team. followed by analyzing data to draw conclusions (79%). For the 84 mentors surveyed, most (83%) also reported collaborative work as occurring most or every day. The next most frequently reported activity by mentors was interaction with STEM researchers (71%). Far fewer mentors reported actual student work with a STEM researcher on a real-world problem (23%).

Figure 2. AEOP participants had opportunities to engage in a variety of STEM activities



Participant Survey (n = 364)
Mentor Survey (n = 83)
Participant responses include those who reported, "every day," and “most days.”
Mentor responses include those who reported, “every day,” and “most days.”

4 Development of STEM Skills

Participants and mentors reported gains in a number of STEM research skills as a result of their participation in Unite. In general, mentors were only slightly more likely than students to report that they experienced gains as a result of their participation in Apprenticeships.

4.1 STEM Skills

Data collected from participants and mentors show that students increased their knowledge of STEM and various aspects of STEM research. Table 5 shows survey results for participants and mentors when asked to assess the amount of gain achieved in important STEM skills. Participant reports of small to large gains ranged from 97% for developing knowledge of how scientists and engineers work on real problems in STEM, to 99% for building in-depth knowledge of STEM topic(s). Similarly, mentor reports of at least some gain ranged from 90% for making a model to show how something works to 100% for in-depth knowledge of a STEM topic(s).

Table 5. Students increased their knowledge of STEM and various aspects of STEM research

Response	*Participant* / *Mentor*	Did not learn No gain	Learned just a little Small gain	Learned more than a little Medium gain	Learned a lot Large gain	Overall Learning or Gain
In-depth knowledge of a STEM topic(s)	Participant	1%	10%	48%	41%	**99%**
	Mentor	0%	10%	40%	50%	**100%**
Knowledge of research processes, ethics, and rules for conduct in STEM	Participant	2%	20%	43%	35%	**98%**
	Mentor	6%	17%	36%	41%	**94%**
Knowledge of how scientists and engineers work on real problems in STEM	Participant	2%	14%	39%	44%	**97%**
	Mentor	0%	15%	27%	59%	**100%**
Knowledge of what everyday research work is like in STEM	Participant	3%	14%	36%	48%	**98%**
	Mentor	1%	17%	31%	51%	**99%**

Participant Survey; All AEOP Programs combined (n = 361)

Mentor Survey (n =83)

4.2 Planning and Carrying out Experiments

The vast majority of students improved skills related to planning and carrying out investigations. As shown in Table 6, 90% or more of students and mentors reported increases in skills such as designing procedures or steps for an experiment or designing a solution that works, and presenting an argument that uses data and/or findings from an experiment or investigation.

One-third of students (33%) reported large gains for carrying out an experiment and recording data accurately. The largest gains reported by mentors included carrying out an experiment and recording data (44%), designing procedures or steps for an experiment or a solution that works

(40%), and presenting an argument that uses data and/or findings from an experiment or investigation (37%).

Table 6. Students improved skills related to planning and carrying out investigations

Response	*Participant* / *Mentor*	Did not learn / No gain	Learned just a little / Small gain	Learned more than a little / Medium gain	Learned a lot / Large gain	Overall Learning or Gain
Designing procedures or steps for an experiment or designing a solution that works	Participant	7%	20%	44%	29%	**93%**
	Mentor	10%	20%	31%	40%	**90%**
Creating a hypothesis or explanation that can be tested in an experiment/problem	Participant	8%	23%	44%	26%	**93%**
	Mentor	4%	17%	43%	36%	**96%**
Carrying out an experiment and recording data accurately	Participant	8%	19%	39%	33%	**91%**
	Mentor	9%	17%	31%	44%	**92%**
Presenting an argument that uses data and/or findings from an experiment or investigation	Participant	9%	24%	37%	30%	**91%**
	Mentor	10%	17%	36%	37%	**90%**

Participant Survey; All AEOP Programs combined (n = 368)

Mentor Survey (n = 83)

4.3 Analyzing and Interpreting Data

Most students and mentors reported that students developed skills in data analysis and interpretation. While most students reported positive gains overall, students were most likely to report “large gains” in their skills for creating charts and graphs to display data and find patterns (29%), considering multiple interpretations of data to decide if something works as intended (23%), and identifying the strengths and limitations of data or arguments presented in technical or STEM texts (23%). However, creating charts and graphs to display data also had the highest percentage of students reporting no gains (15%).

Mentors similarly reported positive gains in student skills in data analysis and interpretation with at least 90% reporting some gain in each data analysis item asked. Mentors were most likely to report students made large gains in identifying the strengths and limitations of data or arguments presented in technical or STEM text (26%) and identifying the limitations of the methods and tools used for collecting data (26%).

Table 7. Students developed skills in data analysis and interpretation

Response	*Participant* / *Mentor*	Did not learn / No gain	Learned just a little / Small gain	Learned more than a little / Medium gain	Learned a lot / Large gain	Overall Learning or Gain
Considering multiple interpretations of data to decide if something works as intended	Participant	7%	28%	42%	23%	**93%**
	Mentor	10%	43%	27%	21%	**90%**
Identifying the strengths and limitations of data or arguments presented in technical or STEM texts	Participant	9%	27%	40%	23%	**90%**
	Mentor	9%	31%	34%	26%	**92%**
Identifying the limitations of the methods and tools used for collecting data	Participant	7%	31%	42%	21%	**94%**
	Mentor	10%	43%	22%	26%	**90%**
Creating charts or graphs to display data and find patterns	Participant	15%	25%	31%	29%	**85%**
	Mentor	10%	37%	36%	17%	**90%**

Participant Survey; All AEOP Programs combined (n = 368)

Mentor Survey (n = 83)

5 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; they were less likely to indicate growth in their media and technological literacy skills, though this may be most likely due to programs not engaging in related activities.

The surveys asked about skills in five main areas:

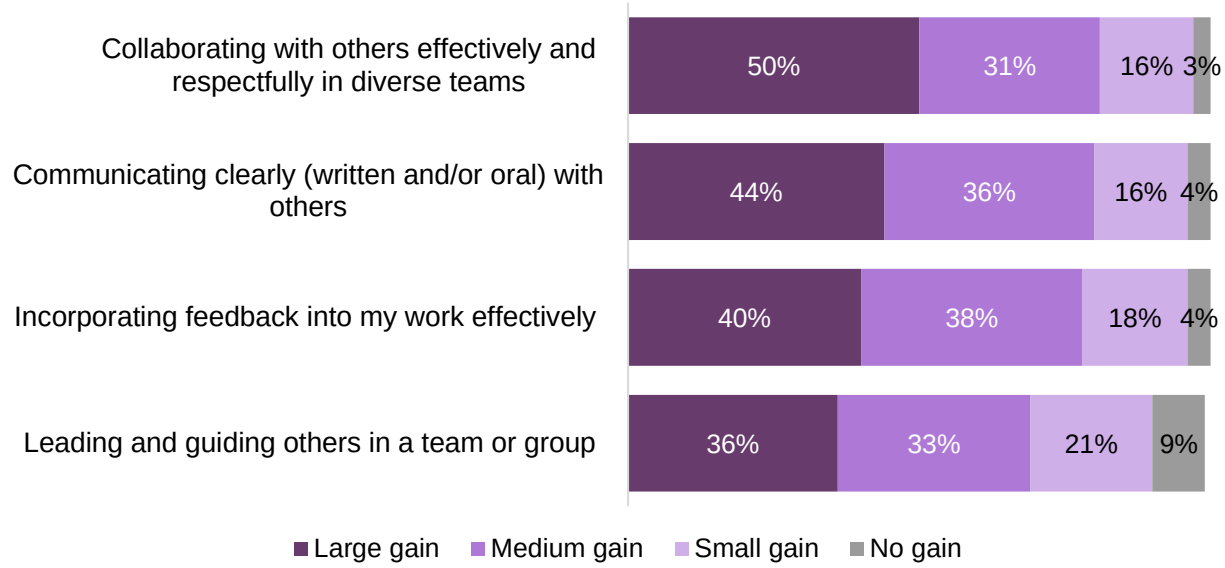
1. Communication and Collaboration
2. Critical Thinking and Problem Solving
3. Creativity and Innovation
4. Initiative, Self-Direction, and Flexibility
5. Media and Technological Literacy

Results from each domain are below.

5.1 Communication and Collaboration

Unite students indicate that their communication and collaboration improved as a result of AEOP participation. Most student participants reported moderate to large gains incorporating feedback into their work (78%; Figure 3). The percentage of students reporting moderate to large gains was even higher for collaborating with others effectively and respectfully in diverse teams (81%) and communicating clearly with others (80%). Students were slightly less likely to report medium to large gains with respect to leading and guiding others in a team or group, with 30% indicating small to no gains.

Figure 3. Students improved their communication and collaboration skills, but were less likely to report improved skills leading within a team

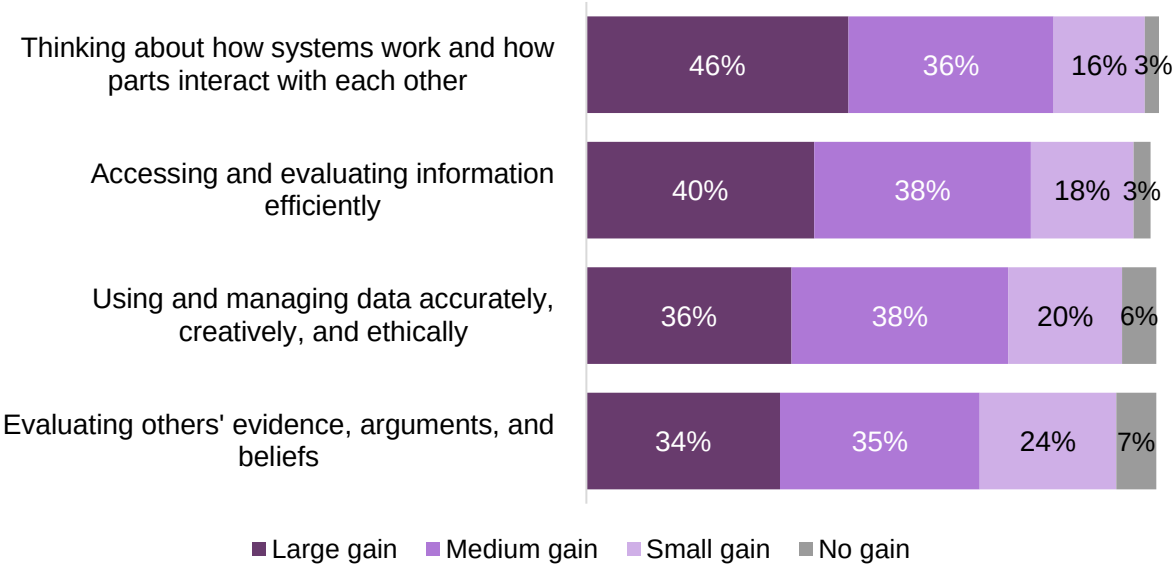


Participant Survey (n = 359)

5.2 Critical Thinking and Problem Solving

Unite students indicated that they improved various critical thinking and problem-solving skills. The vast majority of students reported gains across all critical thinking and problem-solving skills asked with over 90% reporting at least some gain on all areas (Figure 4). Skills with the most reports of "large gains" were thinking about how systems work and how parts interact with each other (46%) and accessing and evaluating information efficiently (40%). It is also worth noting that more than a quarter of students reported small to no gains for using and managing data accurately, creatively, and ethically (26%), and evaluating others evidence, arguments, and beliefs (31%).

Figure 4. Students improved various critical thinking and problem-solving skills

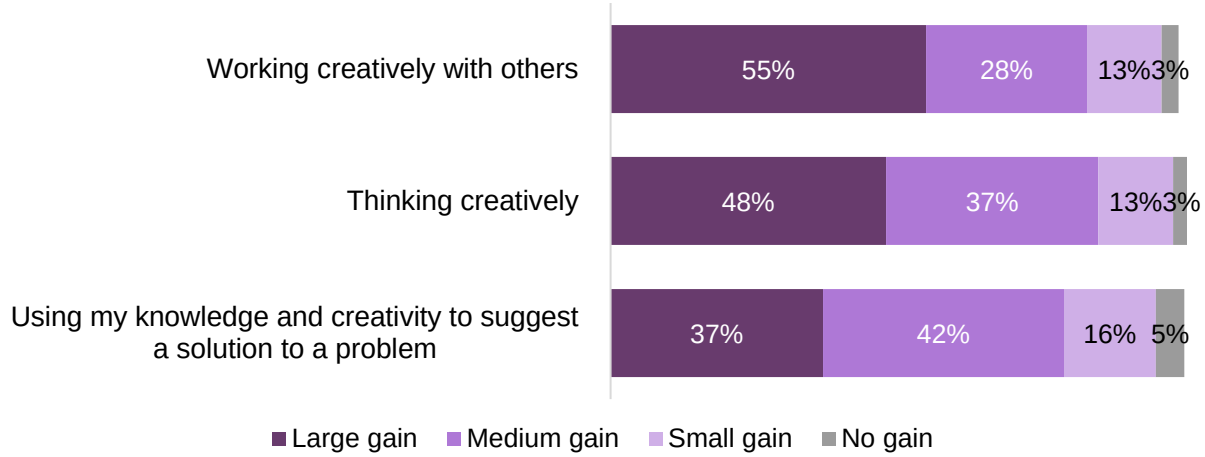


Participant Survey (n = 358

5.3 Creativity and Innovation

Unite students increased their ability to work more flexibly and creatively. The majority of students reported gains in thinking creatively (97%), using knowledge and creativity to suggest a solution to a problem (95%), and working creatively with others (97%; Figure 5). Of particular note is that more than half the students responding to the survey reported large gains with respect to working creatively with others (55%).

Figure 5. Students increased their ability to work more flexibly and creatively.

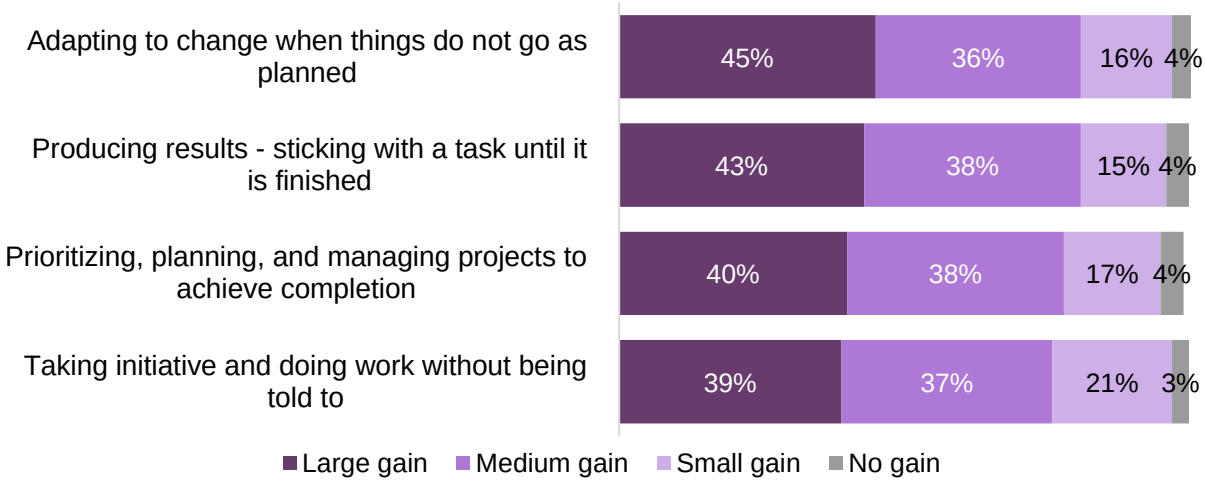


Participant Survey (n = 365)

5.4 Initiative, Self-Direction, and Flexibility

Students increased work habits related to taking initiative, self-direction, and flexibility. Students reported gains with producing results—sticking with a task until it is finished (96%), adapting to change when things do not go as planned (96%), prioritizing, planning, and managing project to achieve completion (96%), and taking initiative and doing work without being told to (97%). The majority of gains reported were reported as large or medium.

Figure 6. Students increased work habits related to taking initiative, self-direction, and flexibility



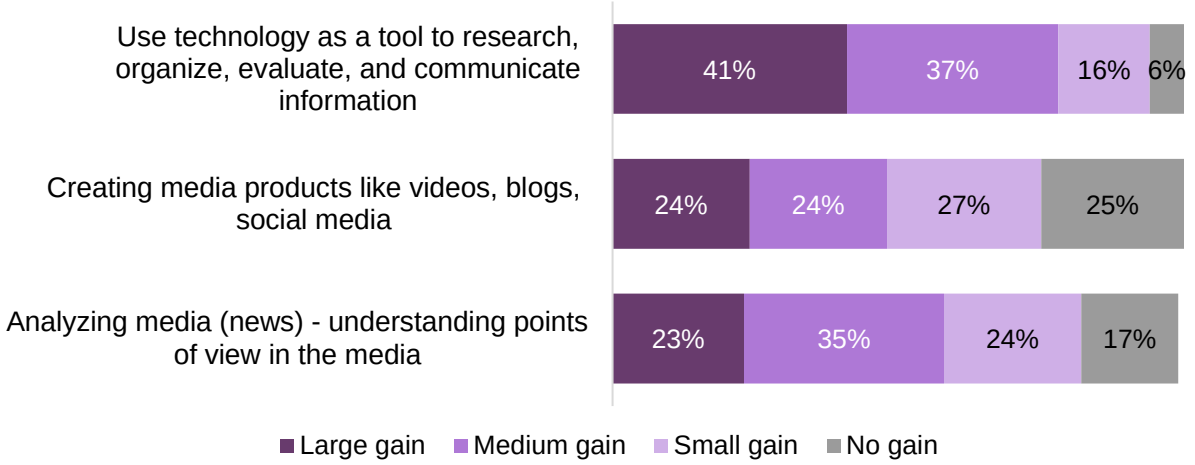
Participant Survey (n = 357)

5.5 Media and Technological Literacy

Students were less likely to report gains in media and technological literacy. While the vast majority of students reported gains using technology as a tool to research, organize,

evaluate, and communicate information (94%), fewer students reported gains with respect to analyzing media (83%) and creating media products like videos, blogs, or social media (75%).

Figure 7. Students were less likely to report gains in media and technological literacy



Participant Survey (n = 359)

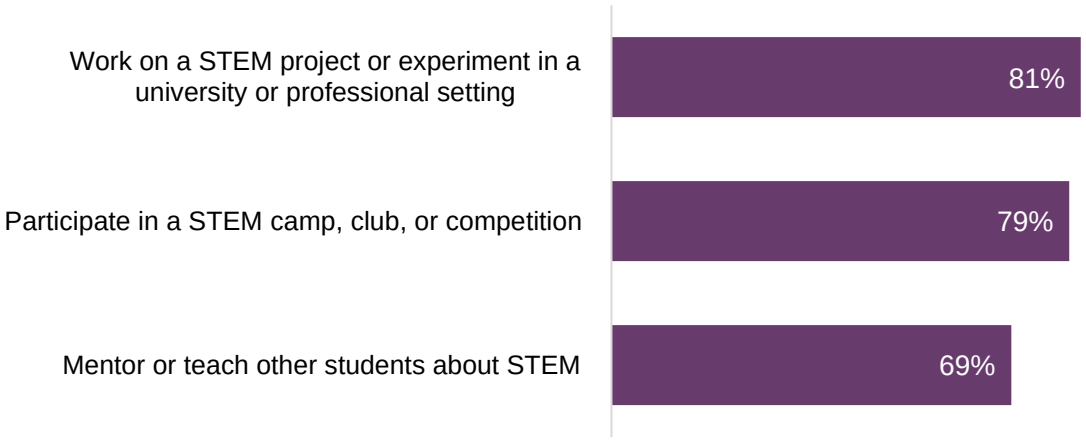
6 Interest in STEM and STEM Careers

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

6.1 Interest in STEM

Most Unite students reported that they were likely or much more likely to participate in other kinds of STEM-related activities after the program. About four-fifths of students reported a higher inclination to work on a STEM project or experiment in a university or professional setting (81%), and to participate in a STEM camp, club, or competition (79%). A smaller percentage of students, still representing a majority, said they were more interested in becoming a mentor or teaching other students about STEM (69%).

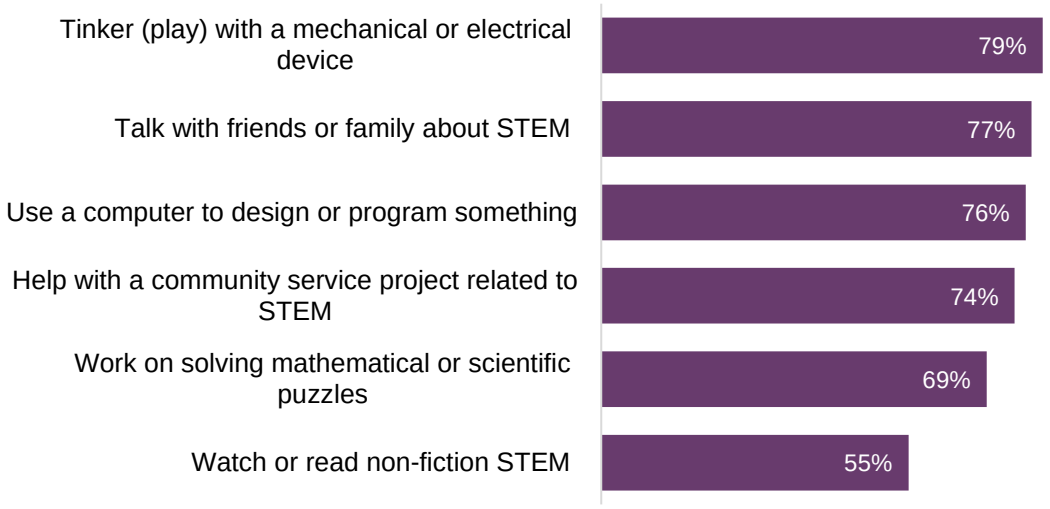
Figure 8. Most students reported an increase in their interest in participating in other kinds of STEM-related activities



Participant Survey (n = 342)
Responses include those who reported, "more likely" and "much more likely."

Students reported increased interest in STEM-related information and exploration. More than three-quarters of Unite students reported that they were more or much more likely to tinker (play) with a mechanical or electrical device (79%), use a computer to design or program something (76%), or talk with friends and family about STEM (77%). More than one-half reported being more likely to help with a community service project related to STEM (74%), work on solving a mathematical or scientific puzzles (69%), or watch or read STEM non-fiction (55%).

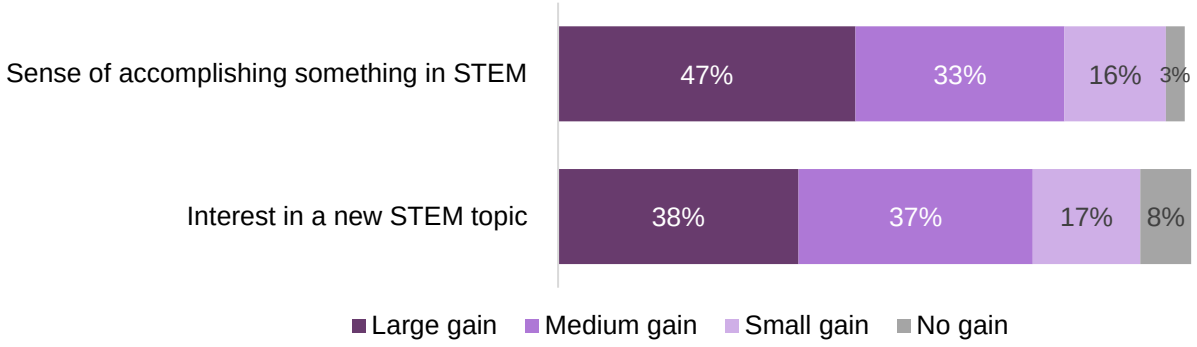
Figure 9. More than half of students reported an increase in their interest in STEM information and exploration



Participant Survey (n = 346)
Responses include those who reported, "more likely" and "much more likely."

Most students reported large or medium gains with respect to having a sense of accomplishing something in STEM (80%) and interest in a new STEM topic (75%) (Figure 10).

Figure 10. Most students said Unite increased their STEM Confidence

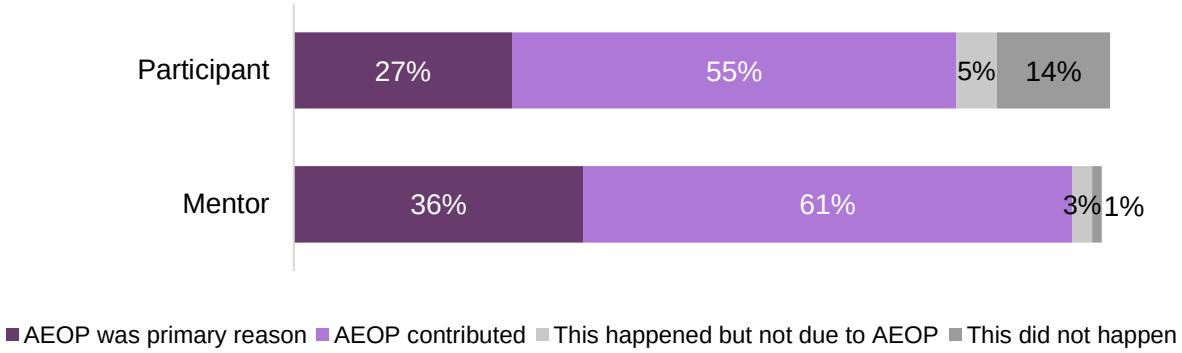


Participant Survey (n= 348)

6.2 Interest in Pursuing STEM Education and Careers

Both students and mentors reported increased participant interest in earning a STEM degree as a result of Unite activities. About one quarter of participants (27%) cited Unite as the primary reason they were interested in earning a STEM degree, while just over half of participants (55%) said the program contributed to their increased interest. Mentors had a more positive assessment of Unite's impact, with 36% of mentors citing the program as the primary reason and 61% saying it was a contributing factor.

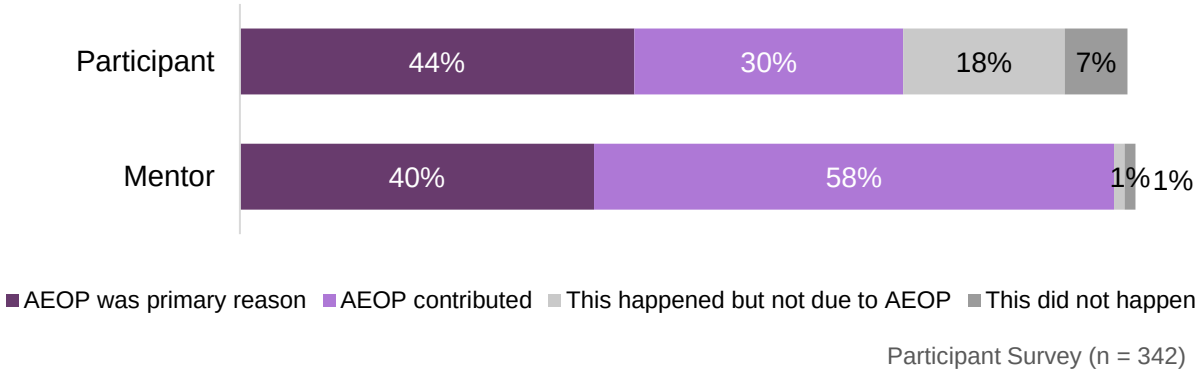
Figure 11. Unite had a positive influence on students' interest in earning a STEM degree



Participant Survey (n = 339)
Mentor Survey (n=81)

Participants reported an increased interest in pursuing a STEM career. Most students (74%) reported that Unite was either the primary reason or at least a contributing factor to their interest in pursuing a STEM career (Figure 12). Some felt that they had an increased interest in STEM but did not attribute it to the program (18%). A few reported no increase in interest in pursuing a STEM career (7%).

Figure 12. Unite contributed to increasing students' interests in pursuing a STEM career

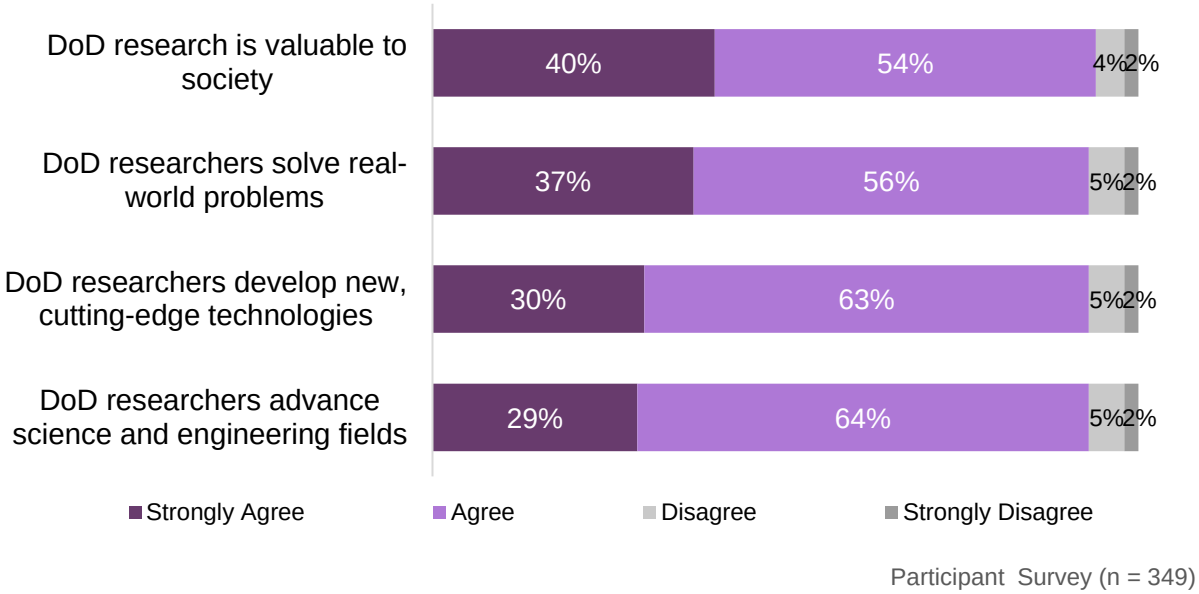


Participant Survey (n = 342)
Mentor Survey (n = 81)

6.3 Interest in Army/DoD STEM Research and Careers

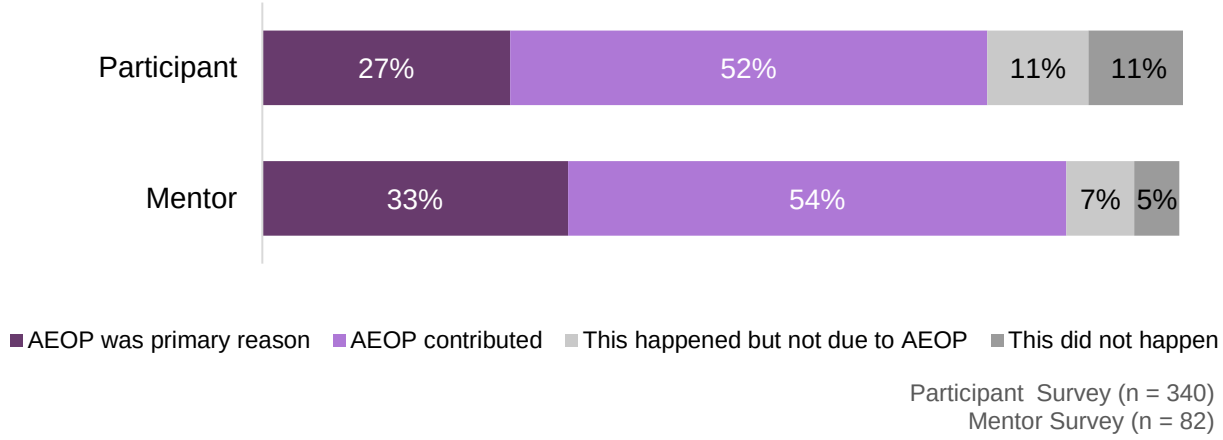
Students gained a greater appreciation of Army/DoD STEM research through their participation in Unite. Over 90% of students agreed or strongly agreed that DoD researchers advance science and engineering fields, develop new and cutting-edge technologies, solve real-world problems, and that DoD research is valuable to society (Figure 13).

Figure 13. Students understand that DoD research is important



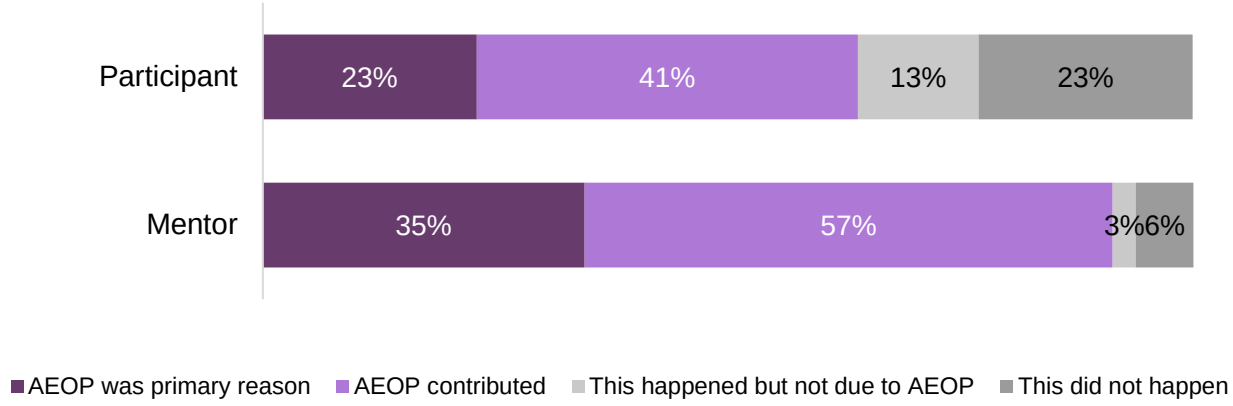
Most Unite students and mentors felt that the program increased student appreciation for Army/DoD research. Most participants reported that the program was either the primary reason or a contributing factor to their appreciation for Army/DoD research (79%). A greater percentage of mentors attributed increased student appreciation for Army/DoD research to the program (87%).

Figure 14. AEOP contributed to increasing students' appreciation for Army/DoD research



More than one-half of students reported that the program contributed to their increased interest in Army/DoD STEM careers. A total of 64% of participants and 91% of mentors reported that students' interests in an Army or DoD career increased as result of AEOP (Figure 15).

Figure 15. Unite contributed to increasing students' interest in Army/DoD STEM Careers

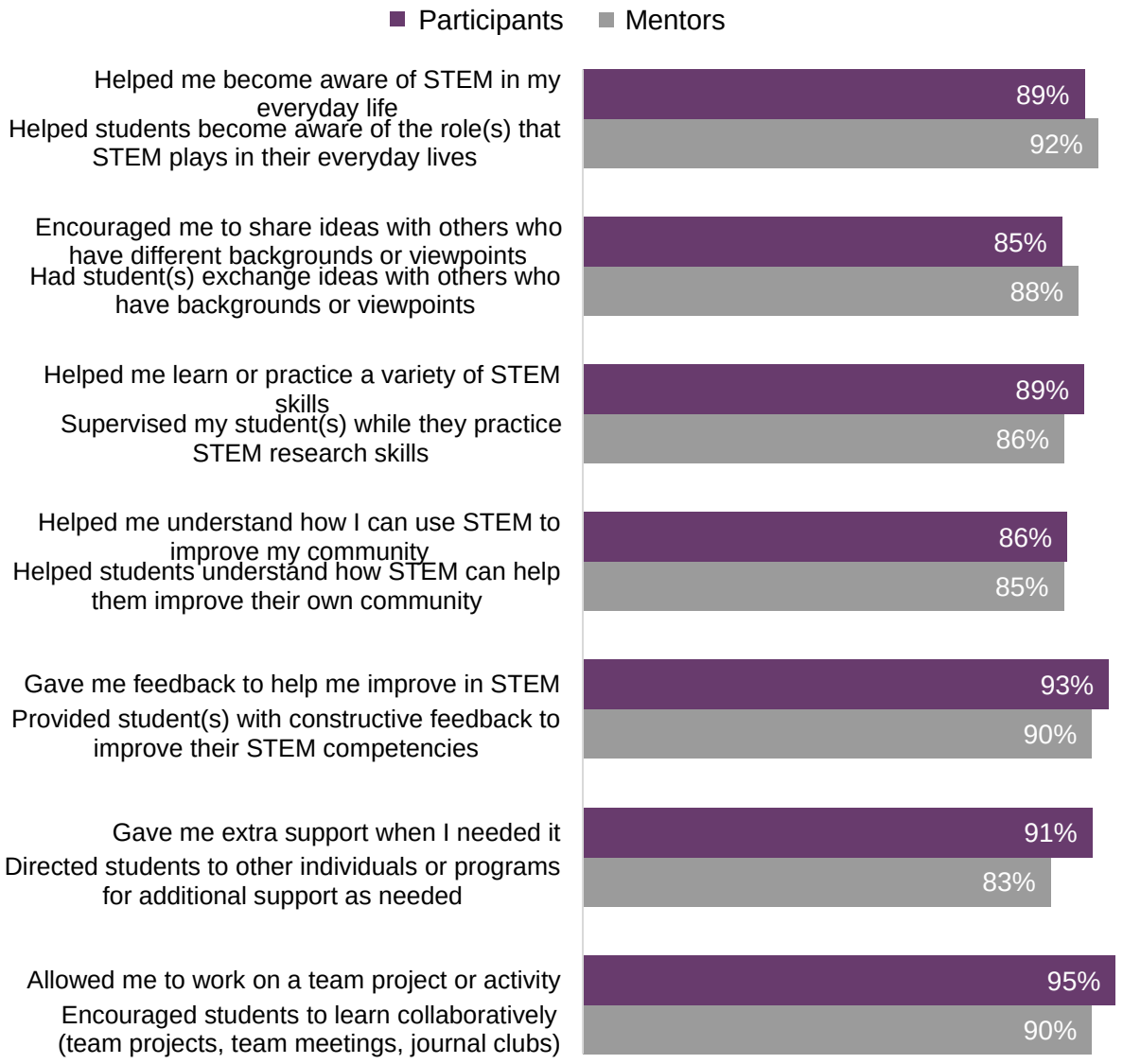


Participant Survey (n = 341)
Mentor Survey (n = 82)

7 Impact of S&E Mentors on Program participants

Unite participants and mentors reported a high use of strategies commonly used to achieve AEOP goals. Participants particularly stressed that Unite allowed them to work in teams (95%) and gave then feedback to improve in STEM (93%). Almost all mentors reported using helping students become aware of the roles that STEM plays in their everyday lives (92%), providing students with constructive feedback (90%), and encouraging students to learn collaboratively (90%). Mentors were least likely to report that they directed students to other individuals or programs for additional support as needed (83%).

Figure 16. Unite mentors reported common strategies used across sites



Participant Survey (n = 350)
Mentor Survey (n = 82)

In addition to the methods mentioned above, the surveys asked about mentor strategies in four main areas:

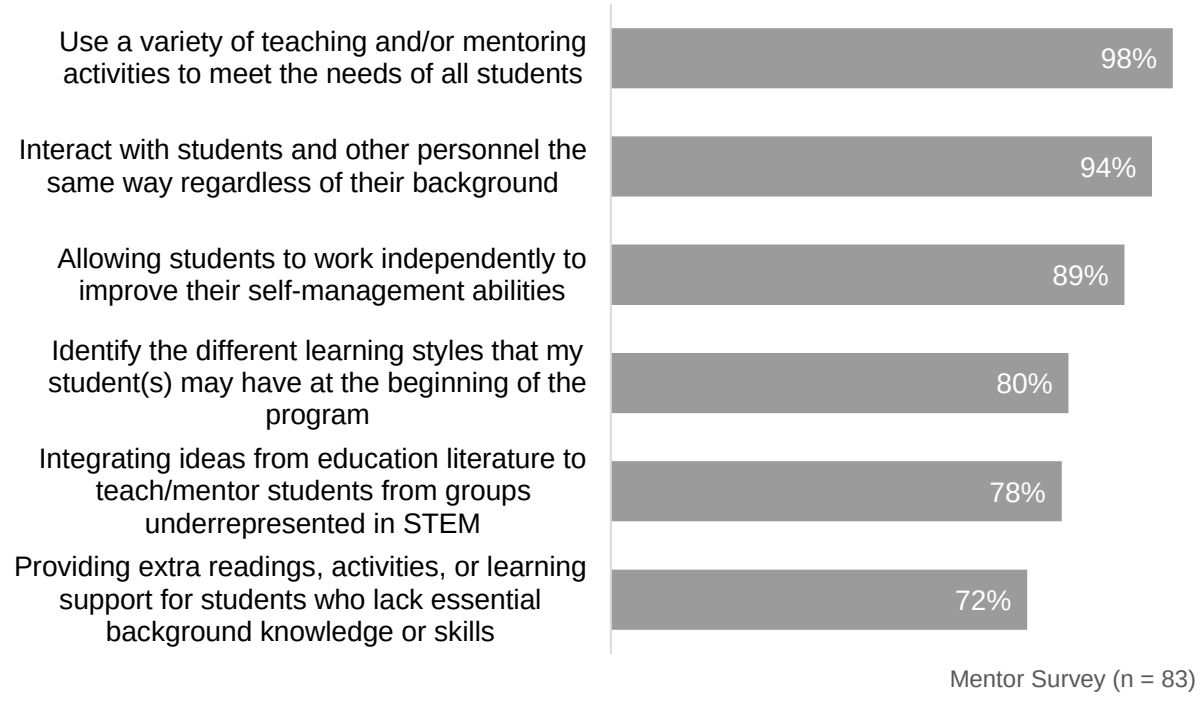
1. Supporting the Diverse Needs of Students as Learners
2. Establishing the Relevance of Learning Activities
3. Supporting Student Development of Collaboration and Interpersonal Skills
4. Supporting Student STEM Activities and Educational Pathways

Findings from each of these core areas are below.

7.1 Supporting the Diverse Needs of Students as Learners

Mentors used multiple strategies to meet students' diverse needs. Almost all mentors reported using a variety of teaching and/or mentoring activities to meet the needs of all students (98%) and interacting with students and other personnel the same way regardless of their background (94%; Figure 17). A high percentage of mentors also reported allowing students to work independently where appropriate (89%) and identifying students' learning styles early (80%). Even the lowest reported strategy—providing extra reading activities or learning supports for students who lack essential background knowledge and skills—was reported by the majority of mentors (72%).

Figure 17. Mentors used multiple strategies to meet students' diverse needs

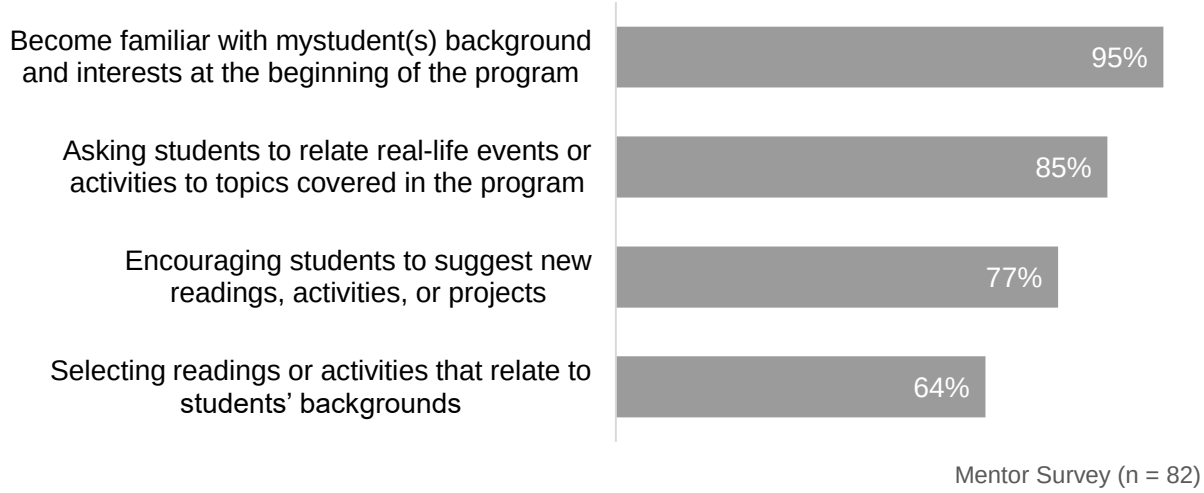


7.2 Establishing the Relevance of Learning Activities

Mentors reported high use of strategies to enhance the relevance of learning activities. The vast majority of mentors reported becoming familiar with their student's background and

interests at the beginning of the program (95%). Even the lowest reported strategy in this survey category—selecting reading or activities that relate to students' backgrounds—was reported by more than 69% of mentors.

Figure 18. Mentors used different teaching strategies to enhance the relevance of learning activities

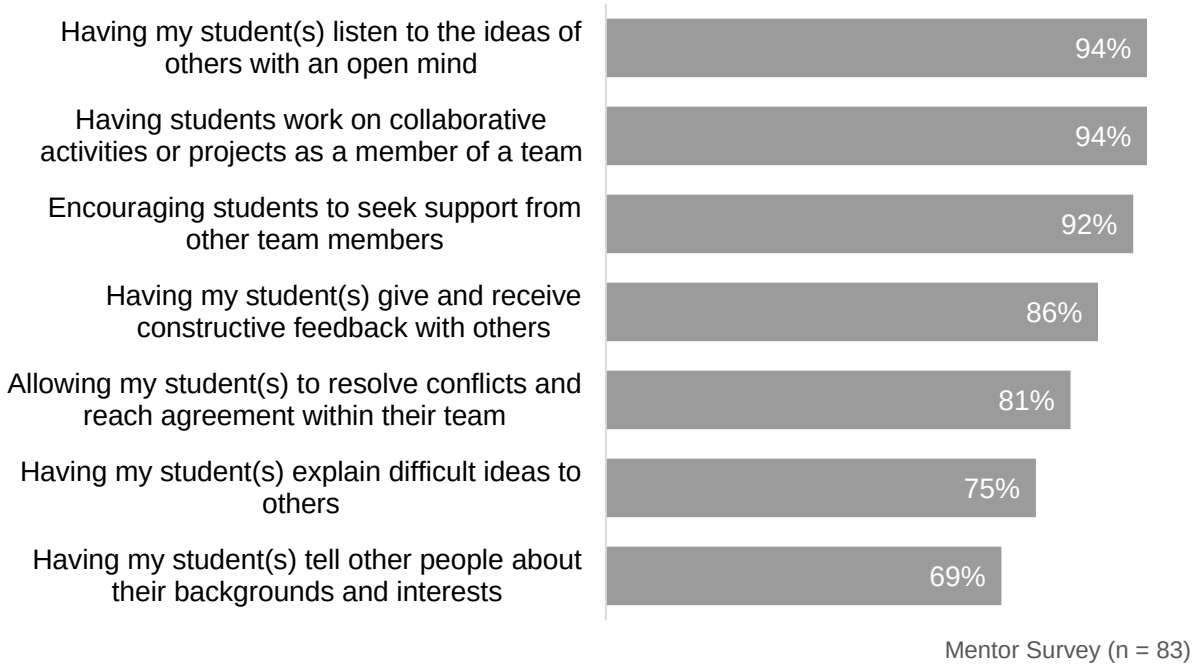


Mentor Survey (n = 82)

7.3 Supporting Student Development of Collaboration and Interpersonal Skills

Unite mentors fostered students' communication and interpersonal skills. Strategies identified by almost all Unite mentors were having students listen to ideas of others with an open mind (94%), having students work on collaborative activities (94%), and encouraging students to seek support from other team members (92%). Unite mentors were least likely to report having students tell other people about their background and interests (69%), but even here the majority of Unite mentors reported using this strategy.

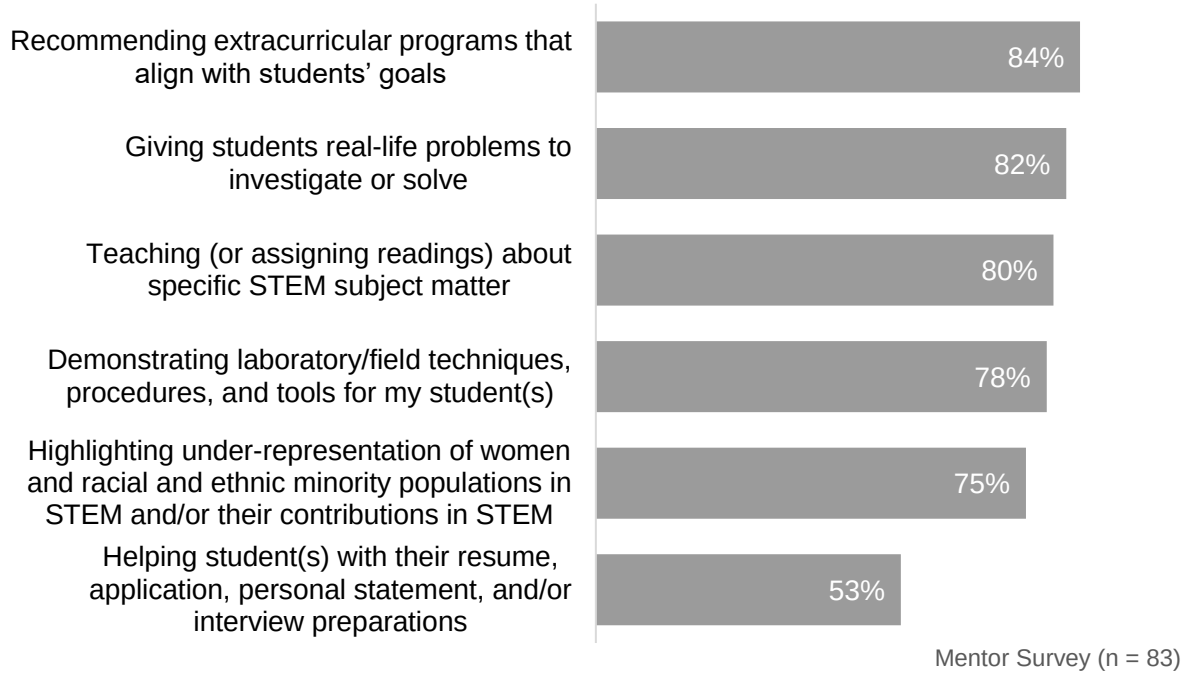
Figure 19. Mentors frequently fostered communication and interpersonal skills



7.4 Supporting Student STEM Activities and Educational Pathways

Unite mentors report a variety of strategies to support student engagement in STEM. The most frequently reported strategy was recommending extra-curricular activities that align with student goals (84%) (Figure 20). The lowest reported strategy was helping students with their resumes (53%), which most likely was not a major component of many Unite sites' programming.

Figure 20. Mentors reported using different strategies to support student engagement in STEM



8 Recommendations

This report distills findings across the student 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 Unite program; however, based on the results presented above, we offer the following recommendations:

Programmatic Considerations

- **Continue to offer hands-on, authentic, relevant research experiences.** Research shows these kinds of experiences are important to developing and sustaining students' interest in STEM education and career pathways.
- **Encourage work with STEM researchers and companies on real-world projects.** While slightly more than one-half of Unite mentors reported that this type of collaboration was undertaken, nearly one-half did not. Given the desire for additional outside speakers expressed by participants and mentors alike, more collaborative real-world experiences for a greater percentage of participants and mentors would be consistent with both practice and interest.
- **Improve opportunities for Unite students to develop skills in data analysis and interpretation.** Unite student and mentor reported relatively smaller gains in important data analysis practices such as considering multiple interpretations and identifying limitations of methods or data collection tools.
- Increase focus on Army/DoD STEM research activities. Increasing the focus on Army/DoD STEM research could potentially improve the number of Unite students meeting the AEOP goals of increasing student appreciation of Army/DoD research and increasing student interest in Army/DoD STEM careers.
- **Consider ways to bring mentors together to exchange promising practices, successes, and lessons learned.** Mentors play an important role in Unite. Most mentors shared that they are engaging in meaningful ways with student participants. When asked about ways to improve AEOP, mentors frequently expressed a desire for instructional materials. Peer learning opportunities would allow them to share effective strategies, resources, and tools.
- **Explore ways to improve awareness of various AEOP resources, including printed materials, the website, and other social media.** Although students reported that in-person resources like invited speakers and career events were helpful, they were less likely to say the same about printed and online media.